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Message

The Biomedical Engineering Department of the Rajalakshmi Engineering college, widely and popularly known as REC is organizing a two-day International Conference RIBE2023 in Hybrid mode during July 27-28. The conference provides for the following tracks as mentioned in the call-for-papers brochure.

- Track-1 Biomedical signal processing
- Track-2 Medical imaging and processing
- Track-3 Biomedical instrumentation
- Track-4 Rehabilitation and Artificial organs
- Track-5 Biomechanics and Robotic for healthcare
- Track-6 Non-invasive technologies for diagnosis and therapy
- Track-7 IoT based assistive technology for healthcare.
- Track-8 Nano and micro: 3D structure and imaging

Currently, the above topics are actively pursued and progressed by research and innovation in academia and healthcare industry and will form the basis for advances/solutions. We will be witnessing many patents, startups, and new improved medical devices. Many recent developments in Digital India are having large scale positive societal impact touching and improving the quality of life; the field of Biomedical Engineering with high potential offers interesting challenges and possibilities. It is interesting to note that the above tracks draw upon advances in other fields of R&D including Nanotechnology, Nano and smart materials, computational science (Machine Learning, Deep Learning, Artificial intelligence), networked-devices, sensors, to name a few. It is therefore imperative that professionals and students prepare themselves for both breadth and depth by rapid continued learning.

RIBE'2023 is timely and will provide an excellent opportunity for students, faculty, industry and medical professionals to interact by sharing experiences and strengthening the network for future joint collaborative pursuits. Hearty congratulations to the faculty and the UG/PG students of the Biomedical Engineering Department of REC in organizing RIBE2023. Welcome to REC and Greetings to all the participants, delegates, resource persons and invited speakers.

Wishing you all a successful conference.

Dr C. R. Muthukrishnan
Advisor, REC
18-7-2023

PREFACE

Welcome to the International Conference in Research and Innovation in Biomedical Engineering RIBE2023. In the recent past, there are lot of research and developments happening in medical instrumentation and devices. These equipments are periodically updated with technologies like digital miniaturization, automation, remote access etc. In this aspect RIBE2023 provides a platform to bring in various expertises working in biomedical related science and technologies.

Research and Innovation in healthcare not only help in better diagnosis and treatment but also improve the life quality especially among physically challenged people. In globally connected times, it is much more essential to know the technological updates and present clinical requirements. So this conference has now attracted 200 papers from research organizations in India and overseas. We had reviewers from reputed institutes and research organizations. We have also imminent keynote speakers and invited papers from subject experts.

The various sessions of this conference will discuss topics related to bioinstrumentation, assistive technologies, modelling informatics, information technology, signal and image processing related to biomedical applications. The papers range from research short communication to review the state of art.

I, on behalf of the entire RIBE Team express my sincere gratitude to all our participants, reviewers, panel members, keynote speakers, students and faculty members belonging to various committees. It is our pleasant duty to acknowledge the financial support extended by the management REC.

Dr R. Kalpana
Chair- RIBE 2023

Foreword

On behalf of the management Rajalakshmi Engineering College, Chennai, I extend my warm welcome to the department of Biomedical Engineering, Rajalakshmi Engineering College, Chennai. In the beginning of academic year 2023-24, this conference unites academicians, industrialist, and clinicians in terms of research and innovation for betterment in healthcare sector.

As our country is marching towards digital India and Make in India, conference like this will ignite young minds to apply their engineering skill in the right direction, Also any contribution in healthcare sector will directly improve the life style as well as have huge societal benefits. This conference particularly encourages the knowledge sharing in the latest development in medical devices, between the young researchers with most established research institutions, industries and hospitals.

I also feel happy to note the overwhelming response to this conference which has attracted around 200 research papers, out of which 145 papers were shortlisted for presentation. The proceedings of this conference will provide the world with an excellent reference material. I wish this event to happen annually and hope RIBE 2023 will be a grand success.

I also extend my heartiest congratulation to the department of BME in taking huge efforts and making this event a reality.

Dr S. Rajkumar
Convenor
RIBE2023

Proceedings of International Conference on Research and Innovation in Biomedical Engineering (RIBE 2023)
27 – 28 July 2023

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The Empirical Comparison of Deep Neural Network Optimizers for Binary Classification of OCT Images

Loganathan R[1] and Latha S[1]

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To determine the optimum solution to a problem, optimizers are employed in a variety of subjects, including statistical analysis, mathematics, and computing. For the past few years, the Adaptive Moment Estimation, sometimes known as Adam, has been more popular for use as an optimizer in deep learning models. It's effective and uses minimal memory. It intuitively combines the "gradient descent with momentum" and "Root Mean Square Propagation (RMSP)" algorithms. The primary goal of this study is to find which optimizer delivers the minimum loss and maximum accuracy in the training and testing phase of a CNN, DNN, and VGG16 models for binary classification of normal vs AMD on the optical coherence tomography (OCT) image dataset. SGD, SGD with momentum, Agadrad, Adam, and RMS prop are the optimizers under investigation at different learning rates. Optimizing the learning rate and other hyper-parameters enhances the deep learning model's accuracy and loss according to experiments. Thus, the results demonstrate that the Adam optimizer provides superior performance over all optimizers. The Adam optimizer could train all binary convolutional neural networks based on these results.

Keywords: *OCT images, Image classification, loss, accuracy, Optimizers, deep learning.*

A Cross-Domain Recommendation System for Medical Diagnosis

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More customization than ever is available forthe recommendation system. Unfortunately, it has problems with data sparsity and cold start. A promising and workable method called Cross Domain Recommendation (CDR) has been put forth. Based on the shared traits of the patients in the source domain, it offers suggestions in the Target domain. Cross-domain recommendation system transmits information from Source Domains with sufficient data for modelling to enable prediction in Target Domains in order to address this issue. Expert knowledge databases and diagnosis case databases contain useful information for the creation of cross-domain recommender systems that aid doctors in identifying the dangers connected to various diseases. Knowledge transfer between the source and consumers was made possible by the development of collaborative matrix factorization. The collaborative Filtering and Content -Based Filtering approaches are used in the Recommendation System. The goal of collaborative filtering is to identify patterns in the patient's disease and provide the patients with predictions based on other patients who have a similarrecommendation based on patient's common similarities. Recommendation System make use of these methods SVM -(Support Vector Machine), BPNN- (Back- Propagation Neural Network), ID3-Decision Tree. Root means square error (RMSE), Precision, Recall, F-score and Accuracy are calculated by using the three methods. Comparing with these three methods, SVM modelhas a good accuracy of 95% and 0.74 second running time, So SVM is identified as the best result for its high accuracy, good efficiency and scalability.

Keywords: ruggedization, medical device, indigenization, product development, MIL-STD-810G.

Early Breast Cancer Categorization and Diagnosis Based on Deep Learning and Transfer Learning Employing Imaging Modalities: A Survey

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Breast cancer (BC) is the subsequent most prevalent condition in women to cause death, and it has an elevated death rate. Its effects will be reduced if diagnosed early. Early detection will lessen its impact. Early discovery of BC may motivate patients to receive quick surgical therapy, which will significantly improve the prognosis and likelihood of recovery. Gene mutation, changes in size, and breast skin texture are indicators of BC. Symptoms must be carefully investigated to offer appropriate patient care, and an automatic prediction system that can classify tumors as benign or malignant is required. This study's primary contributions are an examination of significant issues with BC diagnostic and classification approaches and a summary of recent research articles used to determine. Deep learning is increasingly showing promise for use in a variety of categorization and prediction applications, including breast imaging. Convolutional neural networks were widely used to build a successful breast neural networking-based cancer classification algorithm that may be able to tell if breasts are healthy or cancerous. This review focuses on BC classification by using medical imaging multimodalities through state-of-the-art artificial deep neural network approaches. Deep learning-based methodologies are popular today; thus, this paper examines and summarizes some key deep learning studies. It is anticipated to maximize the procedural decision analysis in different aspects, such as types of imaging modalities, anatomy of breast, types and stages of BC, types of deep neural network, and deep transfer learning model, used for BC classification.

Keywords— *Breast cancer, Breast anatomy & Breast cancer types, medical imaging modalities, Deep-learning, convolutional neural network, Transfer-learning.*

Enhanced Brain Structure Segmentation in Schizophrenia MRI using Bias Correction and Optimization

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Schizophrenia (SZ) is a complex mental disorder that has a significant impact on individuals. Magnetic resonance imaging (MRI) is a commonly used tool to investigate structural abnormalities in the brains of individuals with schizophrenia. The accurate segmentation of MRI images can be challenging due to artifacts like magnetic field inhomogeneity. The main objective of this work is to find the effective method for estimating bias fields, which will improve the accuracy of image segmentation in individuals with schizophrenia. The performance and comparison of two techniques, Multiplicative Intrinsic Component Optimization (MICO) and non-uniformity correction using Brain SUITE for bias correction are used, aiming to enhance the accuracy of MRI image segmentation. Following bias correction, the Firefly, Partial Swarm Optimization (PSO) algorithms are employed to segment regions of interest (ROIs) including gray matter (GM) and ventricles. Through a comparative analysis, our goal is to determine the best combination of bias correction and segmentation algorithms to accurately identify brain structures affected by schizophrenia. The evaluation focuses on assessing the accuracy and robustness of the segmentation results obtained using this framework. The findings of this research contribute to the advancement of image processing techniques in schizophrenia research, by refining the bias correction process and evaluating various segmentation algorithms. With this the aim to improve the accuracy and reliability of identifying relevant brain structural abnormalities in the disorder has been achieved using MICO with PSO combination. This, in turn, enhances the understanding of neurobiological mechanisms underlying schizophrenia and potentially support the development of targeted treatment approaches. Quantitative and Qualitative analysis have demonstrated the performance of proposed work in terms of Structural measures like Structural Similarity Measures (SSIM), Feature Similarity Measures (FSIM) and Accuracy.

Keywords— *Schizophrenia, Image segmentation, Bias correction, Multiplicative Intrinsic Component Optimization (MICO), Non-uniformity correction, Brain SUITE, Firefly, PSO.*

Sombor Index on Antiviral Drugs

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Today's world is struggling with a number of infectious diseases and pandemics. These diseases brought on by bacteria, viruses, fungus, or parasites are affecting people at an alarming rate. The area of molecular topology, whose development has a significant impact on the field of drug design and discovery, deals with the algebraic description of chemical compounds, which enables a distinctive and simple characterization of them. In terms of topological indices, molecular topology is one of the most often utilised applications. In this article, we examine the Sombor Index, a molecular descriptor of several antibacterial medications, including Amoxicillin, Ampicillin, Tetracycline, Doxycycline, Cefalexin, and Ciprofloxacin, which are used to treat bladder infections, rickettsial infections, pneumonia, bronchitis, and other respiratory tract infections.

Key Words— Degree, Distance, Drugs, molecular structure

Design of an Intelligent Power Station to Charge Portable Medical Devices Using Raspberry Pi and Qi-Wireless Charger

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In the current scenario, the world is moving with many new and advanced technologies in the Technology field. So, we have chosen an important project of making a Smart Power Station using Raspberry Pi – 3 and QI Wireless Charger to do some creative and innovative systems. The smart power Station is used to charge portable medical devices without the use of wire. It is very easy to carry, does not involve any wire, and shows us how much power we have consumed for charging our gadgets. It is the new way of charging our devices. As this idea is new and very advanced it will be very useful for us to use this the public hospitals and medical camps where people are more, and we can consume the usage of power supply without any wastage of power. This project's main idea is to ensure that electricity should be conserved as much as possible, and that the consumer should have clear-cut clarity about the power, he has consumed to charge his gadget. The proposed system is going to include a Qi- Wireless charger interfaced with Raspberry pi-3. Our idea is to build a smart power station that has the ability to measure the amount of voltage consumed by each sub-station.

The term "portable medical device" refers to a variety of clinical, homecare, and point-of-care healthcare equipment that is small, light, and transportable. These gadgets are created especially to offer medical monitoring, diagnoses, therapy, or assistance to those with medical disorders or who require medical care. With the aid of this intelligent power station, we can wirelessly charge portable medical devices like nebulizers, wearable health trackers, and pulse oximeters.

The suggested system will have a Qi-Wireless charger connected to a Raspberry Pi 3. Our plan is to construct a smart power station with the capacity to gauge the voltage each sub-station uses. The LCD display will show the results of this data analysis. All of the sub-stations will be connected to a single Raspberry Pi-3, and each sub-station will receive a different supply. By real-time data monitoring, real- time reporting on the status of the charging process, user interaction, integration and control, customization and flexibility, etc., this interface enables us to accomplish a wide range of applications,

including power management. A single Qi-wireless charger that is connected to a power source is included in each sub-station. The Raspberry Pi 3 is used to connect a smart power station to an LCD.

A wireless charger is a gadget that utilizes inductive charging technology to charge appliances. The STWLC68 model is the one we'll utilize for this. A highly integrated wireless power transmitter/receiver IC is called the STWLC68. Advanced power management capabilities like voltage regulation, current control, and thermal protection are offered by this IC.

This device adheres to the I2C communication standard, a well-liked serial communication protocol with a number of benefits. This reduces the number of communication pins needed and simplifies the hardware requirements. I2C reduces the number of pins needed for communication by only requiring two lines of communication (SCL and SDA).

Block Diagram:
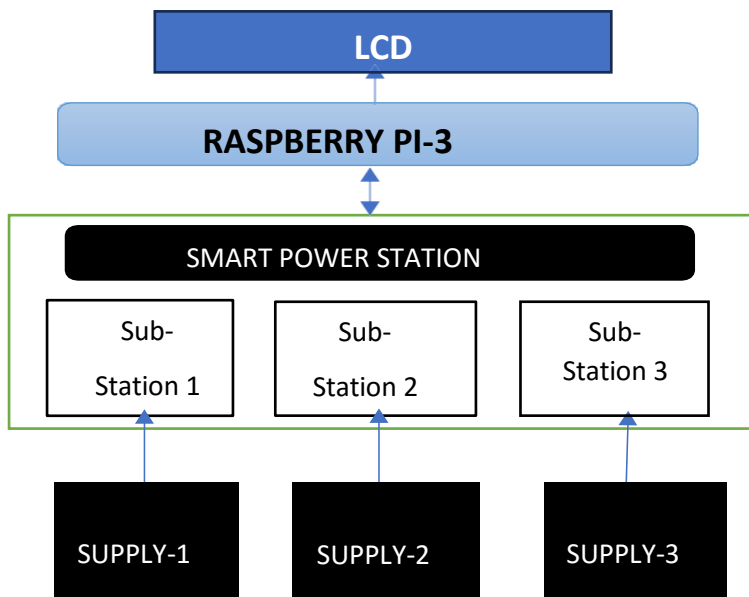
Smart power station can contain any number of sub-stations as needed. If the power station is going to incorporate 4 sub-stations, then we will need 4 wireless chargers and

independent supply for each charger. In order to interface the 4 wireless charger with the raspberry pi-3, multiple GPIO pins must be used. Each wireless charger must be given two connections one is for power and the other is for communication.

Above is the pin connection explanation for a single wireless charger connected with a raspberry pi3. If we need to connect multiple chargers the above procedure must be followed for each charger, whereas the connection for LCD remains the same.

A Survey among Dentists to Investigate the Cement Residues during the Cementation of Prostheses and their Role in Peri-Implant Disease

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A survey was conducted to investigate the type of cement used during the cementation of implants and the detection of cement residues to avoid peri-implant disease. The survey included questions regarding dental cement, residues of dental cement, and the detection of cement residues. The frequency of several factors associated with dental cement residues and peri-implant disease was analyzed using multiple response factors. Descriptive statistics were also carried out with a significance

CIRCUIT CONNECTION
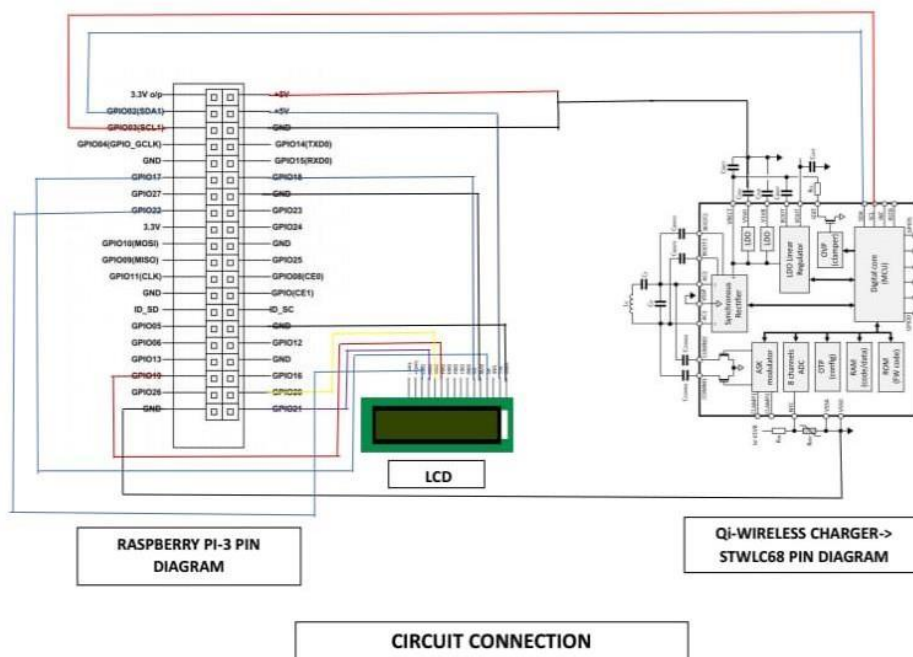
of $p < 0.05$. A total of thirty dentists submitted the questionnaire after three weeks. Nearly 50% of dentists favored dental cement for the permanent restoration of the implant. A significantly higher number of dentists, about 70%, recommended Glass Ionomer Cement (GIC) as the most used dental cement. 46.7% had concerns about the working and setting time of the GIC. When asked to specify the concern, 70% of

participants wrote a response, and 30% did not answer. Nearly 56.7% of the dentists declared that only a partial amount of cement residues could be removed, and 20% were unable to detect and remove the cement residues. Excess cement residues are often undetected and lead to peri-implant diseases. Hence changes can be made in the cement material properties to make it tangible in the gingival and sub-gingival regions post the cementation procedure.

Keywords: *dental cement; glass ionomer cement; dental bonding; restorative dentistry; excess cement residues; fixed prosthetics.*

Wearable Textile based Hexagonal Microstrip Antenna Design with Edge Cuts for ISM Band

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Due to its low dielectric constant or relative permittivity characteristic, the wearable antenna's design is suitable. The design of wearable antenna for 5.7GHz (ISM) band applications is discussed in this paper. The conductive and ground planes are made of copper & textile material respectively. Here, textile material serves as insulation between the human body and the antenna, and copper serves as a conductor. In order to increase the antenna's dependability, micro strip probe feeding was used in the design of proposed antenna. By measuring the antenna's reflection coefficient and radiation pattern, performance is evaluated. Numerous applications utilizing micro strip textile antennas will be addressed in this paper.

Keywords: *Wearable antennas, ISM band, HFSS simulator, Copper and textile, probe feeding, slot.*

Phase Locking Value Based Classification of Cognitive Impairment Using Svm Algorithm from Resting State Eeg Signals

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[2]Fortis Malar hospital, Chennai, India

Electroencephalography (EEG) is a non-invasive way of assessing brain activity through the measure brain signals. This is widely used for understanding cognitive skills and associated dysfunction by external stimulus like light, audio, physical and mental activity. Attempted in this work is to identify cognitive impairment (CI) through 16-channel resting state EEG obtained from 70 volunteers. Since CI is associated with physiological and psychological changes in brain, the relevant features are extracted through algorithms like phase locking value (PLV) and band power estimation. Support vector machine (SVM) architecture is designed with kernel radial basis function (RBF) to make binary classification. The result of the study demonstrates that the classifier is able to distinguish EEG signals with an accuracy of 85.71%. For the tasks used in this study, 12 EEG channels (that are relatively more active are selected) by this way the feature set is reduced by 25%, and subsequently SVM gives the same classification accuracy as 85.71%. With this the proposed method yields better accuracy when compared with the contemporary research work.

Keywords: Phase locking value; Resting state EEG; Support vector machine; Cognitive impairment; Band power.

Design of Self-Powered Wheelchair with Piezoelectricity

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INTRODUCTION

This paper presents an eco-friendly, affordable electric wheelchair using piezoelectricity [1]. It aims to provide a low-cost solution for individuals with disabilities, reducing complexity and weight. With a single motor, the wheelchair can move in both forward and backward directions. The project focuses on designing a piezoelectric mobility aid for the physically challenged, addressing the crucial issue of their mobility.

The integration of piezoelectric materials in wheelchair design offers promising potential for enhanced functionality and energy efficiency. These materials generate electric charge when subjected to mechanical stress, enabling the conversion of wheelchair movement into electrical energy [2]. By substituting batteries with piezoelectric materials, costs can be reduced, and electricity consumption minimized. Advantages include reduced weight, lower carbon footprint, and decreased operating costs.

Implementation involves attaching piezoelectric sensors to tires and connecting them to batteries to power the motor. Expertise in materials science, electrical, and mechanical engineering is required. Overall, this project has the capacity to revolutionize wheelchair design, providing more affordable and sustainable options, thereby improving the lives of wheelchair users.

1.   MATERIALS ANDMETHODS

The piezoelectric wheelchair project involves several key steps. Initially, thorough research is conducted to understand the principles and potential applications of piezoelectric materials. The design phase includes planning the wheelchair's incorporation of piezoelectric elements, sensor placement, and circuit integration. The appropriate piezoelectric material is selected, such as PZT or PVDF.A3D model of the entire structure is designed before the implementation [2] [fig2.1]. Sensors are integrated to detect mechanical stress, enabling the generation of electrical signals.

Electronic circuits with rectifiers, voltage regulators, and energy storage devices are employed for signal processing and energy conversion [fig2.2]. The prototype undergoes testing and evaluation to assess its performance, efficiency, and usability. Iterative design improvements are made based on evaluation results. Once the desired performance is achieved, the final design is documented with technical specifications and operating instructions. This documentation serves as a reference for future replication. Overall, the piezoelectric wheelchair project aims to incorporate piezoelectric materials into the design and function of wheelchairs, improving their energy efficiency and usability for individuals with disabilities.
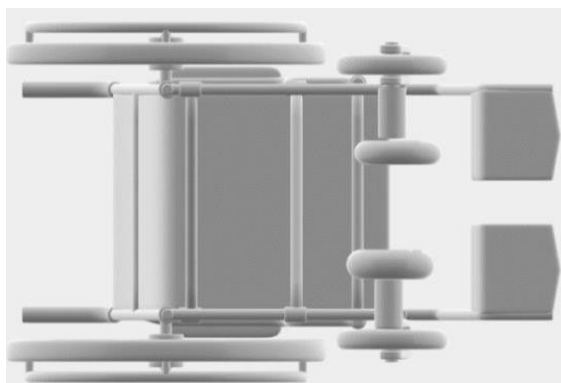
Fig 2.1a 3D model of the piezoelectric wheelchair (Bottom view)

Additional wheels with Piezoelectric sensors

Fig 2.1b 3D model of the piezoelectric wheelchair (Lateral view)

Fig 2.2 The flow chart explains how the piezoelectricity obtained from the mechanical pressure produced in the wheels is used to run the motor.

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┌─────────────────────────────────────────────┐
│   Piezoelectric sensor attached to the wheel │
└─────────────────────────────────────────────┘
                      │
                      ▼
┌─────────────────────────────────────────────┐
│        Pressure exerted on the wheel         │
└─────────────────────────────────────────────┘
                      │
                      ▼
┌─────────────────────────────────────────────┐
│   Mechanical to electrical energy conversion │
│         by piezoelectric materials           │
└─────────────────────────────────────────────┘
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                      ▼
┌─────────────────────────────────────────────┐
│    Storage of electrical energy in battery   │
└─────────────────────────────────────────────┘
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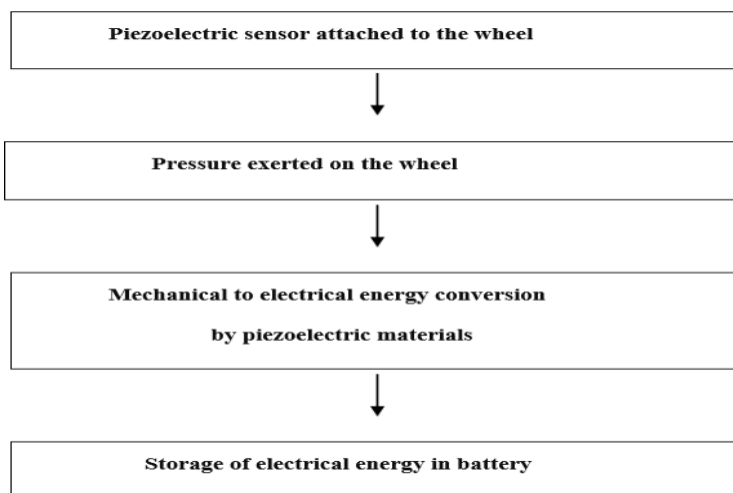
RESULTS AND DISCUSSION

The power generation circuit for the piezoelectric wheelchair was simulated using Multisim software to obtain the desired output [4] [fig 3.1]. The integration of piezoelectric materials into wheelchair design offers a promising solution for creating more affordable and sustainable options. Byreplacingtraditionalbattery-based power systems, piezo electric materials can convert mechanical energy intoelectricalenergy, providing a constant and renewable power source that requires minimal maintenance or replacement. This innovation has the potential to significantly reduce costs, making wheelchairs more accessible to a largerpopulation.

Piezoelectric materials are renowned for their ability to generate electricity when subjected to mechanical stress or pressure. This property enables them to produce a voltage that can be used to power a motor. By incorporating this technology into wheelchair design, a more reliable and sustainable power source can be achieved, eliminating the need for frequent battery changes.

Furthermore, the use of piezoelectric materials contributes to eco-friendliness by reducing reliance on batteries. This reduces the production and disposal of hazardous battery components, resulting in a smaller environmental footprint.

Overall,the integration of piezoelectric materials in wheel chair design offers an innovative and sustainable approach to power generation, improving affordability and environmentalimpact.

15

Number of piezoelectric sensors (in each tire)	Voltage output
1	3V
2	6V
3	9V
4	12V
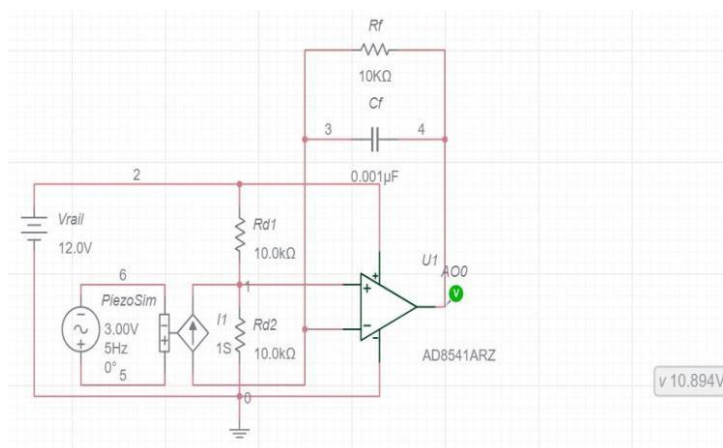
Fig 3.1 Multisim output of the power generation circuit

2. CONCLUSION

Piezoelectric materials in wheelchairs offer affordable mobility, reduced electricity consumption, and increased independence for users. They generate electricity from wheelchair movement, eliminating the need for expensive batteries and reducing environmental impact. Lightweight and durable, piezoelectric wheelchairs enhance manoeuvrability and reduce maintenance. This innovation is especially beneficial for those with limited financial resources, revolutionizing accessibility, and sustainability.

The future scope of this project is to develop the design into a fully functioning prototype with the reference from the outputs obtained from the 3D model [fig2.1] and the Multisim software [fig 3.1].

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RSAS—Rendezvous-Specific Authentication Scheme for Reliable Internet of Things Service Sessions in 5G

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Internet of Things (IoT) grants ubiquitous access to resources and services through the heterogeneous interconnection of intelligent "things." The IoT platform is open to different users, both legitimate and illegitimate, with security features. The common issue is the unpredictable service intervals for administering security. In this article, Rendezvous-Specific Authentication Scheme (RSAS) is introduced for mutual service authentication. The proposed scheme performs local decision-making through repeated service interval time analysis. In this analysis, the admitting user/ device and the service provider's agreement time and the service interval are recurrently verified. The eccentricity in either of the interval results in terminating the session with user verification. The intervals are secured using secret key authentication; further verification and key generation rely on the rendezvous sessions—this helps to condense the session disconnection, authentication complexity, and false positives.

Key Words— *IoT, Machine Learning, Mutual Authentication, Secret Key, User Verification.*

IOT-Based Saline Level Monitoring and Automatic Alert System Using Load Sensor

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[2]*Department of Artificial Intelligence and Data Science, Saveetha Engineering College, Chennai, India*

The research paper proposes an IoT-based solution for monitoring saline levels in intravenous IV fluid bags, ensuring patient safety and efficient treatment delivery. The system uses a load sensor to monitor saline levels in real-time, automatically alerting healthcare providers when levels become critically low. This system improves patient care by enhancing the efficiency and accuracy of saline-level monitoring.

Key Words— *load sensor, IoT-enabled microcontroller, cloud server.*

Saliva-Based Microfluidic Biosensor, A Non-Invasive Monitoring Tool for Oral Cancer

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Saliva, a multi-constituent oral fluid, acts as a potential diagnostic tool due to its ease and non-invasive accessibility. Its abundance of biomarkers includes hormones, enzymes, antibodies, antimicrobials, and growth factors. All major compounds found in blood are also detectable in saliva. The development of biosensors has enabled an invasive to non-invasive approach. Here microfluidic biosensor was theoretically reviewed for diagnosing oral cancer. Microfluidic biosensors are miniatured analytical devices used to detect the desired biomolecules. Since it's tiny and compact, can be used for rapid and continuous measurements with high specificity and minimum usage of reagents. In the current study, interleukin-8 has been chosen as the desired biomarker to detect oral cancer, and simulation studies were carried out. The binding kinetics of antigen-antibody has been investigated in 2D and 3D. The model was simulated by various parameters like antigen concentration, polymer profiles, reacting surface design, and length using COMSOL MultiphysicsTM software.

Key words—*Microfluidic biosensor, Oral cancer, Saliva, Interleukin-8.*

Smart Farming to Diagnosis Disease in Pear Using Machine Learning

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Effective plant growth and yield enhancement are critical given the rising demand in the farming sector. Uneven climatic conditions are having an impact on crops, which reduces agricultural productivity. The world agriculture economy is impacted by this. Furthermore, when crops contract a disease, the situation gets even worse. Also, a growing population puts pressure on farmers to boost production. In order to detect and prevent this, sophisticated agricultural techniques and systems are required to keeping certain diseases from infecting the crops. that work, we provide the website-based app that useful for people to upload pictures of the damaged fruit, assisting them in identifying fruit illnesses. A trained dataset of image data for the pear fruit already exists for the system. The input photo from the user must go through a number of processing steps before it can be compared to pictures from the trained dataset to determine how severe the sickness is. The input photo from the user must go through a number of processing steps before it can be compared to pictures from the trained dataset to determine how severe the sickness is. Once the image has been shrunk in size, the features are next grouped using the k-means techniques are extracted based on factors like colour, shape, and CCV. The picture is subsequently examined for infection using SVM. A highly beneficial intent search approach is offered to help in determining user intentions even more. Wediscovered that by applying shape, among the three recovered features, we had the best results. In 82% of the python programming language experimental trials, the suggested technique correctly and reliably acknowledged pear sickness.

Keywords: *color, shape, hue coherence vector; SVM; k-means algorithm; intent search; Genetic algorithm.*

Smart Baby Warmer

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One of the most significant and delicate areas of treatment in the biomedical profession is preterm newborn care. To acclimatize to their new world, preterm infants need a setting that is identical to the womb. To some extent, the neonatal incubator can provide a level of temperature to an extent in which the preterm has some condition as in the womb. Air temperature must be maintained as it requires for a preterm baby. Measurement of air temperature can be done and under the risk situation depending upon temperature, the concerned person can be informed via GSM technology. And weight is one of the most crucial health indicators of a preterm newborn baby. A premature infant in an incubator should begin gaining weight a few days after birth because their average weight is around 1 kg lower than that of a newborn. So, it is important to regularly check on the body weight of premature neonates. The major goal of this project is to develop the on/Off control system, which is used to control the temperature distribution inside the incubator in order to keep the baby's stable and normal state inside the incubator at the target temperature of 36 degrees Celsius. The incubator can regulate the surrounding temperature, keep the infant's body temperature within normal ranges, and weigh the infant.

Keywords: *Incubator, Temperature, Weight, Arduino, Infant, Global System for Mobile Communication (GSM).*

Wearable Bionic Chair – An Assist Device for Long Standing Industry Workers to Avoid Varicose Veins

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Varicose vein is of the major causes in many human beings. Varicose vein is the common disease, which affects the blood circulation of the vein. The main factors of varicose vein are that, in manufacturing industry, people who are doing their work by standing in assembly line for long hours which develop stress and fatigues. The proposed project gives support to the person who faces the above stated problem, and it will lend support to such persons who works by standing for prolong period. In the manufacturing sector, with the Wearable Bionic chair, the user can walk with the fitting and can move anywhere.

Keywords: *Varicose vein, Wearable Chair, prolong period.*

A Study on the Etiology and Biology of Anxiety, Stress and Depression

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The quality of life is determined by mental and physical health. It is found that about 197.3 million people in India have mental disorders. Mental health affects physical health and is often associated with cardiovascular diseases, diabetes, asthma, and arthritis. The most common and inevitable mental disorders are anxiety, depression, and stress. In this narrative review, we have focused on the etiology and biology of the above three disorders. It is evident that neurotransmitters play a huge role in the cause and effect of these disorders. The role of Serotonin, dopamine, GABA, and endorphins are discussed in detail. The psycho-social treatments are found to be effective in the initial phases of treatment.

Keywords: WHO, DSM, APA, Neurotransmitters, PD, MDD, DMDD, PDD, PTSD, GAD.

Development of Low-Cost Wireless Functional Near Infrared Spectroscopy System to Measure Hemodynamic Changes in the Prefrontal Cortex

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Functional Near-Infrared Spectroscopy (fNIRS) is an optical brain monitoring technique that uses near-infrared light to estimate cortical hemodynamic activity occurring in response to neural activity. The commercially available functional Near Infrared Spectroscopy systems are cumbersome, not completely portable, and pose many difficulties. This work is directed towards the development of a two-channel wireless functional Near Infrared Spectroscopy System that is portable, lightweight, less sensitive to motion artifacts and does not impose significant physical restraints. It is therefore appropriate to monitor a wide range of cognitive tasks across different age groups. This system has been subjected to validation by measuring the hemodynamic changes in the prefrontal cortex during cognitive tasks and various other conditions.

Keywords: hemodynamic changes, fNIRS device development, neuroimaging methods, OPT101, wireless, low cost

Natural Dermal Ointment

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In general, infections such as bacterial and fungal infections are caused by several factors. Wounds, rashes, allergens, itchiness, and we opt for ointments made from chemical sources. Prolonged usage of those ointments causes several side effects like skin irritation, allergies one of the majors being Contact dermatitis. Contact dermatitis is a common skin condition caused by exposure to irritants or allergens. The use of traditional remedies for skin ailments has gained popularity due to their effectiveness and minimal side effects. Kalanchoe pinnata is a well-known medicinal plant with anti-inflammatory and antimicrobial properties. The ointment was formulated using the extract of Kalanchoe pinnata. Kalanchoe pinnata is a succulent plant that is commonly used in traditional medicine to treat various ailments, including skin allergies. The plant has been found to possess anti-inflammatory, antifungal, and antibacterial properties, which makes it a potential candidate for the treatment of skin allergies. This abstract is to summarize the available evidence to back our novel use of Kalanchoe pinnata blend as a lotion against skin allergies.

Keywords— *Contact Dermatitis, Allergens, Skin Allergy, Irritants*.

Neuronal Communication: Exploring the Nature of Nerve Impulse

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The Human body is a complex system which has many abilities and capable of doing many functions, and it is also considered to be the most intellectual system compared to all other living species. The human system which composed of multiple subsystems and each individual system are responsible for unique tasks such as enzyme production and management, physical balance, thought process, visualizing, etc. Each of the individual subsystem are interconnected with each other in order to work as one whole system. All these subsystems interlinked with the help of nerves, which serves as the communication channel for the whole human anatomy. These nerves are the pathways which help in transferring the signals which are produced by the Central Nervous System (CNS), the nervous system consists of Neurons of various types, which forms a specific pattern also referred as the neural circuits, each neural circuits specific pattern based on the nature of the information. While considering the signals that are produced by the brain, also referred as the nerve impulse or brain signals sometimes. These nerve impulses were invented as a result of various groundbreaking experiments done by various scientists during earlier times. And after some intense experiments it has been concluded that the nerve impulse which is solely an electrical signal which is sent from brain to other parts of the body, but during latter stages many scientists also found some evidence which pointed out to a conclusion where these electrical signals are also accompanied by various other factors, such as mechanical, optical and thermal factors. This paper mainly focuses on the nature of the nerve impulse and also the other accompanying factors which are also responsible for the transmission of nerve impulse.

Keywords— Neuronal communication, Nerve impulse, Neurons, Electrophysiology, Neuroscience, Central nervous system.

A Systematic Approach: An Assessment of Cardiovascular Fitness Using Stress Test Protocols

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With the evolution of generation and boom of economy, people's dwelling fashion has progressively modified from Active-lifestyle into Sedentary-life-style. According to statistics, the ratio of college students accomplishing ordinary exercising has been declined with the growth in education. Under the long-term scarcity of exercising, young adults generally can't expand ordinary exercising conduct as quickly as feasible which has in a roundabout way cause the lower in age of getting persistent cardiovascular diseases. Cardiopulmonary exercising testing (CPET) has come to be a critical scientific device to assess exercising capability and predict final results in sufferers with coronary heart failure and different cardiac conditions. It gives evaluation of the integrative exercising responses regarding the pulmonary, cardiovascular and skeletal muscle systems, which aren't accurately meditated thru the dimension of man or woman organ gadget function. CPET is being used more and more in a huge spectrum of scientific programs for assessment of undiagnosed exercising intolerance and for objective willpower of practical capability and impairment. A vital set of physiological indicators, including heart rate (HR), blood pressure (BP), and rate pressure product (RPP), may be used to study the physical state of the human body. However, this work has provided a step-by-step analysis of the changes in RPP and ECG waveforms before and after regular exercise. The aim of this research focuses into how ECG waveforms change after standard physical activity. After a 12-minute Running exercises during a span of five weeks with 10 healthy participants, RPP effects may be determined based solely on HR and SBP. The restoration of HR, which is the main evolution parameter of cardiovascular fitness, is determined in these observations based on the typical 5 weeks of exercise.

Keywords— ECG, HR, RPP, BP, CPET, Sedentary lifestyle.

IoT Enabled Healthcare System for Scheduled Medicine Dispensing and Reminder

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To make medical diagnosis and treatment easier, the recent increase in technology has been used in the field of health care. For the ailment to be treated, the drug must be taken at the appropriate time after treatment. Patients frequently forget to take their medications at the proper times, and other people have skipped taking their medications due to their hectic work schedules. The suggested method aids such individuals by alerting them in accordance with a timetable and distributing the medication to the disabled person in question. A smart medicine box that is intended to assist patients in taking their pills on time makes up the suggested system. The "automatic opening and closing of the box" and an alarm so that the required person can take the prescribed drugs on time are the major components of the suggested model. The system's ability to "store the data" in the cloud allows patient carers the ability to examine and program the medicine box in accordance with a doctor's medical prescription. The caretaker will be alerted through SMS alert if the patient under their care forgets to take their medication even after it has been administered, and they can then physically remind them.

Keywords: *IOT, Health care system, medicine dispenser, Medication reminder.*

Harmonic Injection Based Hybrid Algorithm for Identification of Islanding in a Grid integrated PV System

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Renewable energy systems are penetrated deeply into the power system due to their economic and environmental benefits. Nowadays most of the remote areas are being powered with RES. During the autonomous operation of the distributed generation (DG), surplus amount of generated power is being wasted. In order to utilize the surplus power from the autonomous system and also to meet the shortfall in load demand at the DG side, grid integrated systems are being developed. Despite its benefits, synchronizing DG systems with the grid also brings about significant issues including the power quality and the occurrence of islanding states in DGs. It is mandatory to identify involuntary islanding quickly and to isolate the DG from utility grid. Because islanding may cause, the working personnel on the grid side to get exposed to electric shock and the equipment to get damaged if out of phase re-closure occurs. This paper proposes a hybrid Islanding Detection Strategy (IDS), with THD as passive method and Odd Harmonic Perturbation (OHP) as active method is and their performances are being assessed. MATLAB 2023a software is used to simulate the proposed algorithm. The obtained results show that the hybridized methods out performs well when compared with the conventional methods.

Keywords: Grid Interfaced Distributed Generation (GIDG), Islanding detection Strategy (IDS), Odd Harmonic Perturbation (OHP).

Simulation of Heart Rate Variability – A Neurophysiology Based Model in Comparison with A Nonlinear Network Oscillator Model

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Background and Objective:

ANS influences all vital organs which are involved in involuntary physiologic processes. Hence a sturdy and agile Autonomic Nervous System (ANS) is essential for the wellbeing of a person. In mammals, heart rate regulation is moderated by the ANS. Hence functional integrity of the ANS can be indirectly assessed by monitoring Heart Rate Variability (HRV). One way of understanding the heart regulation mechanism by the ANS is to build quantitative models.

Methods:

The quantitative model of HRV based on neurotransmitter kinetics developed by the authors is compared with a model based on nonlinear network oscillators. The comparison is based on the HRV parameters obtained on analysis of the simulated HRV by the models for three different autonomic states. The power spectrum and Poincare plot are selected for comparison. As the HRV features indicate the autonomic function of the person, these parameters have diagnostic significance.

Results:

Both the models have successfully reproduced key features of the HRV. The power spectrum and Poincare plots corresponding to both the models are presented pictorially along with those of original physiologic HRV data, and important features are estimated quantitatively.

Conclusion:

The HRV features generated by the physiologic model have a superior performance compared to the latter. This observation is quite straight forward as the model based on neurophysiology reflects the underlying biochemical reactions and gives immense flexibility for fine tuning the model parameters corresponding to various autonomic states while in the latter only coupling coefficient between oscillators are changed which can be done to a limited extent.

Early Detection of Oral Cancer using Deep CNN Classification Approach

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Oral cancer is one of the visible types of cancer, many of these types of cancer are preceded by potentially malignant lesions, and medical intervention can prevent the development of cancer. Overall, oral cancer offers an opportunity for early detection. One of his approaches to solve this problem is to develop an artificial intelligence algorithm that classifies oral lesions into early stages. This project proposes to assemble a library of images from existing and future collections. This facilitates the development of deep learning algorithms. Deep learning algorithms are tested and validated using automated tools and validated for early detection of oral cancer. This presented approach will help identify and treat these lesions, reducing mortality and the likelihood of malignant transformation. The proposed method applies a median filter to the input image to enhance it. The output comes from an enhanced image that has been applied to a morphological and fuzzy C-means clustering process, followed by a GLCM feature extraction process and a deep CNN classification method.

Keywords— *deep learning, CNN classification, oral cancer, artificial intelligence.*

HAP Nanomaterials Synthesis and Characterization from Fish Scales and Seashells for Biomedical Applications

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This research focuses on the biomedical applications of hydroxyapatite (HA) nanoparticles derived from fish scales and seashells. The HA nanoparticles were produced by chemical precipitation and then calcined at various temperatures. X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), and transmission electron microscopy (TEM) were employed to characterise the structural and morphological characteristics of the synthesised HA nanomaterials.

The nanocrystalline structure and purified phase of HA nanoparticles synthesised from fish scales and seashells were observed. The FTIR spectra revealed bands characteristic of HA, indicating that HA nanoparticles were effectively synthesised.

When analysed by SEM and TEM, the HA nanomaterials were discovered to be spherical and 20–100 nm in size. In addition to their high biocompatibility, the synthesised HA nanoparticles have potential applications in bone tissue engineering and drug delivery systems.

Detection of Missing Surgical Tools with Transfer Learning

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Surgical tools and equipment are essential to ensure successful completion of the surgery. However, there are instances where medical instruments go missing, which causes significant problems during the surgery. Additionally, missing of surgical tools inside the patient's body are accidents, seldom occur, but have severe consequences. To mitigate the risks posed by missing surgical tools in a surgical setting, we attempt to utilize a non- invasive computer vision-based image recognition and object detection approach to identify missing parts before and after the surgery. We utilize an existing dataset to train a transfer learning- based model. The developed model is then validated using a training-testing dataset to measure the precision of the developed model. We experimentally test the developed model with a different dataset and the findings are reported. The results indicate that the use of transfer learning-based models for computer vision-based image recognition and object detection is a suitable approach to mitigate missing of surgical tools. The impact of using such non-invasive effective methods to identifying missing tools will enable significant reduction in delays and anxiety among medical staff during surgery, also prevent missing of surgical tools inside the patient's body.

Keywords: *transfer learning, surgical instruments, object detection, image recognition, gossypiboma.*

A Novel on Lung Cancer Detection and Type Prediction using Computer Vision Technology

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Nowadays, lung cancer is found in most people. People can detect cancer from CT scans using computer vision and machine learning but detecting lung cancer does not indicate the risk of cancer, as there are different stages of cancer that result in different types of tumors with varying sizes and risks. This research work analyzed different types of tumor sizes such as (Large_cell_carcinoma, Normal, Squamous_cell_carcinoma, and adenocarcinoma). Also, are preprocessing the image for further detection and prediction of type by using the deep learning model of the Residual neural network (ResNet), which is the computer vision method have chosen is called Resnet, As a result, its deep layers can be used to detect and predict lung cancer by python tool box and results are carried out for the assistance to the medical doctor which is more easy to process the diagnosis based on AI technology.

Keywords: *Lung cancer - Deep learning model - Residual Neural network (ResNet) and AI Technology.*

A Hand Controlled Prosthestic Leg Movement for Hemiparasis

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1. INTRODUCTION

Stroke has become a common disease, often leading to motor dysfunction and even permanent disease. Lower-limb rehabilitation can help patients to carry out reasonable and effective training to improve the motor function of paralyzed extremity. In this paper, the developments of lower-limb rehabilitation is based on the hand movement. For this purpose, gyro sensor is attached at the hand based on the hand movement leg is controlled and this system monitors the health condition of patient and it upload to the web server with help of Internet Of Things (IOT).

2. MATERIALS AND METHODS

Arduino is a microprocessor device which controls sensors like gyro,blood pressure,temperature. When the power supply is transfered to arduino, it reads signal from the sensors and execute the signals into the LCD and drives the motor for movement. The working of sensor is based on the sense rotational motion and orientation changes.

3. WORKING MODEL
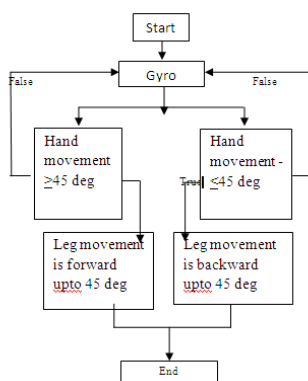
4. RESULTS AND DISCUSSION

In the previous system they use button for controlling leg. In our project we can control leg by our hand gesture with the use of gyro sensor which is placed on the patient's finger. It is also possible to monitor patient's temperature, blood pressure, temperature by using separate sensors. All data's will be stored in AURDIUNO controller. We can also upload the data's in IOT. We provide passwords to the responsible persons by using passwords the responsible persons get the details of the patient without being in physical contact with the person from distance.

5. CONCLUSION

A patient's rehabilitation regimen depends mainly on the severity of their disability. These exercises range from walking on a treadmill to the bending of their fingers. The patient can walk independently without seeking any help from others and also helps in the rehabilitation process during physiotherapy.

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Disease Prediction and Drug Recommendation using Machine Learning Techniques

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We live in such a hectic world that people don't even pay attention to their health when they are so busy. There are many people who are too busy at work to visit a doctor until their condition reaches a critical stage, due to the fact they are too busy at work. The behavior of this kind is unsafe for people and contributes to a large number of deaths every year because of it. In addition to that, they also take medicines without anyone recommending them to do so. The purpose of this paper is to predict the onset of the disease based on the symptoms of the individual. Moreover, it also recommends the drugs and specialists depending on the disease predicted by using the machine learning algorithms as well as recommending them based on the content-based algorithm based on the prediction. Through this project, we will be able to recommend a drug based on their age and level of activity, so that they consume fewer drugs as a result.

Keywords: Drugs, recommendation, prediction, machine learning, SVM, regression.

Detecting different types of Arrhythmia by using ECG Signals and Applying Machine Learning and DeepLearning Algorithms

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Heart diseases are one among the main causes of deaths within the world. Prediction ofdisorder could also be a critical challenge within the world of clinical data analysis. This will be contributedprimarily to the event within the classification and recognition systems utilized in disease diagnosis whichis during a position to provide data that aids doctors in early detection of fatal diseases and thus, increase the survival rate of patients significantly. Applying different classification algorithms, each with its own advantage. The results of the study strengthen the thought of the appliance of machine earning inarrhythmia. In our study we found out that linear and sigmoid SVM of 73.5% performs better, and wehave implemented manual grid- search for the different parameters like using different kernels andregularization parameters.

Key Words— Electrocardiogram (ECG), Support Vector Machine Machine Learning; Feature selection; cardiovascular disease (CVD); Arrhythmia.

Stroke Prognosis from Retinal Fundus Images using Local Binary Pattern Variants

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Stroke is one of the prime causes of adult impairment and mortality. For the detection of a wide variety of cardiovascular diseases such as stroke, retinal fundus images are examined. Exudates, occlusions, and other changes in retinal vasculature are frequently seen as a characteristic of stroke. In this research work, Local Binary Pattern (LBP) and its variants, Center Symmetric Local Binary Pattern (CS-LBP) and Completed LBP (CLBP) are employed to obtain attributes from the zone of interest of fundus images. This introduced approach is evaluated for the automatic identification of normal healthy and abnormal images of stroke patients. CS- LBP features extracted from the zone of interest, when provided to a Random Forest (RF) classifier gives a promising accuracy of 96.1 % outperforming all other LBP variants.

Key Words— *Stroke, Local Binary Pattern (LBP), Center Symmetric Local Binary Pattern (CS-LBP) and Completed LBP (CLBP), Random Forest (RF).*

Continuous Estimation of Blood Pressure from PPG Signal

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Blood Pressure measurement is essential to manage and treat many medical conditions. Worldwide, high blood pressure is a significant contributor to morbidity, mortality, and several chronic medical problems. According to the WHO, one of the global targets set for non-communicable diseases is the reduction of the prevalence of hypertension by 25% by the year 2025. So Regular BP monitoring is suggested for healthy individuals and essential for those with cardiovascular illness due to its close association with Hypertension. Therefore, this work focuses on the continuous estimation of blood pressure using a non-invasive method based on Photoplethysmogram (PPG) signal. The blood pressure values can be continuously estimated from the PPG signals acquired from different body locations by the pulse wave analysis (PWA) method. The PPG signal undergoes pre-processing for the removal of noise and artifacts. Various features can be extracted from the PPG signals, including spatial, frequency, and derivative features. For effective estimation, discriminant features are derived from the PPG signal. These features are then fed into the Regression algorithm for estimating the systolic blood pressure (SBP) and diastolic blood pressure (DBP). With its effective performance, this technology contributes to the global decrease in the prevalence of hypertension by meeting the growing demand for reliable, non-invasive continuous BP monitoring devices.

Key words—*Photoplethysmogram, diastolic blood pressure, systolic blood pressure, pulse wave analysis.*

Human Paralysis to Retrofit the Motion Using Artificial Neural Network

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1. INTRODUCTION:

Paralysis is a debilitating condition that affects millions of people worldwide. It is caused by damage to the nervous system and can result in the loss of muscle function and control. In this paper, we propose an approach for retrofitting motion in humans using an Artificial Neural Network (ANN).

An artificial neural network is initially trained using signals obtained from the brain-computer interface (BCI) user (ANN). Artificial neural networks (ANNs) are computer programs with biological influences that mimic how the human brain processes information. ANNs learn (or are trained) through experience rather than through programming, and they learn by identifying patterns and relationships in data.

2. MATERIALS AND METHODS:

The proposed approach for retrofitting motion in humans using an Artificial Neural Network (ANN) and Brain-Computer Interface (BCI) involves several steps:

1. Electrodes are implanted in the motor cortex of the brain, allowing the BCI to record neural activity associated to move.
2. The ANN processes the neural signals and produces a set of control signals that can be used to stimulate the muscle receptors in the paralyzed portion of the body.
3. These control signals are then transmitted to a stimulation device, which is attached to the paralyzed muscles.
4. The stimulation device produces an electrical signal that stimulates the muscle receptors, causing them to contract and produce movement.
5. Over time, with repeated use, the ANN is trained to improve the accuracy of the decoded neural signals and produce more refined control signals.

3. RESULTS AND DISCUSSION:

The proposed method of retrofitting motion in humans using an Artificial Neural Network (ANN) and Brain-Computer Interface (BCI) has the potential to significantly advance the treatment of paralysis. This method creates a neural bypass[5] that enables the interpretation and rerouting of signals away from the affected area of the nervous system, allowing patients to regain control and movement of their paralyzed limbs.

The ANN accurately decodes the neural signals linked to the intention to move and generates control signals that can be utilized to stimulate the muscle receptors, according to preliminary experiments, which have produced encouraging results. The paralyzed muscles have been stimulated by these control signals, resulting in mobility in the afflicted limbs.

4. ANALYSIS:

4.1 BCI
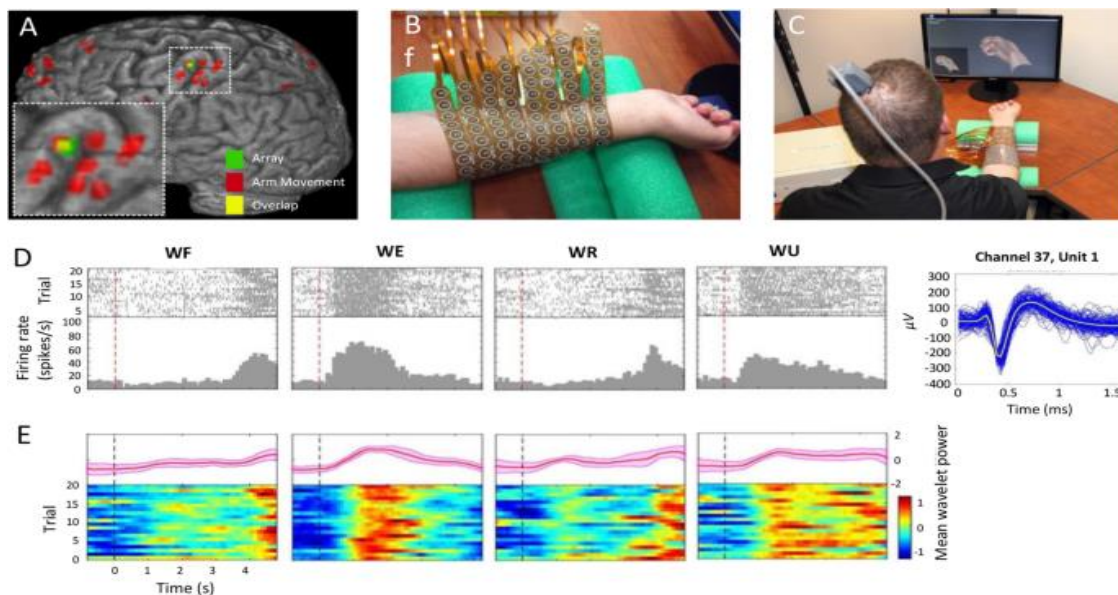
Fig. Analysis of brain using BCI

2. Flow of Artificial Neural Network

A node layer of an artificial neural network (ANN) consists of an input layer, one or more hidden layers, and an output layer. Each node, or artificial neuron, is connected to others and has a weight and threshold that go along with it. Any node whose output exceeds the defined threshold value is activated and begins providing data to the

network's uppermost layer. If not, no information is transferred to the next tier of the network.
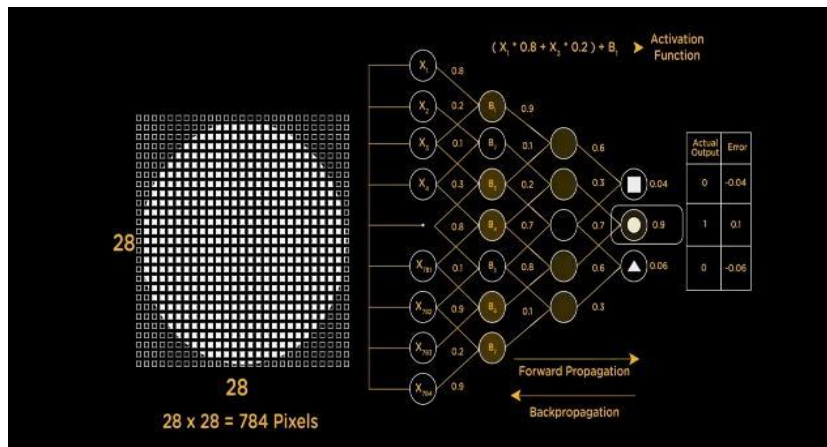
4. CONCLUSION

"This neural bypass stimulates the muscle receptors in the paralyzed portion in a different way. There are most strategies to stimulate but, I propose using BCI(Brain Computer Interface) to monitor the brain activity and collect the data to proceed after the information gained, using an ANN (Artificial Neural Network)we continuously pass the impulse to neuromuscular junction likewise How the normal person neurons working?. At some stage the muscle receptor responds, then acetylcholine releases the moment done."

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Synthesis of Graphene Nanoparticles for Enhanced Antimicrobial Properties against Multi Drug Resistant Bacteria

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Recent years, the inhibition of multi drug resistant bacterial infections is heightened worldwide due to continuous failure of existing drugs. Among the multi-drug resistant bacteria, gram negative bacteria are contributing more in public health due to development of multi drug resistant behavior to all the current antibiotics. To overcome this problem, graphene nanoparticle was used in this study to eradicate the multi-drug resistant bacteria of E. coil and P. mirabilis. The agar well diffusion method was indicated with 200 mm and 18 mm zone of inhibitions against P. mirabilis and P. mirabilis. In addition, the minimum inhibition concentration result was suggested, 250 µg/mL concentrations was very effective against both the bacteria. Also, the inhibition rate of 92% and 94% was indicated against E. coil and P. mirabilis at 250 µg/mL concentration were observed. Finally, the result was proved that the graphene nanoparticle as efficient anti-bacterial agent and it can be used as an anti-bacterial drug in hospitalized infections.

Keywords: *2D nanomaterial, graphene nanoparticles, antimicrobial activity, minimum biofilm inhibition concentration.*

Mathematical Modeling and Simulation of Respiratory System

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In the transportation of oxygen and carbon dioxide, the respiratory system is crucial. The respiratory system needs to be mathematically modelled since pulmonary research is expanding quickly. The training on simulation platforms becomes an absolute necessity in this fast-paced growth of modern medicine. Mathematical modeling of the respiratory system is important in monitoring the cause and effects of various pulmonary diseases. A medical ventilator is a machine which provides mechanical ventilation into and out of the lungs. This ventilator testing and calibration is done using bulk machines, in which the size must be reduced. The requirement found in this field is to device a ventilator calibration equipment which would show the simulated results when suitable parameters are entered. This should be small in size so; a mathematical model of the lung mechanics can be simulated. This can be developed using SIMULINK and MATLAB. This model is used to depict the changes in the normal and abnormal conditions. It resembles a pressure-controlled ventilator in which the pressure wave is given as input. Pulmonary research requires this kind of simulations for better understanding.

Keywords— Mathematical modeling, ventilator, electrical analogy, computer aided analysis, Pulmonary system, pressure, volume and resistance.

Fabrication of Microstructured Sensor for Pressure Sensing Applications

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Microstructured flexible pressure sensors' excellent mechanical properties enable a variety of cutting-edge application scenarios, including electronic skin, soft robotics, wearable electronics, etc. The development of microstructured flexible pressure sensors in recent years has received a lot of attentionin the work presented here. To help with a better understanding of the associated devices, several mechanisms, materials, and preparation methods are briefly explained at the beginning. To emphasise the significance of microstructure for device performance, microstructures of different configurations, such aspyramid, pillar, and hemisphere, are introduced and examinedin detail through the analysis of the influence of configuration parameters and material properties. The future research directions for flexible pressure sensors are then outlined about the current issues with the application.

Keywords— *Resistor, Breadboard, Microstructured Sensor, Arduino, Pressure sensor, Sensitivity.*

IoT-Enabled Health Monitoring System with Sensor-Based Accident Detection and SMS Alert

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One of the world's most populous nations is India. In India, health insecurity and overpopulation continue to be major issues. Keeping an eye on your loved one has become a difficult task in today's world. Also, keeping track of the health status of an individual or a subject is a difficult task. Unpredictable and unanticipated incidents result in one's death every minute. Saving a life is propitious as well as valuable. This paper introduces an IoT-based health monitoring system integrated with sensors for accident detection and emergency response. The system employs various sensors to continuously monitor vital signs, including heart rate, temperature, and accelerometer data. In the event of an accident or emergency, the system utilizes GPS/GSM techniques to send an emergency alert SMS to the medical room and the subject's relatives, ensuring timely assistance. The IoT architecture enables seamless connectivity between the sensors, a central processing unit, and the cloud-based platform for real-time data collection and analysis. By leveraging these technologies, healthcare professionals can remotely monitor patients' health status and respond swiftly to critical situations. The integration of GPS/GSM techniques ensures accurate location tracking, enabling the system to dispatch emergency alerts to the appropriate individuals. This IoT-based health monitoring system offers an effective solution for proactive healthcare management, accident detection, and rapid emergency response, ultimately enhancing overall patient safety and well- being.

Key Words— IoT, health monitoring system, accident detection, emergency alert, sensors, GPS, GSM, vital signs, remote monitoring, proactive healthcare management.

Fiber Optic Designs for Lidar Receiver and its Signal Analysis Using Time-To-Digital Converter (TDC)

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With the development of artificial intelligence, LiDAR finds significant applications in robotics and autonomous driving. Aiming at increasing the compactness and the integration of 2-D LiDAR, this work presents a highly digitally integrated 2-D LiDAR system implemented in a low-cost FPGA. The system is made of off-the-shelf components to limit the cost to USD100. A laser transceiver with a symmetrical transmitting and receiving lens emits and collects laser pulses to range distance using the time-of-flight (ToF) method. As a key component in ToF, the FPGA-based time-to-digital converter (TDC) is adopted for counting the round-trip time of pulses, which is implemented in a low-cost FPGA of ZYNQ7010 with limited resources. The symmetrical structure of the delay line is used to design a more efficient TDC. The FPGA-TDC enables flexibility of design and integration with more functional logics and is microcontroller-free. All the digital logics including data processing and controlling are integrated into an FPGA with the TDC logics to realize fully digital integration and compact dimensions. The utilization of the whole architecture in the FPGA is about 15%. The experimental results demonstrated that the ranging accuracy of the LiDAR is about 2 cm, which is suitable for consumer electronics.

Keywords: LiDAR, FPGA, time-of-flight (ToF), time-to-digital converter (TDC).

The Role of AI in Advancing Prosthetic and Orthotic Rehabilitation

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This research paper explores the integration of artificial intelligence (AI) and machine learning in the field of prosthetics, orthotics, and assistive technology, and its significant impact on individuals with disabilities. The paper investigates how leading manufacturers in the rehabilitation aids industry have employed neural networks to simulate anatomical and biomechanical functions of missing body parts. It highlights the revolutionary advancements achieved through the interaction of humans with electronic circuitry, software, robotics, and other technologies, resulting in groundbreaking devices such as bionic legs, mind-controlled prostheses, and exoskeletons. The application of AI and robotics technology has significantly contributed to enhancing independent mobility and improving the overall quality of life for individuals with disabilities. Key terms related to this research include artificial neural networks, deep learning, brain-computer interface (BCI), electromyography (EMG), and electroencephalogram (EEG).

Keywords: artificial neural network, deep learning, brain-computer interface (BCI), electromyography (EMG), and electroencephalogram (EEG).

Fabrication of Cost-Effective Thin Film Sensor by Dip Coating Method Using Fullerene C60 For Sensing Pernicious Anemia (PA)

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Pernicious anemia is a kind of chronic anemia which can be caused by various conditions like weakened stomach lining or end-stage autoimmune gastritis. The demand for an effective biosensor used to diagnose pernicious anemia still exits due to its economic and technical limitations. To overcome the limitations and to make ease of disease diagnosing, we propose a cost-effective thin film-based bio sensor fabricated using simple solution-based fabrication process. The electrochemical biosensor works on optimizing the change in resistance which occurs in the C60 active layer of the sensor when exposed to the analyte. The resistance variation due to different analytes were investigated over the C60 thin film layers formed by simple solution-based process with different solvents and their electrical response were reported.

Keywords: *Pernicious Anemia, Biosensor, Thin film sensor, Fullerene C60, Thin film technology.*

Artificial Intelligence based Tool for Early Diagnosis of Autism

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Autism is one of the neuro developmental disorders with high prevalence rate. Ignorance of the condition can become detrimental for the child. The current diagnostic methodologies for autism are a bit tedious, especially for children. The work is to develop a pre-diagnostic tool for autism that evaluates the disorder through different modalities. In the proposed work, Convolutional neural network (MobileNetV2) is used to predict autism through the frontal facial images. RPPG based non-contact heart rate measurement has been deployed that calculates heart rate from the webcam. Standard survey forms to validate the disorder based on the symptoms and behavioral characteristics of the child. Speech detection tool to assess the speech abilities of the child. The reported result for the developed classifier produced 93% validation accuracy 94% specificity and 90% sensitivity. The developed RPPG based heart rate detection system was able to pick up the user's heart rate in a dynamic environment. The speech to text converter tool was able to convert the user's speech into meaningful words. Hence the proposed system could be used to pre-diagnose autism and to get an awareness about the disorder.

Keywords— *autism, survey forms, image processing, RPPG, speech detection, deep learning*.

Detection of Schizophrenia in Potential Patients using EEG Signal Analysis

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Schizophrenia is a chronic mental illness that affects about 1% of the world's population. Early detection and intervention are crucial to improve the prognosis of the illness. Electroencephalography (EEG) signals have been used to study the brain activity of patients with schizophrenia. In recent years, there has been a growing interest in using machine learning techniques to analyze EEG signals to detect schizophrenia. This project aims to investigate the feasibility of using EEG signals to detect schizophrenia. The project will use a dataset of EEG recordings from patients diagnosed with schizophrenia and healthy controls. Feature extraction techniques will be used to extract relevant features from the EEG signals. Several machine learning algorithms will be applied to the extracted features to classify the patients into two groups: healthy and schizophrenic. The project will evaluate the performance of the classification algorithms using several performance metrics, including sensitivity, specificity, accuracy, and area under the curve (AUC). The results of this project will contribute to the development of a non-invasive diagnostic tool for schizophrenia. In conclusion, the use of EEG signals and machine learning techniques can potentially provide a reliable and non-invasive method for detecting schizophrenia. This project will explore the feasibility of such an approach and contribute to the growing body of research in this field.

Keywords— EEG, dataset, non-invasive, feasibility.

Unveiling Identity with Siamese Network: Earbiometricsfor Person Identification

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Identifying individuals through ear images is a topic of ongoing research in thebiometrics field. The ear, similar to other biometric traits such as the face, iris, and fingerprints, possesses many distinct and specific features that make itfeasible for identification purposes. With the ongoing COVID-19 pandemic andwidespread use of masks, face recognition systems have become unreliable. Onthe other hand, the ear is a suitable alternative for passive identification as it canbe easily acquired without the subject's cooperation and its structure remainsrelatively unchanged over time. Furthermore, the ear is still visible even whena person is wearing a mask. This ear biometric system can complement otherbiometric methods in human recognition systems, providing identificationinformation when the other methods are unreliable or unavailable. This studyproposes a Siamese neural network for one-shot image recognition and tests itsefficiency using the IITD-II dataset.

Key Words— Ear biometrics, Siamese Neural Network, IITD II dataset, One-shot image recognition.

Design of a Novel Endotracheal Tube for the Prevention of Ventilator-Associated Pneumonia (VAP)

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Ventilator-associated pneumonia (VAP) is the most common bacterial infection which affects critically ill patients supported with mechanical ventilation. The subglottic secretions in the oropharynx region seep down the endotracheal tube (ETT) cuff, entering into the lower respiratory tract and lungs causing infection. studies were conducted on ETT to prevent the incidence of VAP. In our study, we presented a design of a triple-cuffed endotracheal tube with subglottic drainage. Our design fulfils the drawbacks of the current ETT. The adhesive gel between the cuff layers fits tight into the tracheal wall. This prevents the fluid from entering the lower respiratory tract. The cuff also collects the subglottic secretions and is pumped out effectively. If clinically implemented, our design will reduce the incidence of VAP, thereby decreasing the mortality rate due to VAP in critically ill patients.

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Keywords: Endotracheal tube, VAP, Three cuffed, Subglottic drainage, Biofilm.

3D simulation of Skin to study Diabetes and its Comorbidities

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Sweat glands, also known as sudoriferous or sudoriparous glands are an indispensable element of the skin that are regulated by the autonomic nervous system. Pathological conditions like Diabetes and its various comorbidities substantially affect these sweat glands to the point where these changes become the condition's signature symptom. It has been observed that the morphology of the gland changes during conditions like diabetic neuropathy and nephropathy. Therefore, analyzing these changes would provide insight into the onset of these conditions in their early stages. This study attempts to evaluate the morphological changes in sweat glands and correlate them with diabetes and its comorbidities. To do so 3D models that closely resemble the physiological characteristics of the skin were created using COMSOL Multiphysics Software. These models represent the morphological changes of the sweat glands under diabetes and diabetic nephropathy. The models were irradiated with an Electromagnetic wave of frequency 380 GHz, and the respective electrical field, Specific Absorption Rate (SAR), and Bioheat were computed. The results demonstrate that Diabetic Neuropathy has the highest e-field, and DKD has the highest SAR with a percentage difference of 145 percent concerning the control condition, followed by neuropathy at 93.69 percent and diabetes at 85.26 percent with respect to control. The intention of this research is to find a computational tool for the early detection of Diabetes and its comorbidities using morphological alterations as a key factor.

Keywords: Electromagnetic radiation, Specific Absorption rate, Bioheat, Diabetic Neuropathy, Diabetic Nephropathy.

Virtual Reality incorporated in Visual Acuity Test

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INTRODUCTION:

The main aim of this project is to design a system using the Snellen chart and a portable virtual reality headset and the system aims to test and correct vision and to improve the quality of life of patients with impaired movement. The methodology of incorporating virtual reality (VR) into the Snellen chart involves creating a virtual environment that simulates a realworld eye exam room. The VR headset used for the eye exam incorporates high-resolution displays that can render the Snellen chart with high fidelity. The headset is also equipped with sensors that can track the user's head movements and adjust the virtual display, accordingly, creating a more realistic and immersive experience. This has the potential to improve the accuracy and efficiency of eye exams and provide a more personalized and customizable experience for patients. VR technology can allow for the customization of the Snellen chart based on the patient's needs. For example, the chart can be adjusted for patients with different levels of myopia or astigmatism, allowing for more accurate and personalized visual acuity testing. By incorporating VR to the field of ophthalmology, we can also be able to supplant larger equipments such as AUTOREFRACTOR (device used to measure the refractive error of the eyes and prescribe lenses. The patient is required to look into the machine, which has a picture that moves in and out of focus), RETINAL CAMERA (device that is used to capture an image of the interior surface of the eye, typically the retina and study the patient's retina, monitor the changes in the retina over a period of time and diagnose diseases) in the future.

MATERIALS AND METHODS:

The primary motive of a visual acuity test in VR is to provide a more accurate and engaging method of testing an individual's visual acuity. Traditional methods of visual acuity testing involve using charts and equipment that may not provide a

comprehensive evaluation of an individual's visual abilities and can be intimidating or uninteresting for patients.

In addition, VR technology can make the testing process more engaging and enjoyable for patients, especially children, by creating a fun and interactive experience that feels like a game or activity. This can help reduce patient anxiety and improve compliance, leading to more accurate results.

Overall, the motive of a visual acuity test in VR is to provide a more accurate, comprehensive, and engaging method of evaluating an individual's visual acuity, which can lead to better diagnosis and treatment of visual impairments.

The methodology of incorporating virtual reality (VR) into the Snellen chart involves creating a virtual environment that simulates a real-world eye exam room. The VR headset used for the eye exam incorporates high-resolution displays that can render the Snellen chart with high fidelity. The headset is also equipped with sensors that can track the user's head movements and adjust the virtual display, accordingly, creating a more realistic and immersive experience. This has the potential to improve the accuracy and efficiency of eye exams and provide a more personalized and customizable experience for patients.

RESULTS AND DISCUSSION:

The results of a visual acuity test using virtual reality (VR) would vary depending on the specific test conducted and the individual being tested. VR-based visual acuity tests typically measure an individual's ability to discern visual details, such as identifying letters or symbols on a virtual chart, or detecting subtle differences in contrast and spatial resolution.

The test results may be reported using standardized visual acuity measurements, such as Snellen acuity (expressed as a fraction, e.g., 20/20) or logMAR (expressed as a decimal value). These measurements provide an indication of the individual's visual clarity or the smallest details they can perceive at a specific distance.

During the VR visual acuity test, the individual may be presented with various visual stimuli in a virtual environment, and their responses or accuracy in identifying or discriminating these stimuli will determine their visual acuity score. The test results can be used to assess the individual's overall visual function, identify any deficiencies or impairments, and guide appropriate interventions or corrective measures. It is important

to interpret the results of a VR visual acuity test in conjunction with other clinical evaluations and considerations. Factors such as the individual's age, eye health, refractive error, and overall visual system function should be taken into account when interpreting the results and making clinical decisions. It's worth noting that while VR-based visual acuity tests show promise, they may not yet be widely implemented in clinical practice or fully validated against traditional methods. Therefore, it is important to consult with healthcare professionals or specialists who are familiar with the specific VR system and its limitations to ensure accurate interpretation of the results. The use of virtual reality incorporated with Snellen chart using Sim Lab software can potentially provide a more immersive and interactive vision testing experience for patients. This technology can simulate real-world scenarios and enable the clinician to test visual acuity and contrast sensitivity under different lighting conditions, contrast levels, and visual tasks.

Virtual reality (VR) technology has the potential to revolutionize the way eye tests are conducted. VR can provide a more immersive and interactive experience for patients, allowing for more accurate and detailed testing.

Here are some potential benefits of using VR in eye tests:

1. **Increased accuracy:** VR technology can provide more accurate results by simulating real-world environments and allowing for more precise measurements of eye movements and responses.

2. **More engaging:** Traditional eye tests can be repetitive and boring for patients, leading to inaccurate results. VR technology can make eye testing more engaging and interesting, leading to better results.

3. **Cost-effective:** VR technology can reduce the cost of eye testing by eliminating the need for expensive equipment and facilities.

4. **Remote testing:** VR technology can allow for remote eye testing, which is especially useful for patients who live in rural areas or cannot travel to a clinic.

CONCLUSION:

In conclusion, the use of virtual reality (VR) in visual acuity testing holds significant potential for revolutionizing the way we assess and monitor visual acuity. The immersive and interactive nature of VR technology allows for more engaging and realistic visual experiences, closely simulating real-world environments. This, in turn, can enhance the accuracy and reliability of visual acuity measurements compared to traditional methods.

One of the main advantages of VR-based visual acuity testing is its ability to provide dynamic stimuli and controlled conditions, enabling the evaluation of various visual parameters such as contrast sensitivity, depth perception, and peripheral vision. VR platforms can simulate different lighting conditions, distances, and visual targets, allowing for comprehensive and precise assessments of an individual's visual capabilities.

Furthermore, VR-based visual acuity tests have the potential to be more accessible and convenient, as they can be conducted remotely and do not require specialized equipment or physical visits to medical facilities. This can be particularly beneficial for individuals with limited mobility or those residing in remote areas, facilitating widespread access to visual acuity assessments and promoting early detection of visual impairments.

However, it is important to note that the implementation of VR-based visual acuity testing still faces certain challenges. Standardization of protocols, calibration of VR systems, and validation against established clinical measures are crucial steps that need

to be addressed to ensure accuracy and consistency across different platforms and settings. Additionally, considerations must be given to potential biases and limitations related to user experience, adaptability, and technological advancements.

Overall, virtual reality has the potential to transform visual acuity testing by providing a more immersive, accurate, and accessible approach. Continued research and development in this field, alongside collaboration between healthcare professionals and VR experts, will be key in harnessing the full potential of this technology and translating it into effective clinical practice for visual acuity assessment and monitoring.

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Sinensis - Organic Bandage

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Organic bandages made from natural materials are becoming increasingly popular due to their biocompatibility, low cost, and eco-friendliness. This study shows the use of orange pith also known as Sinensis, as a potential material for developing an organic bandage that can promote wound healing. Orange pith is a waste product generated during the processing of oranges for juice production, and is typically discarded. However, it is a rich source of bioactive compounds such as polyphenols, flavonoids, and ascorbic acid which has antioxidant, anti-inflammatory, and antimicrobial properties. The bandage is prepared by extracting orange pith using a solvent-free method, and then incorporating it into a sheet which contains the organic properties and this can help to heal the wound effectively.

Keywords: *Orange Pith, Anti – oxidant, anti – inflammatory, Non –toxic, Sustainable, Wound Healing*

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Bioimpedance Analysis of Normal and Diabetic Blood Vessel Through Numerical Modeling

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INTRODUCTION

Bioimpedance analysis is one of the noninvasive techniques to identify the type and amount of different tissue components in human body [1]. According to electrical properties of blood, it is considered as inhomogeneous in nature as it is a mixture of formed elements like Red blood cells, white blood cells, plasma, platelets and other electrolytes and nutrients. Any change in blood's composition, results in change its electrical properties. The conductivity of blood is more than normal one [2] . Hence Our study intends to analyze electric field distribution inside artery for a normal and diabetic blood flowing through blood vessel using numerical modeling technique and to predict diabetic from electric field analysis.

MATERIALSANDMETHODS

Geometric model of a blood vessel with electrodes is created in COMSOL Multiphysics. The material properties such as electrical conductivity and relative permittivity of blood, vessel wall and electrode is assigned to the geometry. The electrode is excited with 1mA, 50kHZ sinusoidal current. By applying suitable boundary conditions, electric field distribution inside the blood vessel is obtained by COMSOL Multiphysics. The simulation is carried for the same geometric model with diabetic blood by assigning different electrical conductivity and relative permittivity. The electric field and potential distribution in both models are analyzed.

RESULTS AND DISCUSSION

From the electrical potential measured at the surface of the artery model, there is a detectable change between the normal artery and artery with diabetic blood. The surface potential of normal artery is higher than artery with diabetic blood. Hence it is deduced that by suitable method, the diabetic condition of a person can be detected by measuring surface potential. Future work is to extend this study by considering other

tissue layer such as muscle, and skin. Also, the effect of frequency in bio impedance in this case has to be done.
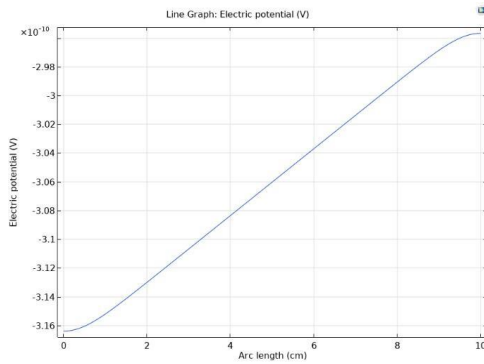
Figure 1   Normal artery surface potential with diabetic blood
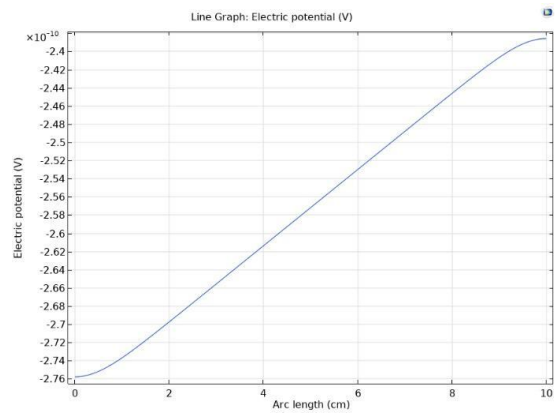
Figure 2 Surface potential on Artery

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Automatic Detection of Movement in Coma and Paralyzed Patients

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INTRODUCTION

Coma is the state of anesthetized or unconscious state where the patient doesn't respond to the actions or any activities. In this condition it is difficult to monitor the patients 24x7 and observe their state. A system containing an accelerometer is used for this purpose. The accelerometer is a sensor that converts acceleration or change in orientation into voltage. Thus the accelerometer is used to monitor the patient's physical state. This can be achieved by attaching the accelerometer to the patient's body. This project aims at providing immediate attention to patients and reducing the need for physical monitoring of them regularly.

MATERIALS AND METHODS

The implemented hardware design consists of an Accelerometer (ADXL335), Voltage Regulator (AMS117 5V), LM324 IC, Buzzer, Power Supply. The main component of this circuit is an accelerometer. It works by detecting change in acceleration or movement.The accelerometer is connected to the patient's limbs and converts change in orientation or acceleration into voltage. An accelerometer consists of three output pins: x, y and z, through which there is always a constant voltage. Let us consider the accelerometer is rotated about its x axis, then the output voltage at the x axis increases, while those at the y and z axis remain the same. This principle can be applied to use the z axis as the reference voltage in the voltage comparator.

Now the voltage at the x axis and z axis are fed as the inputs of the voltage comparators and the voltage comparator produces an output voltage if the voltage at the x pin exceeds the voltage at the z pin. This is achieved when the accelerometer is rotated about the x axis. Now the output voltage from the comparator is fed to a buzzer which rings, indicating change in the equilibrium of the accelerometer which is in turn caused by the motion of the patient.

RESULTS AND DISCUSSION

The accelerometer was able to sense the movement of the patient and alert the concerned people. The prototype was tested on different people considering varying angles and body parts. The accelerometer has a sensitivity of about 3.3g and is controlled by a switch.

Consider the accelerometer is connected to the patient's arm, in case the patient regains consciousness and there is movement in their arms, the accelerometer attached to the patient's arm also experiences an acceleration as a consequence of the movement.

Thus it is observed that when there is a movement in the part in contact with the accelerometer, there is change in acceleration of the accelerometer. This acceleration is responsible for production of a voltage and thus the alarm ringing. Thus, the alarm system uses a buzzer as a means for alerting doctors /caretakers and helps provide immediate attention to the patients.

DEVELOPED PROTOTYPE
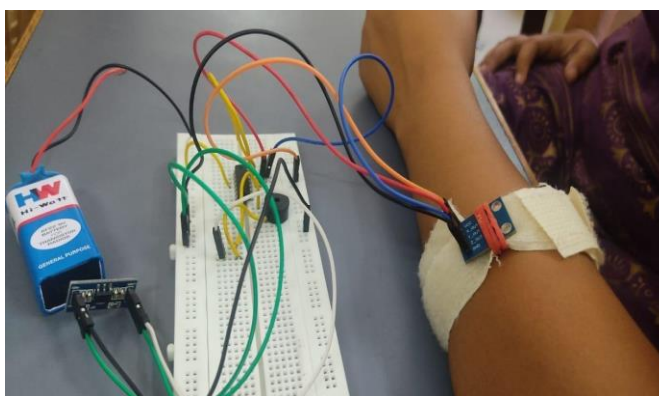
Figure: Circuit Connections

CONCLUSION

The accelerometer connected to the patient was successful in detecting movement and alerting through an alarm system. It would serve as a cost-effective aid to the doctors/nurses for easier monitoring of patients and eliminate the need for continuous monitoring of such patients. In addition, this prototype will also be helpful for home-based care for coma patients or paralyzed patients and alerting caretakers in case of an emergency. This circuit could be integrated into patient monitoring systems for effective monitoring of patients. Its efficiency can be improved by increasing the number of sensors and connecting to various parts of the body and the power supply of

the system can be stabilized to ensure longevity. Moreover, this system runs on low power and can be utilized at hospitals as well as household settings. Thus, this model would provide a simple and effective monitoring of Coma and paralyzed patients.

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Smart Baby Cry Detection System for Alerting Parents

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Crying sound technology foralerting (CRYSTAL) parents is aninnovative IoT-based solution thataddresses the challenges faced by busyparents of infants and toddlers. Theproposed work utilizes artificialintelligence (AI) and acoustic matching (AM) to classify a baby's voice into five

possible terms: sleepy, hungry, discomfort, lower gas, and burp. By analyzing theunique acoustic signature of a baby's cry, CRYSTAL enables parents to quickly andeffectively respond to their child's needs. With its user-friendly interface andcustomizable settings, CRYSTAL providesa reliable and efficient way for parents toattend to their child's needs promptly. Byusing CRYSTAL can enjoy peace of mindknowing that they can always stayconnected and responsive to their child'swell-being, even in the midst of a busy day.

Keywords: IoT, Acoustic matching, Artificial intelligence, Support VectorMachine (SVM), Remote monitoring, Baby cry

Denoising of Low-Dose CT Images using WGAN

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INTRODUCTION

Computed X-ray tomography (CT) has become a widely used and important imaging method in medical diagnosis, offering high-resolution anatomical structures. Concerns have emerged regarding the potential risk of X-ray radiation to patients due to the widespread use of CT scans. The Low Dose CT (LDCT) technique provides a simpler solution, but an accurate definition of CT parameters is crucial to maintain diagnostic quality while reducing radiation dose. Reducing radiation dosage in LDCT increases noise and artifacts, which can compromise diagnostic accuracy. Therefore, extensive efforts have been made to improve LDCT image reconstruction and processing methods, including sinogram filtration, iterative reconstruction, and image post-processing. The available deep learning-based approaches utilise end-to-end networks with mean squared error (MSE)-based loss functions. However, MSE-based methods may over-smooth edges and lose important details, neglecting subtle image textures essential for human perception. Our proposed solution uses a generative adversarial network (WGAN) with Wasserstein distance as the measure between distributions to overcome these challenges. A perceptual loss is also applied to calculate differences in an established feature space. By incorporating WGAN, denoised CT images are encouraged to have the same distribution as normal dose CT (NDCT) images, effectively reducing blurring effects and artifacts such as non-uniform biases.

MATERIALS AND METHODOLOGY

Generative adversarial networks (GANs) are an advanced data augmentation technique that involves two convolutional neural networks (CNNs). The generator generates images from noise, and the discriminator is trained to classify the images as real or fake. These networks work adversarially, with the generator trying to generate more realistic images to fool the discriminator and the discriminator trying to identify images with better accuracy. As one network improves, the other also learns.
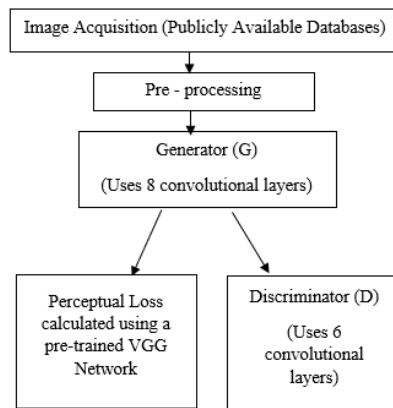
Figure 1. Model of the proposed WGAN-VGG Network.

The model implements three different units: a generator (G), a discriminator (D) and a pre-trained VGG-19 network. The generator is trained to generate fake data and images, calculate the corresponding errors and perform backpropagation. The weights are updated with a gradient. The discriminator trains on real data and calculates the error and back propagates and also trains on fake data and calculates error and back propagates. Generator loss, discriminator loss and VGG loss and Wasserstein distance are calculated. Various other networks are used in conjunction for validation. The hyperparameters are initialised, and an optimal linear denoising filter design is implemented.

RESULTS

The model is trained for 100 epochs, and the denoised image is visualised against the ground truth image. The Peak Signal to Noise Ratio (PSNR) and Structural Similarity Index Measure (SSIM) of the denoised image using the proposed model is compared with the existing models.
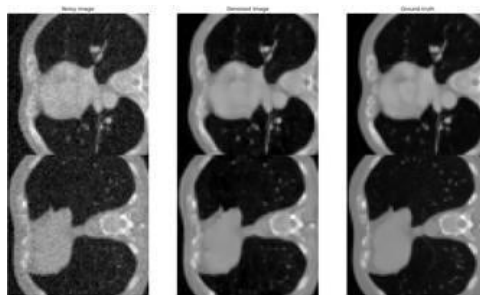
Figure 2. Denoised low dose CT image using GAN.

71
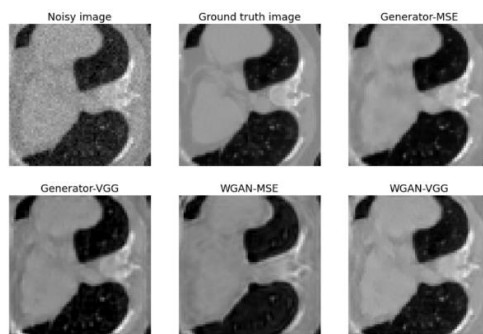
Figure 3. Denoised image compared with other available networks

	ssim	psnr
generator_alone_mse	0.996554	38.078655
generator_alone_vgg	0.961098	32.607155
generator_wgan_mse	0.944914	30.557816
generator_wgan_vgg	0.966164	34.792500

Figure 4. Comparison of SSIM& PSNR for the networks.

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Advancing Liver Tumor Segmentation: Integrating UNet Architecture and Computed Tomography for Improved Diagnosis

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The liver facilitates in keeping healthy blood sugar levels, eliminating toxins from blood supply to the body, as well as regulating blood coagulation. Additionally, it will regulate the blood's chemical composition and release bile. Since the liver contains a variety of cell types, a variety of distinct tumor types can grow there. These aberrant growths may develop into malignant (cancerous) or benign (non-cancerous) cancers. The three most common malignant liver tumors are hepatocellular carcinoma, sarcoma, and hepatoblastoma. These illnesses cause weight loss, abdominal swelling, nauseousness, and vomiting. The final stage may also result in death. To eliminate and treat liver tumors as quickly as possible, earlier detection is required. The liver tumor is found using a medical imaging technique called Computed Tomography (CT), which is then sent to a convolution neural network architecture for biological image segmentation (UNET) that will precisely segment the liver's malignant cancer cells. In addition to the standard approach, a dropout regularization has been employed here to lessen the number of filters and prevent model bias. The dataset used to train the model was taken from the LiTS - Liver Tumor Segmentation Challenge (LiTS17) dataset, which contains roughly 130 CT scans for segmenting the liver and tumor lesions. The output will have a portion of the image that has been highlighted to show the presence of cancer cells, and the suggested methodology aids in the quick retrieval of tumor identification.

Estimation of Optimal Muscle Load Using Electromyography Fatigue Index

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1. INTRODUCTION:

Carrying heavy loads is one of the most common reasons behind the leading cause of musculoskeletal injuries. Peoples employed in specific occupations often have to carry heavy loads. Surface electromyography (SEMG) has been used in both research and clinical applications for non-invasive neuromuscular assessment in several different fields such as sport science, neurophysiology and rehabilitation. It is a valuable tool for the assessment of muscle load and fatigue. Fatigue can be induced by prolonged or vigorous activities that include physical or mental effort, like severe exercise, prolonged physiological stress and chronic diseases. Muscular fatigue can be regarded as a reduced muscular work capacity, together with the loss of efficiency, often accompanied by subject feeling of physical and mental fatigue. In the study of human biomechanics, it is often desirable to assess the fatigue of muscles that are involved in performance of a task. Physiologists have become accustomed to using the force output of a muscle as the index of muscle fatigue. In particular, the point at which a contraction can no longer be maintained (the failure point) is generally the point at which the muscle is said to fatigue. This approach implies that fatigue occurs at a specific point in time. There are various methods of the EMG signal analysis. For many years the commonly used indicators of load and fatigue were determined in time or frequency domain on the basis of Fourier transform.

2. METHODOLOGY:

In this paper, a EMG amplifier circuit is designed and SEMG signals acquired to monitor and evaluate the changes in EMG parameters of muscles of low extremities. The recording is done while performing muscle activity carrying load. The acquired signal is then analysed both in time domain as well as frequency domain to estimate muscle fatigue. Subjects were asked to perform 3 walking tests. Initially with no load then for the second test a backpack load of 10% of their BW was given. Then third test

was with 15% of their BW. Subjects were asked to walk and the last 30s of walking was recorded. EMG signal is acquired for all three varying loads and analysed using software to find the desired result. The EMG analysis for muscle fatigue is commonly performed through spectral parameters median frequency (MDF) over time during a fatiguing effort. The percentage of fatigue during exercise is determined by the ratio between the variation in the median frequency.

The RMS of the measured EMG signal is calculated using (1).

$$RMS = \sqrt{\frac{1}{N}\sum_{n=1}^{N} x_n{}^2}$$

Where x_n is the voltage value at ith sampling and N is the number of the samples in a segment.

The next feature, MDF is the frequency of EMG signal at which the average power within the segment/windows is reached. MPF can be calculated as in (2).

EMG is analysed in frequency domain to find the presence of fatigue. The frequency domain parameter like median frequency is used to find onset of fatigue during muscle activity

$$\int_0^{MDF} p(f)df = \int_{MDF}^{120} p(f)df$$

Where MDF is the median frequency value and P(f) is the PSD of the signal.

2.1 *Block Diagram*
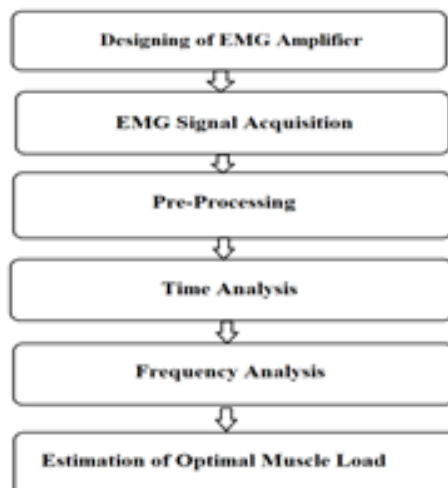
3. RESULTS AND DISCUSSION

Muscle fatigue causes decrease in MDF values which is caused by shifts of the power spectral density (PSD) of the EMG signal towards relatively lower frequencies. The effects of muscle fatigue on both EMG features RMS and MDF were analyzed by comparing the variations for each load.

4. CONCLUSION

From the analysis it is seen that a 15% BW of load could potentially be an appropriate safe backpack load limit for a male and a 10% of BW of load is safe for a female to reduce load-carriage related injuries which impair performance and cause discomfort and disability. Further studies should also test heavier percentage of BW backpack loads to compare the effects of heavy and lighter backpacks. The prolonged effect of backpack loads requires testing by walking for longer durations.

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Automatic Temperature Detector for A Covid Safety Cabinet

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COVID-19 had made a huge impact on the society with new restrictions being imposed at regular intervals as in social distancing, number of users allowed in a particular room as in offices, shops etc. While COVID-19 pandemic was persisting, taking precautions to prevent the spread of the virus became a necessity. One such preventive measure was monitoring body temperature. Fever is one of the main symptoms of COVID-19, and detecting high temperature early can help identify potential carriers and reduce the risk of transmission. To make the process more efficient and reliable, an automatic body temperature detector for a COVID safety cabinet can be used. The number of people present in the room as well as the temperature will be displayed on the Arduino IDE or LCD display. This non-contact device can quickly measure and display temperature reading, hence a large number of people can be evaluated individually at points of entry.

Keywords: Non-contact device, PIR Motion Sensor, IR sensor, Non-contact IR Temperature Sensor.

Innovation for Neonatal Care- A Smart Band Design for Neonates

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INTRODUCTION

In order to protect an infant's health and wellbeing throughout these important early stages of life, neonatal surveillance is essential. In order to identify any potential health issues early on, newborns must have their vital signs continuously monitored because they are particularly vulnerable. The use of wires and probes in conventional neonatal monitoring techniques can be intrusive, painful for the infant, and raise infection risk. A ground-breaking strategy has been developed to solve these issues in the form of smart bands for newborn care. These cutting-edge gadgets are designed to offer a non-intrusive and practical manner of monitoring, enhancing the baby's comfort while lowering the danger of infection. To improve the standard of care given to babies, smart bands for neonatal care are being developed. These bands use cutting-edge technology to continuously gather and send vital sign data in real-time, giving parents and healthcare professionals up-to-date information on the condition of the infant. These smart bands make it possible to identify potential health problems early, which enables prompt interventions and therapies that enhance baby health outcomes. The unique demands of infants are taken into consideration when designing smart bands for neonatal care. They are non-intrusive, light, and ergonomically made to guarantee the baby's comfort and mobility. These bands have sensors built in that can gauge vital indications including temperature, oxygen saturation, and heart rate. In order to enable prompt action in the event that any irregularities are found, the collected data is analyzed and provided in real-time to parents and healthcare professionals. Smart bands' real-time monitoring enables medical professionals to manage neonates' health in a proactive and watchful manner. Vital sign alterations can be quickly identified, allowing for fast interventions and therapies. For instance, temperature can be measured using the temperature sensor DS18B20[1] and heart rate sensor MAX 30100[2].

MATERIALS AND METHODOLOGY

Temperature sensor DS18B20[fig1.1], MAX30100 Pulse-Oximeter and Heart Rate Sensor[fig1.2], NODEMCU ESP8266 are connected and they are programmed to transfer data to Arduino IOT Cloud. The sensors are then incorporated into a silicone wristband. The results are viewed on the Arduino IOT Cloud.

Fig 1.1 DS18B20temperaturesensor oximetersensor

Fig 1.2 MAX 30100 heart rate andPulse-
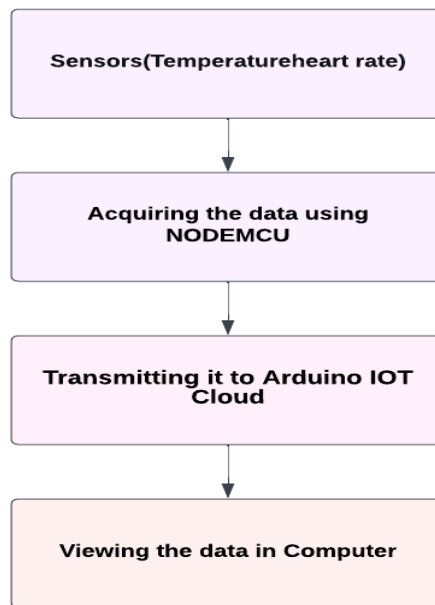
Fig 1.3 The flow chart explains how the data are acquired and transmitted to the computer

RESULTS AND DISCUSSION

Early detection of potential health issues is one of the key benefits associated with smart bands for neonatal care[3]. By continuously monitoring vital signs such as heart rate, oxygen saturation, and temperature, these devices can promptly detect any abnormalities or deviations from the normal range. This early detection allows for timely interventions and treatments, which can ultimately lead to better health outcomes for the baby.
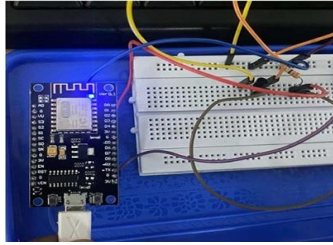
Fig 2.1 The Prototype

CONCLUSION:

In conclusion, the development of a smart band for neonatal care that displays data rather than alerts has the potential to provide valuable information to healthcare providers and parents, without causing unnecessary alarm. The smart band can track vital signs such as heart rate, and body temperature, and display this data in real-time. By providing continuous monitoring, the smart band can also help detect subtle changes in the baby's vital signs that may indicate the onset of a disease or condition. The display of data can also help parents to be more involved in the care of their newborn. Parents can access the data in real time and track their baby's progress and development. This can help to reduce anxiety and increase confidence in their ability to care for their newborn.

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Impact of Health Based Mobile Applications on Medication Adherence in Patients with Type 2 Diabetes

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1. INTRODUCTION:

The use of mobile phone apps to promote diabetic self-management is growing in popularity. The proper use of medications is a vital component of diabetic self-management. This study intends to thoroughly evaluate and characterize diabetic self-management app medication management features and their adherence to best practices and evidence-based standards.

2. METHODOLOGY:

In a healthcare organization, once the patient visits the practitioner, medications are prescribed and dispensed. In daily medication consumption routine, there are no reminders for the patient regarding consumption of pills. With technological advancements medications can be taken using reminders on mobile phone application. The pathway for the functioning of medication reminder is provided as a flow in Figure 1. The medication schedule is first planned, organized and preset in the mobile app. The information fed is synced with the smart phone's operating system calendar. There can be allocations to add medications and dosage as per prescription. The purpose of the medication can be entered as an option by the patient. Some applications include links to external resources to the app and provide information about complementary medicines.

Adherence and monitoring is mandatory to access the patient's improvement in any ailments. Taking this into consideration, the designed app allows users to track the pattern of medication consumption. This will also enable the user to gauge the benefits of planned medication schedule over actual consumption of medication. As an added benefit, the patient can also communicate through messages to the healthcare professionals regarding any medication queries. Data management can be activated to transfer, store and record medication based information between user and health care provider and vice versa. Reminders are set to take medication, refill prescription; check

expiry dates, reinforces the importance of medication adherence and provides encouragement to the users.
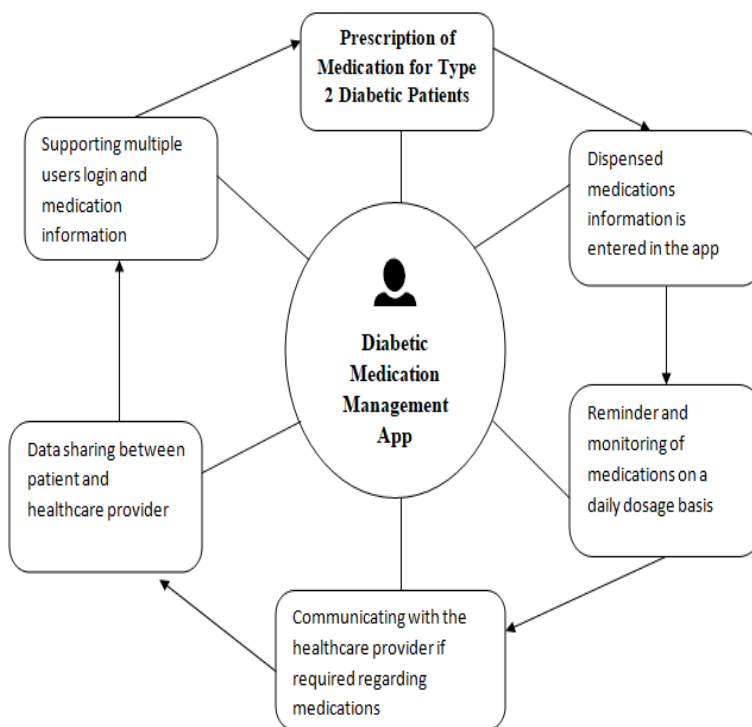
Figure 1. Generalized Flow of medication-based information smart phone applications

3. RESULTS:

By analyzing most of the mobile applications, almost more than 150 mobile applications which which had diabetic based functionalities inbuilt with management of pharmaceuticals, were downloaded and tested. More than 50% of the apps had users registering basic information like name, medication information and reminder (ex: "take panadol") with remarks. Since these applications runs on an Internet, most of the applications gave an automatic second trigger 20-30 minutes after the first medication reminder. Some of the apps had tones for each medication, dosage time, alarm for delay of medication etc. Overall, the health based mobile applications for type 2 diabetic medication had basic functions and reminders incorporated in the app.

4. CONCLUSION:

Many diabetic self-management applications lacked features to improve medication adherence and safety. To increase alignment with evidence-based best practice, more attention should be placed on the design of medication management features in diabetic apps. As a future work, standard medications which are certified by the WHO can be in built in the app so the patient can overcome the hassle to manually entering the medications. Secondly, age based automatic dosage can be inbuilt in the mobile based applications which would enable easy input of medication and can be furthermore carried onto a smart watch.

5. KEYWORDS:

Medication adherence, diabetic app, self management, complementary medicine, panadol

6. ACKNOWLEDGEMENT:

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Data Handling Algorithms for the Healthcare System for the Prediction of Diabetes in Health Data Science (HDS): A Survey Report

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In this modern time, the data science is a primary technology for data handling in different fields. Data science provides the facility to quality of data with proper accuracy with proper data handling of the large volume data by using other advance technology known as machine learning (ML) which is part of artificial intelligent (AI). In this review paper, introduce the data science technology in healthcare system, so propose the data science in health data science (HDS). Health data science (HDS) is a class of data science which is focus on management and analysis for large quantities of health-related data which collected from healthcare system in the form of questions by doctors and patients. This survey paper presents the idea of the data prediction of diabetes data set using data handling algorithms formally known as machine learning algorithms for finding the accuracy of prediction to diabetes. This complete survey is based on behalf of previous research work in the direction of diabetes prediction using ML algorithm and focus on its research gaps for further research work with new ideas. Every algorithm of machine learning is used in data science technology for handle the data so introduce in terms of data handling algorithms. Finally in this review paper focus on health data science with handle the predictive data set of diabetics' patients' which generate by hospitals or healthcare system and prediction of diabetes using data handling algorithms.

Keywords: Data science, Health data science (HDS), Machine learning (ML), Data handling algorithms, KNN, RF, CNN, ANN

Low Power Non-Volatile Memory Design and Optimal Task Allocation Using Modern Multiversion Scheme

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In recent years, the energy consumption of computer systems has increased and much of this energy is consumed in the main memory. In this sense, researchers have proposed the use of non-volatile memory, such as phase change memory (PCM), which has low read latency and power; and almost zero leakage power. Compared to conventional random access dynamic memory (DRAM), emerging non volatile memory such as phase change RAM (PRAM) has better density and energy efficiency. However, it usually suffers from power / latency disadvantages and low write endurance. In this project, We discuss the problem of distributing tasks in hybrid core memory to both DRAM and PRAM in order to take advantage of the power consumption and performance of the memory subsystem using Robust Dynamic signal power optimization method. For a static task set to design a Linear Programming Integer (ILP) based on an Robust Dynamic signal power optimization algorithm to achieve optimal task allocation.

Keywords: *Non-Volatile Memory, Phase Change Memory (PCM), Dynamic Random-Access Memory (DRAM), Phase Change RAM (PRAM), Linear Programming Integer (ILP).*

Estimation of Varietal Purity and Quality Analysis in Rice Seeds Using Digital Image Processing – A Survey

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Agriculture plays a major role in today's world. 70% of rice production is cultivated in south India. Thailand, the US, India, Vietnam, etc., are exporting rice all over the world. But they are facing one of the most difficult tasks: assuring the rice seed quality. Good seeds can increase production, so selecting seeds is very important. A maximum of the work was done physically or by using huge, expensive machines. For choosing good seeds, agronomists be conscious of two factors, such as the variety which is determined by some quality criteria, and next by the skilled one who is going to analyze the rice seed physically. Both tasks take a long time and the result of accuracy is also not as expected. Nowadays computer vision technology with Digital Image Processing plays a major role in many fields, namely agronomy, healthcare, machine vision, pattern recognition, remote sensing, Video processing, etc. Our research work mainly focuses on the agricultural arena, going to provide good quality seeds and identify dissimilar varieties of rice seeds by digital image processing techniques such as image capturing, segmenting the rice seeds, extracting the features from the rice seeds and finally feeding into the machine learning algorithm to find out the accuracy too.

Keywords— Machine vision, Rice seed varietal purity, Classification of rice seed, Quality Analysis of rice seed, Machine Learning algorithm.

NEAR INFRARED BASED NON-INVASIVE BLOOD GLUCOSE PREDICTION SYSTEM-DEVELOPMENT AND EVALUATION

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INTRODUCTION

Diabetes is a long-term disorder indicated by the marked increase of glucose in the bloodstream resulting in other serious complications such as atherosclerosis, nephropathy, diabetic retinopathy, macular edema, neuropathy in mere future. The WHO reported the prevalence of diabetes among adults was 8.5% in 2014.In addition, in 2019, diabetes accounted for 1.5 million fatalities, with 48% of the deaths under the age of 70. Approximately 77 million and2 5million Indian population are affected by type 2 diabetes and are pre-diabeticrespectively. Precise tracking of glucose is of paramount importance while administering the drug to regulate the glucose profiles. Conventional techniques for the quantifying the glucose values are invasive as it involves venipuncture or the use of the finger stick to obtain the bloodsample for biochemistry analysis or glucomet er testing. These procedures can lead to skinirritation and subsequent infections, particularly when testing is performed frequently during continuous monitoring. Current research is primarily centered around optical-based systems,which allow for ambulatory glucose monitoring without causing any inconvenience to thesubject. In this study, we propose a non-invasive near infrared (NIR) optical approach rather than state-of-the art invasive methods for the purpose of glucos emonitoring by optimizing the NIR wavelengths at which glucose exhibits its affinity.

MATERIALS AND METHODS

Based on the literatures, it has been identified that the wavelengths of 940 nm, 1050nm, 1150 nm, 1400 nm, and 1550 nm exhibit prominent peaks that are highly relevant for thequantification of glucose concentration within the NIR region. Our aim was to develop a low-cost system that uses a single wavelength, hence we preferred

940nm light emitting diode(LED) and photodiode in our study. Furthermore, we employed both the transmittance and reflectance methods on the index finger of four subjects (1-diabetic and 3-Normal) as shown in Figure 1 to determine the most effective strategy for differentiating individuals with diabetes from the healthy.The distance between the LED and photodiode was varied to identify theoptimal distance.
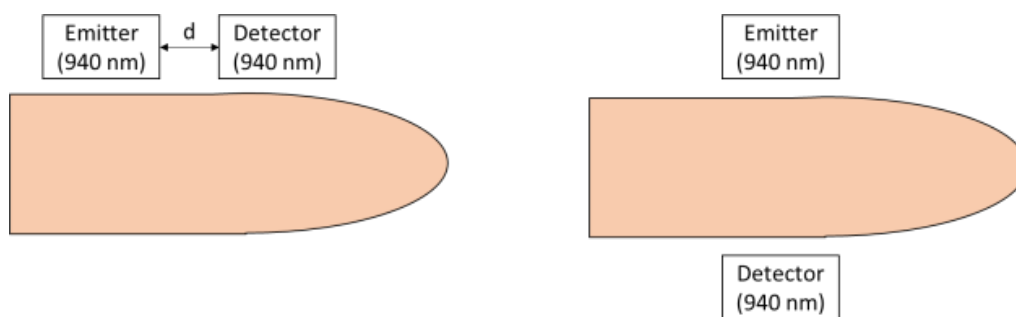
Figure1.Visual representation of reflectance and Transmittance method

RESULTS & DISCUSSION

We obtained the glucose concentration in blood with the glucometer 'Accu-chek Instant' tocorrelate with the voltage that was obtained with the photodiode at each measurement. The glucose values are tabulated in Table1 along with the voltage values obtained with transmittance method. The voltage output acquired through the implementation of the reflectance emethod at different distances isillustratedin Figure 2.

Table1. Comparison of voltage output obtained with transmittance method

Subject	RandomGlucose(mg/dl)	Voltage (mV)[Transmittancemethod]
Subject1	210	2783
Subject2	97	2852
Subject3	93	2671
Subject4	88	3051
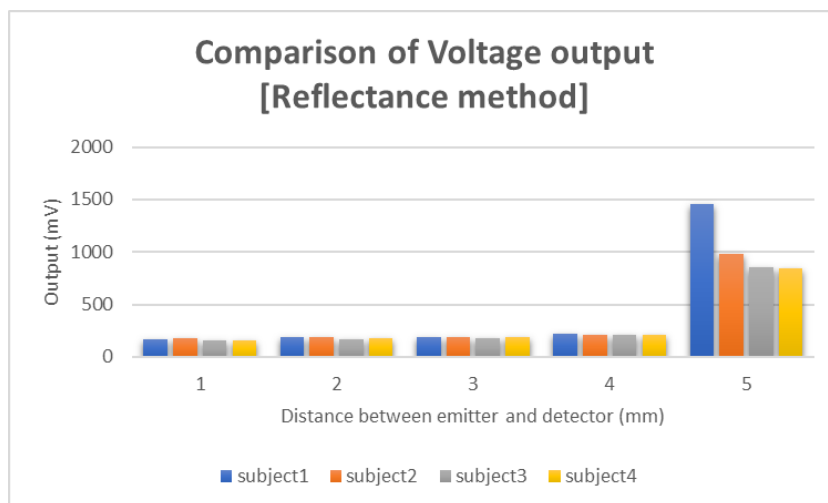
Figure2.Comparison of voltage output obtained with transmittance method

It was observed that the no distinguishable NIR output was produced in transmittance modebut difference between the diabetic and non-diabetic was identified in reflectance mode at 5mm.

CONCLUSION

The successful implementation of a cost-effective near-infrared (NIR) optical system was undertaken with the objective of quantifying glucose levels.The findings of this initial investigation indicate that the concentration of glucose can be as certained through the utilization of a reflectance method, with a separation distance of 5mm between the LED and photodiode.The present study was conducted using a limited sample size,and it is recommended that future research expand the sample size in order to establish a regression equation that relates glucose levels to the voltage obtained from the system.

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Synergistic Effect of Natural Mordant with Guava Leaves Extract as Antimicrobial Property of BambooFabric for Topical Wound Healing Purpose

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Leaf extract from Psidium guajava Linn., which contains phenolic chemicals, is recognised for its antibacterial properties. The purpose of this work is to create antibacterial bamboo fabric bandages utilising harad (Terminalia chebula) and Psidium guajava Linn. leaf extract. Harad was incorporated using a laboratory water bath at 50°C for 30 minutes, a M:L ratio of 1:10, and a concentration of 5% of for encapsulation. Different concentrations of bioactive/antibacterial agent (100 g/mg of fabric, 50 g/mg of fabric, 25 g/mg of fabric, and 12.5% g/mg of fabric) were employed for the application of guava leaf extract using the spray-dry-cure method at a temperature of 50 °C. Before applying Psidium guajava Linn.leaf extract, an antibacterial agent, to bamboo fabric, Harad was first introduced. Escherichia coli was used as the test organism for the fabric's antibacterial properties.

Key Words— *Synergistic, Psidium guajava Linn., antibacterial textile, encapsulation.*

An Efficient Algorithm for Screening Anemia Based on Analysis of Eye Conjunctiva Images

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Anemia is a highly prevalent blood-related disorder occurs due to the decrease in the level of hemoglobin or a lowered oxygen-carrying capacity of the blood. According to the estimate of World Health Organization (WHO) 1.62 billion people worldwide, or 24.8 percent of the world's population are affected due to anemia. The major anemic patients are of children under the age of six and of expectant mothers globally. According to the National Family Health Survey-5 (2019-21) the incidence of anemia in India has worsened in the category of under-5 children and women. The paper presents the basic screening test for anemia by non-invasive analysis of the anterior conjunctival pallor region of the eye. The Analysis proceed by acquisition of digital images of eye conjunctiva region taken with help of a smartphone camera of appropriate resolution under adequate lighting condition. The efficient algorithms in digital image processing such as automatic feature extraction and classification using CNN and handcrafted features fed into classifier such as support vector machine (SVM) are used for detection of anemic condition. The paper also compares performance of both and evaluates to identify the strengths and limitations of each approach, guiding the selection of the most appropriate algorithm for efficient anemia screening and detection.

Key words—Eye Conjunctiva Images, anemia screening, segmentation, Feature extraction, Support vector machine (SVM), Convolutional Neural network (CNN).

Saline Bottle Monitoring System and Fall Detection System

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Later, it became increasingly difficult to adequately care for patients due to a lack of sufficient nurses. This shortage often resulted in critical conditions and, unfortunately, even the loss of patients' lives. However, in recent years, the healthcare industry has experienced significant growth in patient healthcare monitoring systems, which have paved the way for preventing such tragic incidents. These systems have played a crucial role in improving patient outcomes and ensuring their well-being by providing constant monitoring and timely intervention.

Preeclampsia Risk Monitoring and Alert System Using Machine Learning

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A significant pregnancy complication called Preeclampsia, a serious pregnancy complication, is characterized by high blood pressure and signs of organ system damage, usually to the liver and kidneys. Preeclampsia affects both the mother and the unborn child, and if it is not detected and treated very away, it can result in serious morbidity and mortality. Preeclampsia early detection is essential for both maternal and foetal outcomes. Symptoms of organ system damage, most frequently to the liver and kidneys. Preeclampsia affects both the mother and the unborn child, and if it is not detected and treated very away, it can result inserious morbidity and mortality. A significant pregnancy complication called preeclampsia is characterised by elevated blood pressure and symptoms of organ system damage, most frequently to the liver and kidneys. Preeclampsia affects both the mother and the unborn child, and if it is not detected and treated very away, it can result inserious morbidity and mortality. Preeclampsia early detection is essential for both maternal and foetal outcomes. Preeclampsia has been predicted using machine learning approaches using Decision tree, K-nearest neighbour, Random Forest algorithm utilizing a variety of clinical and demographic data, including proteinuria, blood pressure, and maternal traits like age, BMI using machine learning techniques.

Key words: preeclampsia, maternal and foetal outcomes, machine learning approches

Cost Effective Blood Collection Monitor for Donors

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Blood collection monitor is used for accurate collection of blood. It is a compact instrument which measures the quantity of blood and provides smooth and gentle rocking of blood for homogenous mixing with anti-coagulant which prevents clot formation of blood cells during collection of blood from a donor. Blood collection process happens in different environments, the main challenge to the phlebotomist (one who draws blood for analysis or transfusion) is to make each blood collection process more comfortable and safer without compromising quality. Blood collection monitor comes into role here; it is specially designed to for standardized high quality blood collection with reduced work load of phlebotomist. Blood collection monitor ensures correct volume of blood collection with constant agitation for better component yield. So, the correct volume of blood collection and mixing of the blood with anticoagulant and periodically during collection of blood is done by blood collection monitor. In this project a more cost effective and easily portable model of the blood collection monitor will be designed.

Key words: Phlebotomist, Portable model, High quality blood collection

A Novel and Self-Governing Hybrid Approach for the Detection of Leaf Diseases using Robotics and the Concept of the Internet of Things (IoT)

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The knowledge that crops supply can only be converted into lucrative decisions when they are managed effectively. Since data has overtaken all other aspects in modern agriculture as the most significant factor in decision-making, Smart Farming is currently expanding dramatically. Objective data obtained by sensors provides significant advantages with the aim of enhancing productivity and sustainability. This type of data-driven farm management depends on information that can increase productivity by reducing resource waste and environmental contamination. Future agriculture is built on a foundation of data-driven farming, assisted by robotic solutions that employ artificial intelligence approaches. Urban agriculture, agriculture, and forestry present a once-in-a-generation window of opportunity for the development of automated and robotic systems thanks to the online of Things (IoT), other cloud-based solutions, and the constantly changing nature of the online world. The development of cutting-edge robotic stems and intelligent technologies for use in precision farming has been aided by the development of GPS, machine vision, lasers, and mechatronics. To diagnose plant diseases in real time, this study demonstrated a versatile Internet of Things (IoT) robotic system for greenhouse cultivation applications. Instead, ADAM uses a BRCNN (Backpropagation Recurrent Convolution Neural Network) module trained with MFO (Moth Flame Optimizer) as its Primary Optimizer to detect disease on a plant and SVM to describe the type of illness. Additionally, the system offers the necessary feedback remedies as needed. Because of this strategy, a quick and basic classification of plant diseases may be made without having to spend a tonne of money on plant inspection and in-depth chemical research. The categorization results demonstrate that the method has a high rate of success in classifying and diagnosing plant diseases. The system's use has shown that it can provide the user with real-time feedback by drawing on a vast library of remedies for each specific case of plant disease. The training dataset that we are utilising is continually being updated with new plant photos since we intend to eventually increase the plant disease dataset.

Keywords: *plant disease, MFO, BRCNN, agriculture*

Designing and Executing a Medicine Ordering System Using LabVIEW Software - An Objective Approach

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The world of medicine is constantly evolving and improving to provide efficient healthcare solutions. One of the most important aspects of healthcare is ensuring that patients receive their medications on time in an efficient manner. Several medical facilities are tilting towards technology to streamline their processes, including the implementation of medicine ordering systems. LabVIEW is a powerful tool that can be used to design and implement a medicine ordering system that is both effective and efficient. This paper illustrates the design of a medicine ordering system for ordering drugs virtually. It includes the quantity, ordering methods and amount estimation of the drugs through virtual instruments. This article provides a synopsis of the procedure followed for implementing a medicine ordering system using LabVIEW software.

Keywords- *Healthcare, medication, LabVIEW, virtual instruments*

Interpretation of an Efficient Inter-Drone Communication Network for Expeditious Medical Drug Delivery

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A drone is a miniature pilotless aircraft that is typically a flying robot which is also known as unmanned aerial vehicle (UAV). To begin with UAV'S are developed worldwide for its high military applications. Currently drone technology have been employed in various sectors especially in industries for its elevated efficiency and truncated workload. Emergency crisis were uncertain, in such cases the response of the recovery process must be firmly fixed. Though the preparedness during an exigency is a great challenge, the usage of unmanned aerial vehicles are pre-requisite. With evolution of drone technology, drones will assist humans in every domain. At the peak of reducing acute time constraints during delivery which involves more human power that causes delay by means of transportation, drones provide better technological infrastructure as they are highly mobile and reliable. They are highly effective and efficient to reach and access remote areas effectively which has in adequate manpower and loss of transportation facilities. This paper aims at providing the insights of drone communication and its application over medical sector which is more reliable during emergency intervention. The delivery process uses GPS navigation system in conjugation with sensors for drone communication is incorporated and employment here. The main objective is to deliver medicines from hospital to hospital with quick and rapid response during emergency situation of patient by drone communication technology as they require least time and energy.

Drones are already used in delivering product. This method is being used by various MNC's todeliver their products. In addition to these drones are also used to deliver medicines during rescue operations and in Covid times. The proposed system uses drones to deliver medicines to the nearby hospitals during emergency times. Basically, in this system drone's communication technique is utilized. This allows the drones in different hospitals to communicate with each other in the availability ofmedicine and the nearest hospital which contains the required medicine will send its drone to deliver

the medicine. When the nearest hospital which contains the required medicine is found, a message will be to therespective hospital. The required medicines will be packed and placed in the drone. Now the drone is ready for delivery.

Each drone in a drone swarm is expected to communicate with another drone using U2U (UAVtoUAVcommunication) mode. Each UAV in a swarm can establish efficient communications, both directly between two UAVs, orvia multi-hop communication paths with other UAVs.U2U communication mode shows similar features to ground device-to-device (D2D) communications including synchronization, peer discovery, mode selection, resource allocation, etc. New possibilitiesfor UAV interconnection could be brought by LoRa communication.Radio frequency bands like 433MHz, 868 MHz (in Europe), and 915 MHz (in Australia and North America) are used by LoRa.Depending upon the different modulation configurations, it enables long-range transmissions up to various kilometers with low power consumption,achieving datarates from 0.3kbps to 27kbps. But the simple MAC protocol makesit unreliable for transmissions without a proper transport layer protocol to make it more robust. But due to its low power requirements and physical characteristics it can be considered as a goodcommunication tool. Terms like latency, bandwidth, radiocoverage, powerusage, robustness and technology maturity helps inidentifying the potential technology partner for U2U communication.

Model drug delivery network for Data/signal transmission:
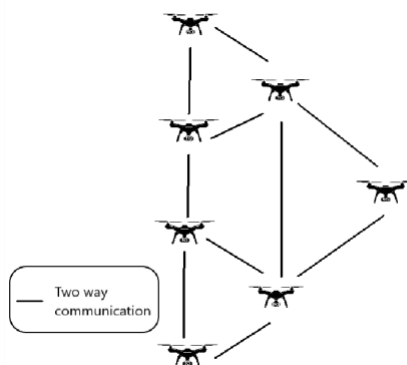
- Each node in the network represents a hospital which contains an drone associated withit.

- The drone associated with the hospital which requires emergency delivery of drugs isnamedastheBASE drone.

- The basedronesendsitslocationasthe signaltothe dronesconnectedtoit.

- If the required drugs are available in any of the hospitals in the first level, then the droneof that hospital will accept the signal and get ready for delivery. Else, the signal istransmittedto thenextlevelofdronesconnectedto them.

- Once the signal is accepted by a delivery drone, the remaining drones (which received thesignal) and also the base drone will terminate the process and wait for a new commandfromground station.

This network helps toquicken the process of signal transmission which is advantageous during emergency situations. Drones which are nearer to the base is given first preference which leads toquicker delivery ofdrugs.

Once the drone had reached the desired location it will find safe location to lower the package. Thislocation is either set by the customer but in case of hospitals there should be a separate location for landing of the drones. These locations are similar to that of helipads but indrones they donot require so much space.QRcodes will be sent to the customers.The drone camera scans the code identity for safe drop and then lower the chords.After delivery the drone will return to its hospital.
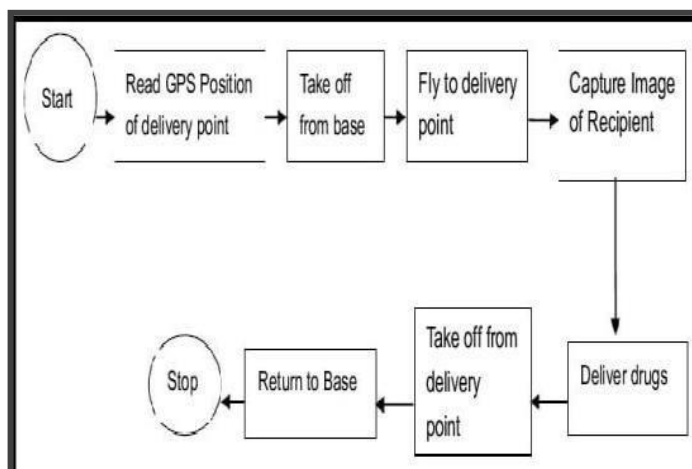
Software used for navigation and delivery: Mission planner software The starting location and tx is selected. Target location is set. A home location is set for the Quadcopter it will give a "failsafe" and return location if anything were to go wrong

with the aircraft. The user can plot waypoints after setting home location using Google maps interface. Using "DO_SET SERVO" releases a mechanism on Quadcopter, delivering the package in the Target location. Once this is complete, the UAV retreat to home specified on the flight map.

PVA/ZTA Hydrogels for Cartilage Tissue Engineering: Physiochemical and Mechanical Evaluation

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Polymeric hydrogels have demonstrated versatility in a variety of biomedical applications. The current study intended to fabricate and characterize a ZTA reinforced PVA hydrogel with superior mechanical characteristics for articular cartilage applications. The citrate-assisted sol-gel approach was used for synthesizing ZTA powders, and the repeating freeze-thaw method was used to construct varied concentrations of PVA/ZTA hydrogels. XRD and Raman analyses were used to confirm the phase behavior of the ZTA powder. FTIR was used to evaluate the interaction and bonding between PVA and ZTA in the developed hydrogels. Swelling and mechanical strength were also examined to identify the water holding capacity and tensile strength of the hydrogels for their practical application in the replacement of articular cartilage.

Key words: PVA; ZTA; hydrogels; Mechanical

Advancements in Satellite Constellations for Global Networking

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This paper discusses the concept of using constellations of satellites to provide internet coverage to remote and underserved areas. Satellites are objects that orbit the Earth for a specific purpose, and they have played a crucial role in modern-day communication systems. The new innovation involves launching hundreds or thousands of small satellites into orbit, which work together to provide internet coverage. This technology has the potential to bridge the digital divide and provide internet coverage to any location on Earth, regardless of how remote or isolated it may be. Several companies are already working on launching satellite constellations to provide global internet coverage. The paragraph concludes by stating that this technology has the potential to revolutionize the way we connect to the internet, and it will be exciting to see how it develops in the future. The reduced cost of building and launching small satellites has made the concept of satellite constellations a more feasible solution for providing internet coverage. With the ability to provide high- speed internet to remote and underserved areas, satellite constellations could enable access to education, healthcare, and economic opportunities. However, there are also challenges to overcome, such as the potential for space debris and interference with other satellites.

Keywords: constellations, satellites, network, communication, navigation, internet coverage, remote areas, global telecommunication system, technology, digital divide, innovation, affordability, high-speed internet, space debris, global connectivity.

Performance Evalution of Spectrum Energy Detection in Cognitive Radio Network Determinative Based Threshold Schemes

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This work presents a hardware-friendly algorithmand architecture for cooperative spectrum sensing (CSS) in the data-fusion-based cognitive-radio (CR)network. The proposed VLSI-algorithm is based onthe iterative power method and deflation techniquethat alleviate the computational complexity ofconventional CSS algorithm with minimalperformance degradation. In this work, a newhardware-efficient VLSI architecture of cooperativespectrum sensor (CSR) for the data-fusion center ispresented, which supports up to six secondary usersin the cooperative CR network. Its performanceanalysis under fading channel environment has beencarried out where it delivers 0.8 detectionprobability (Pd) at -8 dB of channel SNR with a falsealarm rate of 0.1. It shows the minimumperformance degradation of 0.057 dB at P d = 0.88compared to the conventional algorithm. Thesuggested CSR architecture has been application-specific integrated circuit (ASIC)-synthesized andpostlayout simulated in UMC 90 nm-CMOSprocess. Thus, it occupies 2.4 mm2 of the core area, consumes 36 mW of total power, and delivers a lowsensing time of 60.41μs while operating at amaximum clock frequency of 87.7 MHz.Comparison with the reported works indicates thatthe proposed design requires 40.3% lesser area, andit is 41% hardware efficient than the conventionalimplementation. Eventually, this design has beenfield-programmable gate array (FPGA)prototyped, and its functionality is verified in thereal-world test environment.

Keywords: *Cooperative Spectrum Sensing (CSS), Cognitive-Radio (CR), Application Specific Integrated Circuits (*ASIC), Field-Programmable Gate Array (FPGA).

Analysis of Ocular Fluid Dynamic effects on the Magnesium Drug Delivery implant device for Smooth Pursuit Eye Movements using CFD

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Age-related macular degeneration (AMD), a degenerative retinal disease, is one of the primary causes of blindness in persons over the age of 50. One of the most common causes of blindness in patients is macular hole degeneration, which is treated with anti-VEGF drugs. In the treatment of AMD, a magnesium-based implant device is employed in medication administration, which is highly effective in reducing the number of injections. It is essential to develop new drug delivery devices that enhance treatment results, and magnesium is a promising substance. Magnesium is an essential component of ocular function. Magnesium is extremely beneficial because of its low corrosion resistant, biodegradability, and biocompatibility. The purpose of this research is to see how ocular fluid dynamics affect a implant gadget in the vitreous humor. The flow-induced total pressure response on the device's external surfaces was studied for different smooth pursuit eye movement periods. The simulations were carried out using CFD for the smooth pursuit eye movements for different frequency of eye movements 1Hz, 2Hz and 3Hz in absence of rest time. Computational Fluid Dynamics was utilized to determine the pressure distribution on a magnesium-based device for smooth pursuit eye movements inside the ocular vitreous chamber. The influence of fluid-induced vitreous splashing on the intravitreous administration of drug delivery medicines was analysed.

Keywords—*AMD, Magnesium, Smooth pursuit eye movements, CFD, Drug Delivery*

Arrhythmia Detection and Classification using PPG.

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Cardiovascular diseases (CVDs) remain a significant global health concern, contributing significantly to mortality rates worldwide. The majority of sudden cardiac arrest incidents, accounting for approximately 80% of cases are attributed to arrhythmias, leading to approximately 12% of all annual fatalities. Arrhythmia stands as the prevailing cardiovascular condition, resulting from abnormal heartbeats, characterized by either excessive speed, slow pace, or irregular rhythm. These irregularities in heartbeats can trigger heart attacks, organ dysfunction, or fatal outcomes. Therefore, it is crucial to continuously monitor the heartbeat and to detect the arrhythmias at the earliest. ECG (Electrocardiogram) based cardiac monitoring systems cannot be used for continuous monitoring and they are not portable. In contrast, photoplethysmography (PPG) is an inexpensive method that can be employed in wearable devices for continuous heartbeat monitoring. In this work, the PhysioNet Challenge 2015 dataset was utilized to detect life threatening arrhythmias using PPG signals. The four distinct types of arrhythmias - tachycardia, bradycardia, asystole, and ventricular tachycardia were identified and classified based on the analysis of PPG signals.

Keywords— Cardiovascular diseases, PPG, Arrhythmia detection

3D Modelling of Heart Valves – A Review

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Aortic valve located between left ventricle and aorta in cardiovascular system helps in circulating blood from left ventricle to other body parts and prevents backflow. Various abnormalities like aortic stenosis, aortic regurgitation, congenital diseases,infective endocarditis and valve degeneration which impairs the valvular function leading to replacement of valves.Aorticvalve located between left ventricle and aorta in cardiovascular system helps in circulating blood from left ventricle to other body parts and prevents backflow.Various abnormalities like aortic stenosis,aortic regurgitation,congenital diseases,infective endocarditis and valve degeneration which impairs the valvular function leading to replacement of valves.Decision to replace aortic valve is made on severity of symptoms,impacton heart function.Artificial aortic valves has revolutionized the process by restoring normal blood flow, treating aortic valve diseases. 3D modelling techniques are used for optimizing design, performance and durability of artificial aortic valve. Modelling process will be started by creating a detailed 3D model of the valve using Autodesk.Autodesk is a versatile 3D modeling software that can be employed to create detailed 3D models of aortic valves. It offers featuressuch as parametric modeling, direct modeling, and sculpting tools that facilitate the precise representation of valve anatomy. It also allows for the integration of mechanical and fluid simulations, enabling the analysis of valve function and performance. Model will be exported to the COMSOL Multiphysics software and analysis is conducted by considering various parameters such as fluid dynamics,material properties,fluid structure interaction and leaflet performance. COMSOL Multiphysics will allow us to realistically simulate the interaction of fluid flow and blood within the valve structure. Combined Autodesk and COMSOL approach provide a comprehensive framework for studying and analysing mechanical behavior of aortic valve.

Keywords: Aortic valve; abnormalities; valve replacement; artificial aortic valve; 3d model; COMSOL; Autodesk

Automated Medication System for Adult Care

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Many patients fail to follow instructions from healthcare providers regarding medication usage due to various reasons. These may include a lack of understanding of the directions, forgetfulness, the complexity of multiple medications with different regimens, unpleasant side effects, or a perceived lack of effectiveness of the medication. To address this issue, we have developed the automated medication system for adult care, a high-performance smart pill dispenser. This device not only dispenses pills but also handles liquid medications, making it a versatile solution. Unlike existing mono-use pill dispensers that serve only one patient, our device is designed to accommodate multiple patients by incorporating slots for their medications. To ensure patient safety, access to the device is limited to healthcare professionals such as doctors or pharmacists. Additionally, we have implemented a temperature-controlled system within the device to safeguard the pills from external conditions. Developing an advanced integrated system with these features at an afford- able price has its challenges. However, with the technological advancements available today, we have been able to create a device that fulfills all these requirements without imposing exorbitant costs. We understand that protecting patients is a top priority, even when it comes to medication management. Therefore, we have taken great care to ensure that our device provides essential safeguards to patients, such as maintaining proper storage conditions. In summary, our automated medi- cation system for adult care is a comprehensive solution that addresses medication management challenges. It combines a pill dispenser, a liquid medication dispensing system, and various protective features to enhance patient adherence and safety. Moreover, by focusing on affordability, we aim to make this innovative technology accessible to a wider population, rather than limiting its use to a privileged few.

Keywords: Smart pill dispenser, Liquid medications, Patient adherence

Identification and Analysis of Disease Gene Relationship using Machine Learning Approaches

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The presence of vast amount of genetic data poses acute challenges in identifying specific genes associated with the complex diseases that need timely detection. Identification and analysis of genes associated with the diseases is essential wherein the current conventional procedure is time consuming and entail expensive experimentations involving field experts. Therefore, effective, low-cost computational methods based on machine learning are the need of the hour that aids in identifying the genes associated with the diseases and their relationship. The machine learning algorithms use biological features to identify significant genes that can serve as biomarkers for the disease. In this work, four diseases namely, Asthma, Diabetes, Malaria and Thalassemia are considered for finding the gene disease association. The biological features have been extracted from the gene sequences associated with the individual diseases and the classification has been performed. Four different frameworks based on statistical analysis have been performed for classification. Machine learning algorithms namely Support Vector Machine, Linear Discriminant Analysis and Decision tree have been used to classify the diseases. The features explored in the study have been able to illustrate the relationship between the gene sequences and corresponding disease and Decision tree classifier has been able to capture this essence by obtaining the maximum accuracy of 86.1%. Significant genes from a large pool of genetic data belonging to the four diseases and features extracted from these were classified with an accuracy of 65%. Deploying such machine learning models for identifying the significant gene-disease relationship alleviate major challenges in conventional methods and aid in diagnosis, prognosis, and treatment.

Keywords—gene disease association, biological features, ANOVA, computational techniques, machine learning

Separation of Fetal ECG from Maternal ECG and Analysis using Empirical Mode Decomposition algorithm

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This paper presents a method forseparating fetal electrocardiogram (ECG) signals frommaternal ECG signals using the empirical modedecomposition (EMD) algorithm. This method utilizesthe EMD algorithm to decompose the mixed ECGsignal into a set of intrinsic mode functions (IMFs) thatrepresent different frequency components of thesignal. The IMF components that correspond to thefetal and maternal heart rates are then identified andused to separate the two signals. The separated ECGsignals are analysed to estimate the heart rate, providing valuable information for fetal monitoringduring pregnancy. The efficacy of the suggestedmethodology is assessed through the utilization ofsimulated electrocardiogram (ECG) signals. Theoutcomes of this evaluation substantiate the capabilityof the method to effectively distinguish fetal ECGsignals from maternal ECG signals, as well as toaccurately estimate both fetal and maternal heartrates. Therefore, it improves fetal montoring duringpregnancy.

Keywords— Maternal, Fetal, ECG, Empirical mode, decomposition, Extraction, Intrinsic mode functions, Heart rate

Self Stabilizing Spoon for Parkinson's Disease

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1. INTRODUCTION

PatientssufferingfromParkinson'sdiseasehaveaserioustremorthathappenswhenevertheytryto grab something with their hands. More accurately it happens whenever they focus on the part oftheir body because their brain is damaged and thus cannot control the body on their will. A majordisadvantage that comes with this symptom is not being able to eat on their own. For this, the ideawas to find a cheaper solution for the said problem which is the Self-stabilizing spoon for the same Parkinson's sufferers.

2. MATERIALS AND METHODS

In this model, using servo motors and an axis analoggy rosensor, the tremble expressed by the patient will be sensed by the sensor, and using a suitable microprocessor programmed accordingly, the servo motors will be programmed to stabilize the unwanted tremble motion, giving movement inthe oppositedirectionalongbothxandy-axis.

2.1 Methodology

To build a self-stabilizing spoon, several steps need to be followed. The first step involves gathering all the necessary components such as the Arduinoboard, servomotor, gyrosensor, battery, and other required materials. Once the components are assembled, the circuit design phase begins. During this phase, the servomotorand gyrosensorare connected to the Arduinoboard, ensuring secureconnections. Moving on, the Arduino board is programmed to read data from the gyro sensor and utilize it to control the servomotor. This programming step involves writing code in the ArduinoIDE using the MPU 6050 library and the Servo library. Following the programming phase, the self-stabilizing spoon undergoes testing. Different positions are tested to observe whether the servomotor can effectively stabilize the spoon. If the spoon does not perform optimally, further refinement may be necessary. This includes making modifications to both the design and programming of the project to enhance its functionality.

Block Diagram & 3D Model:
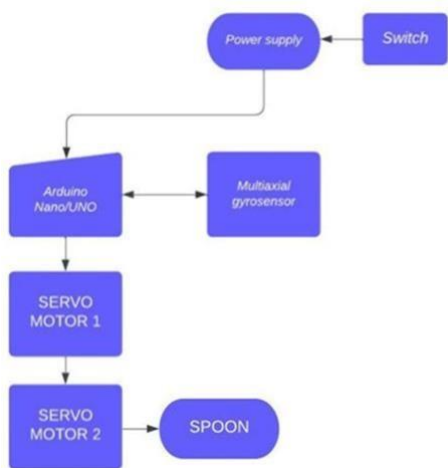
Figure1.Block Diagram
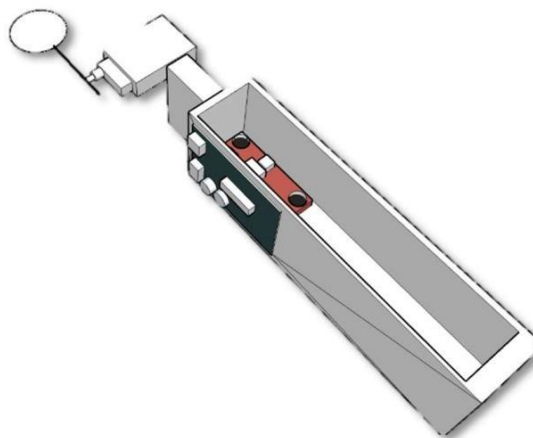
Figure 2.Full viewof3Dmodel

3.RESULTS AND DISCUSSION

The self- stabilizing spoon prototype was successfully designed and implemented, and it demonstrated a significant reduction in the amplitude of tremors during testing, as evidenced by thereduced deviation in the angular position of the spoon compared to when it was operated manuallywithout the stabilization feature. The gyro sensor accurately detected the tremors and provided feedback to the servo motor to adjust the spoon's position in real-time, resulting in improved stability and control.

Lateral View of the Prototype

4. CONCLUSION

In conclusion, the development of the self-stabilizing spoon for Parkinson's disease has proven to be a promising solution for patients suffering from tremors and other motor impairments. Theintegration of a gyro sensor and a servo motor allowed the spoon to adjust its position and remainstable, reducing the amount of spillage and increasing independence for the user during mealtimes. The experimental results showed that the spoon successfully maintained stability during movements, and the user feedback was positive,with many patients reporting increased confidence and ease while eating. Although there are still some limitations to this project, such as the need for a more compactdesign and longer battery life, it serves as a proof-of-concept for future developments in the field ofassistive technologyforParkinson'sdisease.

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Design of a Digital Peak Expiratory Flow Meter

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1. INTRODUCTION

Asthma is a chronic respiratory condition that affects the airways, the tubes that carry air inand out of the lungs. It is characterized by inflammation and narrowing of the airways, which leadsto recurring episodes of wheezing, breathlessness, chest tightness, and coughing. These symptoms can range from mild to severe and may vary in frequency and intensity from person to person.

Diagnosing asthma involves a combination of medical history, physical examination, and lungfunction tests. The medical history includes valuating symptoms, triggers, and any family history of asthma or allergies. During a physical examination, a healthcare professional may listen to thelungs with a stethoscope to check for wheezing or other abnormal sounds. Lung function tests, suchas spirometry, measurehow much aircan beinhaled andexhaledandhow quickly itcan be expelled from the lungs. These tests can help determine the presence and severity of airflow limitation.

Peak expiratory flow (PEF) is a measurement of the maximum speed at which a person canforcefully exhale air from their lungs. It is commonly used in the assessment and management ofrespiratory conditions like asthma. PEF is measured using a handheld device called a peak flowmeter (PEFR). By monitoring PEF, individuals can track changes in their lung function, identify triggers or worsening of symptoms, and adjust their medication accordingly. PEF provides valuable information for healthcare professionals in evaluating the severity of respiratory conditions and guiding treatment decisions. Asthma management requires accurate monitoring of lung function, particularly PEFR, whichserves as a valuable indicator of asthma control and helps predict the onset of an asthma attack. Traditional analog peakflow meters have beenwidely used for this purpose, but they lack theability to store data and are less convenient for patients. Digital peak flow meters offer a digitizeddisplaybut often come with ahigh price tag and limited functionality.

2. MATERIALS AND METHODS

This paper proposes a methodology that involves the use of an orifice to create resistance to airflow during exhalation. By measuring the pressure difference before and after the orifice, the flow rate of exhaled air can be determined. This approach provides a cost-effective solution for measuring PEFR, as it eliminates the need for expensive sensors while maintaining accuracy.

Figure1.Basic prototype of PEFR

To enable data sharing and storage, it is incorporated with a microcontroller into the prototype. The microcontroller acts as a central processing unit, collecting and processing data from the pressure sensors and transmitting it to an application or storage system. This allows for continuous monitoring of PEFR values and facilitates long-term tracking of asthma control.

The prototype presented in the paper demonstrates the functionality of the proposed methodology. It predicts different zones basedon PEFRmeasurements, without the need for additional sensors. The basic prototype of the developed PEFR is shown in Figure 1. However, theprototypeis still intheearly stagesof development andrequiresfurther refinement.

In the future, the device can be enhanced by adding the capability to store PEFR values. Ifabnormal readings are detected, the accompanying application will prompt the user to manuallyinput their condition, providing valuable information for personalized asthma management. Thisadditional functionality aims to improve the accuracy and effectiveness of monitoring, allowing for better asthma control and proactive intervention.

3. RESULTS AND DISCUSSION

The proposed digitalpeak flow meter hasthe potentialtorevolutionize asthma management by offering an affordable and user-friendly solution for patients. By leveraging the advancements in micro controller technology, it enables real-time monitoring and data storage,empowering individuals to take control of their asthma condition.The cost-effectiveness of the proposed device is a significan tadvantage,particularly in healthcare systems with limited resources.It open supopport unities for wider adoption and accessibility, ensuring that even individuals with limited financial means can benefit from accurate asthma monitoring.Furthermore, the ability to store PEFR values and track changes over time provides healthcareprofessionals with valuable insights into a patient's asthma control. This data can aid in treatmentadjustments, personalized care plans, and early detection of exacerbations, ultimately leading to improved health outcomes for asthma patients. However, it is important to acknowledge the limitations of the study. The presented prototypeis still in the early stages of development, and further research and testing are required to validate itsaccuracy and reliability. Additionally, the need to explore wireless data transmission options for seamless integration with existing healthcare systems is essential.

4. CONCLUSION

In conclusion, the paper proposes a cost-effective digital peak flow meter for monitoring asthma patients. The incorporation of an orifice and microcontroller allows for accurate measurement of PEFR and enables data sharing and storage. This innovative approach addresses thelimitations of existing digital peak flow meters, making asthma monitoring more affordable and accessible. By facilitating continuous monitoring and personalized asthma management, this technology has the potential to significantly improve the lives of individuals with asthma and enhance healthcare outcomes in thefield of respiratory medicine.

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Piezoelectric Energy Harvesting from Foot Motion

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1. INTRODUCTION

Piezoelectricenergy harvesting has gained significant attention in recent years as a promising approach for sustainable energy generation. The ability of certain materials to generate an electric charge when subjected to mechanical stress, known as the piezoelectric effect, has paved the way for novel methods of harvesting energy from everyday activities, including foot motion. Foot motion, being a natural and ubiquitous human activity, presents a compelling opportunity for harvesting mechanical energy and converting it into electrical energy to power wearable devices remote sensors, and other low-power electronics.

The process of energy harvesting using piezo electric transducers begins with the mechanical energy input. When the piezoelectric transducer is subjected to mechanical stress or vibration, it generates an electric charge onits surface, which can be collected and stored in a capacitor or a battery for later use or directly used to power electronic devices. In the healthcare industry, piezoelectric transducers can be used in medical implants, such as pacemakers or hearing aids, to harvest energy from body movements or vibrations, eliminating the need for frequent battery replacements. They offer high efficiency, compactness, durability, and versatility, making them suitable for various applications in diverse industries.

Piezoelectricity occurs in materials that have anon-centrosymmetric crystal structure, which means that the crystal lattice does not have a centre of symmetry. When mechanical stress or pressure is applied to these materials,the positive and negative charges in the crystal lattice become displaced, creating an electric dipole moment, as shown in Figure 1. This dipole moment generates an electric field that can be measured as a voltage across the material. The piezoelectric effect is not limited to solids only, it has also been observed in biological systems, such as the bones and tendons of animals.

Piezoelectricity has revolutionized the field of sensors, as piezoelectric materials have the ability to detect mechanical pressure, strain, and acceleration. They are widely used in various industries, from medical to aerospace. Piezoelectric transducers have played a crucial role in the development of medical ultrasound

imaging. The motivation to harness bioenergy stems from the fact that energy harvesting from foot motion is gaining attention due to the growing demand for sustainable and renewable energy sources to power wearable devices, especially for medical rehabilitation and instrumentation. With the increasing reliance on such devices in various applications, the need for efficient and convenient power sources has become critical.

2. MATERIALS AND METHODS

From Figure 2, it is evident that the foot motion from the insole of the footwear sets the PZTs into mechanical force. The twenty piezoelectric transducers have been strategically placed at the pressure points of the right foot, so as to maximise the efficiency of the resulting output. Once the subject starts the gait cycle beginning with the stance period, force is exerted on all the twenty transducers. Maximum pressure is obtained during the single limb support period of the right foot.

 The equivalent pressure is converted in to AC electrical output by the transducers, which is then fed into the DB-107 rectifier IC. This rectification ensures the production of a rectified DC output with minimal loss of voltage. A capacitor is then present for energy oscillation and filtering purposes before finally charging the battery from the energy stored in the capacitor.

Finally, the stored energy from the capacitor charges the battery based on the amount of charge and pressure applied. Table 1 summarizes the components used along with their specifications. The use of multiple piezoelectric transducers in energy harvesting systems has multi found impacts. Figure 3 shows the connections of the circuitry proposed. It allows for harvesting energy from different sources and directions, increasing the overall harvesting efficiency.

When placed strategically, these transducers can capture energy from different types of mechanical motions, such as vibrations, impacts, or deformations, and convert them into electrical energy. The DB 107 is a rectifier integrated circuit (IC) used commonly in low-power applications for rectifying and providing a stable DC output. A 10μF capacitor has a relatively high capacitance value, which means it can store a significant amount of energy compared to smaller capacitance values.

3. RESULTS AND DISCUSSION

From the proposed method, the prototype was able to harvest a voltage ranging from

0.5V to 5V, which varied based on the amount of pressure applied, the number of transducers and the specifications of the components used. The results have demonstrated that it is possible to generate electricity by utilizing the mechanical energy produced during foot motion. The amount of energy generated depends on various factors, including the type and properties of the piezoelectric materials used, the design of the energy harvesting system, and the intensity and duration of foot motion.

The results have shown potential for wearable devices, such as smart shoes, insoles, or fitness trackers, where the harvested energy can be used to power electronic devices, such as sensors, GPS trackers, or wireless communication modules. This can eliminate the need for batteries or provide supplementary power to extend the battery life of these devices.

Some of the challenges face dare due to the fact that foot motions, such as walking or running, can vary significantly among individuals, which can affect the consistency and reliability of energy harvesting. This variability makes it challenging to design energy harvesting systems that can consistently harvest energy from foot motion for a wide range of users. Furthermore, ensuring that the electrical components, such as the piezoelectric materials, wiring, connectors, and energy storage devices, are designed, fabricated, and integrated in away that minimizes the risk of electrical hazards is essential. This includes proper insulation, grounding, and protection against potential electrical shocks, burns, or other injuries. Patient comfort is a key consideration in wearable technologies, including piezoelectric energy harvesting systems.

4. TABLES AND FIGURES
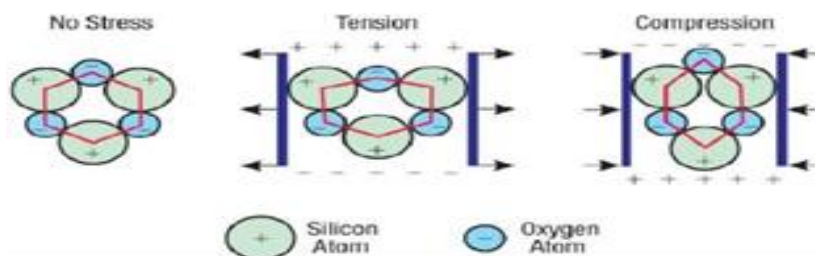
Figure1.Piezoelectric effect on quartz
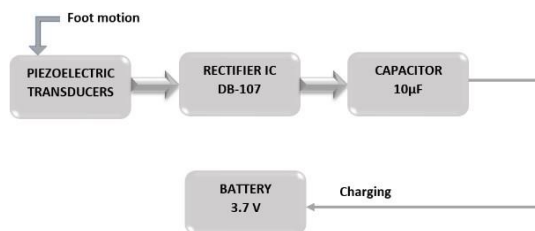
Figure2.A diagrammatic representation **of the circuitry used in the prototype**
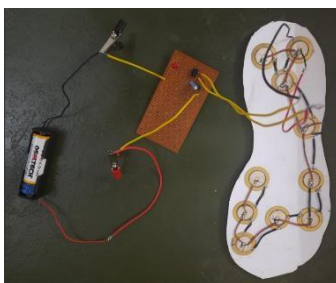
In conclusion, piezoelectric energy harvesting from foot motion holds great potential as a renewable energy source in various applications, including healthcare, sports, and wearable technologies. The ability to generate electricity from the mechanical deformation of piezoelectric materials during foot motion offers a promising avenue for harnessing energy from human motion. A maximum of 5V was generated under high pressure and vigorous activity, with a minimum of 0.5V under normal, relaxed gait. The pitfall in the work is the inconsistent generation of current and voltage and associated energy loss. This can possibly be overcome by experimenting with the values of the capacitor and diode and finding the best-suited specifications. Despite the challenges, piezoelectric energy harvesting from foot motion has the potential to revolutionize the field of wearable technologies and energy harvesting, providing a sustainable and eco-friendly source of energy. Future research efforts can focus on optimizing the efficiency and reliability of piezoelectric energy harvesting systems, exploring new piezoelectric materials with enhanced properties, and developing innovative device designs and integration techniques. In conclusion, the results of piezoelectric energy harvesting from foot motion have shown promising outcomes in terms of energy generation, efficiency, and practical applications.

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Experimental Study of Magnesium-Based Composites for Biomedical Applications in Orthopedic Surgery Bone Implantation

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This research focuses on the development and testing of a magnesium alloy (AZ31) and eggshell powder composite for use in surgical bone implants. Magnesium is a lightweight and strong metal with low environmental impact, making it suitable for biomedical applications. Eggshell powder, which is known for its hardness and strength, is added to enhance the composite's properties. The fabrication process involves mixing the additives with molten magnesium using stir casting. The resulting samples are then tested to evaluate their mechanical properties, including tensile and compressive strength, as well as hardness. The internal structure of the composite is examined using a scanning electron microscope (SEM), and the particle distribution is analyzed using X-ray diffraction (XRD). The fabricated composites are intended for use in orthopedic load-bearing applications and fixation devices such as bone plates, joint replacements, screws, rods, wires, dental implants, and cardiac stents.

Keywords- Magnesium matrix composite; Stir casting; Mechanical Strength; Biomedical applications.

A Comprehensive Review of Expert Systems in Healthcare

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1. INTRODUCTION

The application of artificial lintelligence (AI)in healthcare ha gained significant attention in recent years, particularly in the development of Expert Systems (ES). ES are computer-based programs designed to replicate the decision-making capabilities of human experts in specific medical domains. The healthcare field has witnessed significant advancements with the integration ofAI technologies.

The ES, consist of a set of rules to access the algorithms from its knowledge base. The input information from the physician is interpreted using these rules which assist in further processing as in disease diagnosing and other healthcare portfolios. Apart from being used for research and study purposes, these ES can also estimate potential drug-dosage levels for programmed diseases. The pioneering development of Mycin resulted in the emergence of Internist-I, QMR, Caduceus, Oncocin, etc. These ES can be constantly updated,a sallin formation is availableas softwarein a networkof algorithmsthat can be monitored.

The paper will begin by introducing the concept of medical expert systems and their significance in healthcare. It highlights the need for accurate and timely clinical decision-making and its potential to enhance the quality of patient care. The review then discusses various medical expert systems, including rule-based systems, probabilistic models, and knowledge-based learning algorithms. The workflow of the various expert systems and their components and steps in building ES are also discussed in detail. In the end,a detailed tabulated review of these systems is presented.

1. MATERIALSANDMETHOD

As subsets of AI, ES have remained powerful tools, enabling medical professionals to enhance diagnostic accuracy, treatment planning, and patient care. This

comprehensive review aims to explore the various applications, benefits, challenges, and prospects of expert systems in healthcare. The scope of the paper is to provide a clear understanding of the different typesof expert systems, along with their applications and functionality to explain their significanceandareas of potential development in theupcoming years.

The review begins by briefly describing the various ES types as shown in Figure1, and proceeds to explain the flow of their working. The methodology starts with the identificationof the problem domain such that the chosen problem statement must fall into a niche that can be solved by the expert system and must be programmable. Required components and algorithms mus be developed after identifying the basic idea.Furthermore,the knowledgebase must be fed into the system. Finally, its accuracy and performance are determined by testingtheexpert system with real-lifescenarios.

One of the key applications of medical expert systems is in the field of diagnosis. These system sleverage vast amounts of medical data, including patient symptoms,laboratory results,

and imaging findings, to generate accurate andefficient diagnoses. The review presents examples of successful implementations of expert systems in diagnosing various medical conditions, ranging fromcommon diseases to rare disorders.

2. RESULTS AND DISCUSSION

From there view,it can be inferred that ES play a vital role in the medical field, not just assisting physicians but also saving a lot of computation and diagnosis time. Beginning with MYCIN and evolving to IBM Watson, the results only speak for themselves. It is, without adoubt, a promising field with a colossal scope for improvement and growth. A comprehensivtabulation of all the expert systems discussed in the paper along with their applications and inferences have been tabulated in Table 1.

During the literature survey, it was identified that while ES offer numerous benefits, they also face several challenges including the interpretability of the decision-making process, the need for reliable and up-to-date knowledge bases, the potential for biases in data, and the ethical considerations surrounding patient privacy and informed consent. In challenging healthcar e settings, human judgement, intuition, and inventiveness are lacking in these machines.

Expertsystems may not fully represent the multitude of elements that humantherapists

frequently take into account, such as patient preferences, the social setting, and individual differences. Furthermore, questions of liability may come up if a patient experiences injury orunfavourable results as a result of suggestions made or actions taken in reliance on an expertsystem. These challenges often call for scrutiny of these systems for advancements and to overcome the afore mentioned demerits.

3.   TABLESANDFIGURES

Table1.TabulationofthevariousAI-based Medical Expert Systems and their applications.

S.No	Name of the System	Author/Developed by	Type	Applications	Inferences
1.	Mycin	Ted Shortliffe at Stanford University	Rule-based System	Designed to select antimicrobials for patients with bacteremia or meningitis	• Preliminary foundation for other Expert Systems
2.	Internist-1	Jack D. Myers, Harry E. Pople, Jr., and Randolph A. Miller at the University of Pittsburgh	Rule-based System	Designed to produce multiple complex clinical diagnoses of a patient, when the clinical history and test results are fed in	• Focused on more diverse conditions • Not restricted to certain types of diseases
3.	QuickMedicalReference (QMR)	Jack D. Myers, and Miller at the University of	Rule-based System	Developed to meet the practical needs of	• Primarily intended to boost the accuracy of

		Pittsburgh		clinical medicine with accuracy	Internist • Larger database and more exhaustive search algorithms to present the clinical findings
4.	AthenaDSS	Stanford Medical Informatics, VA Palo Alto Health Care System, and Stanford Center for Primary Care and Outcomes Research	Decision Support System	Implements guidelines for hypertension	• Models hypertension using many parameters and gives logical and therapeutic recommendations • Guideline interpreter determines if the applicable guideline has achieved its target

S.No.	Name of the System	Author/Developed by	Type	Applications	Inferences
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			diagnoses of a patient, when the clinical history and test results are fed in	diseases
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4.	AthenaDSS	Stanford Medical Informatics, VA Palo Alto Health Care System, and Stanford Center for Primary Care and Outcomes Research	Decision Support System	Implements guidelines for hypertension	• Models hypertension using many parameters and gives logical and therapeutic recommendations • Guideline interpreter determines if the applicable guideline has achieved its target
5.	PUFF	Computer scientists from Stanford University, Institute of Medical Sciences in San Francisco, and Pacific Medical Center	Rule-based System	It interprets and diagnoses the results of pulmonary function tests	• Generates reports and diagnoses for patients based on the test outcomes • Designed to resemble conventional

				laboratory equipment
6.	Cadiag G	Department of Medical Computer Sciences, University of Vienna	Fuzzy logic-based expert system	Diagnosis of rheumatic diseases	• Illustrates the relationship between signs, symptoms, findings, and diseases using symbolic logic
7.	Oncocin	Stanford University School of Medicine	Rule-based expert system	Designed to assist oncologists in the treatment of cancer	• Integrates a temporal record of a patient's ongoing therapy with an underlying knowledge base of treatment protocols for modifying the dosage, and other management specifics
8.	XBone	Hatzilygeroudis, A.Tsakalidis and P. J.Vassilakos from the University of Patras	Hybrid medical expert system	Diagnosis of bone diseases	• Scintigrams, or scans, are used as part of the nuclear medicine image (NMI) data • Procedural diagnostic knowledge and heuristic diagnostic knowledge are employed for the diagnosis
9.	VisualDX	Produced by VisualDX company. Co-founded by Lowell	Decision support system	Designed to diagnose dermatological problems	• It enables non-dermatologists to identify various skin

		Goldsmith, MD, and Art Papier, MD			conditions with high accuracy for both dermatologists and non-dermatologists • Users can access VisualDx through a standalone app or online
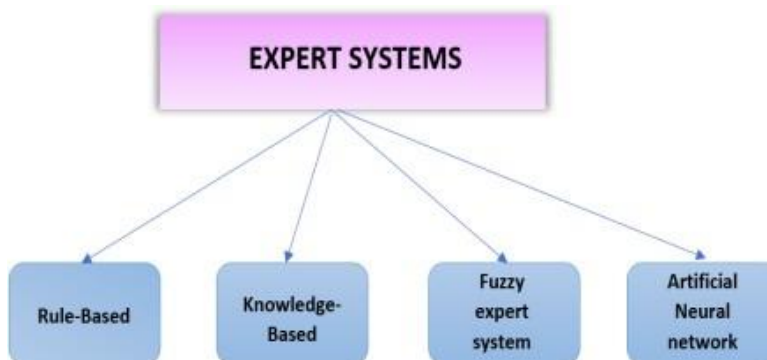
Figure1.Classification of Expert Systems

4. CONCLUSION

The comparisons and descriptions done above clearly show the extent of development and advancements in medical informatics. The nomenclature of expert systems is slowly shifting from conventional naming to disease-specific naming with the focus shifting to small erniches. The implementation of artificial intelligence in the medical field aims to improve the status of the expert system, usually used as a second opinion. Expert systems have several more years to go but will serve as a boon to the healthcare industry. In light of AI taking over the world, it is only fair to assume that despite the discussed pitfalls of ES, they will continue being in the limelight. The find

for developing the best has been going on for decades together andwill one day be a promising tool that will assist medical practitioners and become a strong, powerful system.

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Chromosome Karyotyping Using Image Processing

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INTRODUCTION

Chromosome karyotyping is a time-consuming and challenging procedure used for detectinggenetic disorders by examining an organism's paired chromosomes. However, it often produces inconsistent, imprecise, or biased results. In chromosome analysis, feature extraction plays acrucial role in identifying and representing important characteristics. Size, as the primary feature, and the relative position of the centromere are commonly used for interpretation in karyotyping.

To ensure precise chromosome segmentation and feature extraction, it is essential to address distortions in chromosome images caused by staining artifacts and cellular debris. However, thechallenge lies in effectively filtering out these artifacts while preserving important chromosome details, as excessive filteringcan result inloss of crucialinformation.[1]

Sugapriya et al. [3] introduced analgorithm with three main steps (local thresholding, region growing, and edge detection) to extract chromosomes from G-band metaphase images. However, their study lacked a quantitative analysis of result accuracy. Mohommed [2] proposed algorithmsthat require smooth chromosome boundaries for precise extraction, but chromosome boundaries are inherently irregular. Furthermore, many chromosome image segmentation techniques arelimitedtospecific stainingmethods, limitingtheir practicality.[4]

MATERIALSANDMETHOD

The proposed methodology consists of three mainsteps: preprocessing, segmentation, and feature extraction.
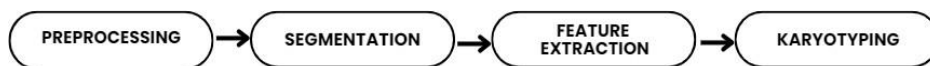
Figure1.Methodology Block Diagram

Preprocessing

In the preprocessing step of chromosome analysis, three methods were evaluated to enhancethe quality of the input image and remove unwanted artifacts. All methods start by converting theimage to grayscale for simplifying subsequent processing.

Preprocessing technique1

The histogram of the image is produced, peak pixel value amongst the background pixels,v_{peak}. Adaptive thresholding (1) is used to create a mask to reduce noise. The image is thensharpened, creating defined boundaries of chromosomes against the background.

$$T=v_{peak}-2(256-v_{peak}) \qquad [1]$$

Preprocessing technique 2

The image's contrast is improved after performing contrast stretching, and the intensity rangeis increased to include (0,255). Image sharpening comes after contrast stretching. An image'sedges are better defined using edge enhancement techniques.

Preprocessing technique 3

To reduce noise in the input image, a median blur filter is applied for blurring andsmoothing. The image is then binarized using Otsu's thresholding following Adaptive thresholding. The chromosome contour and bands are identified using the Canny edge detectionmethod.

Performance Analysis Of The Pre-Processing Methods

Three pre-processing methods were compared using four metrics: Absolute Mean Brightness Error, Peak Signal-to-Noise Ratio, Feature similarity indexing method, and GradientMagnitudeSimilarityDeviation.Thesecondmethod(Fig1(b)) was chosen as the primarypre-processing method based on its favorable metric scores. Method 1 introduced more noise, where as method 3 had a minimal effect on the original image.

Segmentation

After preprocessing, segmentation is performed in chromosome karyotyping to separateindividual chromosomes from the background. The Morphological Gradient method is employedto obtain the contours of individual chromosomes, utilizing the gradient operator with varyingkernel sizes based on image requirements. Watershed segmentation is then applied to furthersegmentthechromosomesasinFig1(c), ensuring

closed boundaries for resulting small segments. Following segmentation, individual chromosomes are extracted from the clustered image by finding contours using the Bounding box as in Fig1(d).

| (a) | (b) | (c) | (d) |
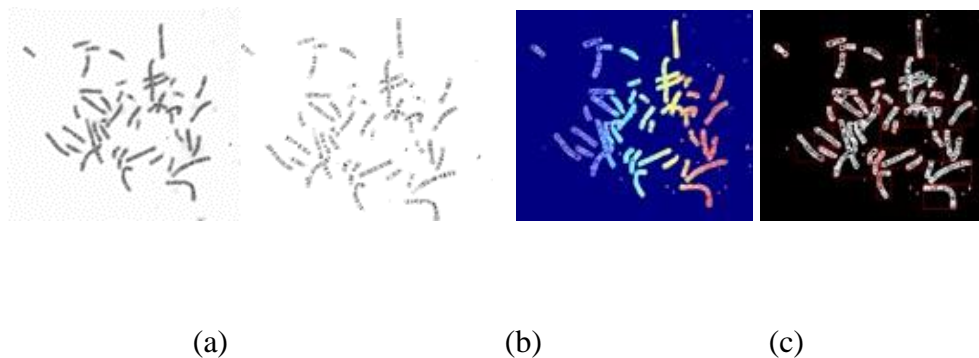
Figure2.Initialsteps:(a)InputImage(b)preprocessedimage(c)watershedsegmentation(d)Boundingbox

Feature extraction

Feature extraction is done after segmentation. Here, the individual segmented chromosomesas in Fig 2(a) are analyzed to obtain four features of interest.

Length: Accurate length values are obtained using Hough transform methods (Fig 2(b)).

Centromere Position: The chromosome boundary is extracted, and the curvature along the x and y axes is plotted (Fig 2(d)). The global minima on the y-axis indicate the centromereposition, which is then plotted on the image (Fig 2(e)).

Lengths of p and q arm: The lengths of the short arm (p) and the long arm (q) arecalculated based on the length and centromere position. These values are used to determine thecentromeric index (2) and the centromeric ratio (3).

$$C_I = \frac{Len\ of\ P\_arm}{Total\ length}$$

[2]

$$C_R = \frac{Len\ of\ P\_arm}{Len\ of\ Q\_arm}$$

[3]

Band features: The chromosomes are aligned along the x-axis using the angles obtained viaHough transform, following which its intensity profile is produced as in

Fig 2(f).

| (a) | (b) | (c) | (d) | (e) | (f) |
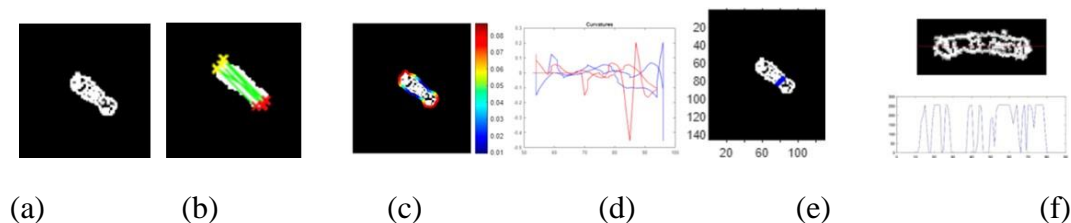
Figure3.Feature extraction:(a) Extracted single chromosome (b)Length (c)curvaturefunction (d)curvatureplot e) centromere detection (f)Intensity plot

RESULTSANDDISCUSSION

A total of thirty images were selected and subjected to scrutiny using the recommended approach. By implementing the aforementioned algorithm, improved outcomes were achieved asinTable (1).

Image	Features				
	Length	Long arm	Short arm	C_I	C_R
1	49.396	33.144	16.325	0.33	2.03
2	39.395	22.804	17.804	0.45	1.28
3	33.541	21.36	13.086	0.39	1.63
4	63.569	44.525	19.66	0.309	2.26
5	31.064	17.066	14.009	0.45	1.218

Table1.Featuresextracted

CONCLUSION

A simple automatic approach is proposed to retrieve the chromosomal features in metaphase images. These features can aid in identifying genetic disorders. However,the presented algorithm does not segment overlapping chromosomes. For future work, it can be extended to identify chromosomal aberrations automatically.

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Investigation of Heart Rate Variability Using Machine Learning

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Coronary Artery heart Disease (CAD) is caused by atherosclerosis incoronary arteries and results in cardiac arrest and heart attack. For diagnosisof CAD, angiography is used which is a costly time consuming and highlytechnical invasive method. Researchers are therefore, prompted for alternativemethods such as machine learning algorithms that could use noninvasiveclinical data for the heart disease diagnosis and assessing its severity Then, CAD situations are modeled using classifications of supervised learningalgorithms like WARM AND NB. We also evaluated this strategy using abenchmarked data set for heart disease. First, we implemented a Warmclassifier and evaluated its performance in predicting heart disease based onthe provided dataset. Subsequently, we applied the Naive Bayes algorithm, which assumes independence among features, to examine its predictivecapabilities in this context. Additionally, we employed a Decision Treealgorithm to construct a decision tree model that captures the relationships andhierarchies within the data. Decision trees can improve prediction accuracyand robustness, thereby enhancing the overall performance of the heartdisease prediction model. We offer important insights about their suitabilityfor use in clinical settings by assessing their performance indicators, such asaccuracy, precision, recall, and F1-score. The results of this study highlight thepotential of machine learning algorithms and advance the area of heart diseaseprediction. By leveraging Warm classifier, Naive Bayes, and Decision Tree, healthcare professionals can make informed decisions, identify individuals atrisk of heart disease, and design personalized treatment plans.

Keywords: Artificial Intelligence, Machine Learning, Decision tree classifier, WARM, Naïve Byes, Cardiology, Cardio Vascular Disease (CVD)

Crack Detection Using Deep Learning

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Surface cracks are defects that can compromise the structural integrity and safety of various materials, such as metal, concrete, and ceramics. Cracks results in catastrophic failures of critical infrastructure and industrial assets in case of ignorance and less maintenance. Traditionally, crack detection has relied on manual inspection by trained professionals, which is time-consuming, subjective, and prone to human errors. Crack detection is already in practice for a long time but due to technical advancements and innovative monitoring, the transformation of manual procedures into automatic ones is essential. Hence the deep learning techniques, specifically Convolutional neural network (CNN) is used to detect the cracks on the concrete surfaces. This project deals with detecting the cracks on concrete surfaces using CNN based algorithm.

The dataset taken into consideration has the images of both cracked and non-cracked surfaces. The images are augmented and pre-processed to increase the size of the data set. Data frame is created by concatenating positive and negative data frames. The CNN architecture involves convolutional layer, neural network, pooling, dense layer and sigmoid activation. Usage of CNN model results in high accuracy. Hence this model can be integrated in real world to detect the cracks on the concrete surfaces in the real world.

Keywords—*Convolutional neural network, deeplearning, surface crack, crack detection.*

Development of Cost-Effective Open Source 3d Bioprinter Using Aloe Vera Based Hydrogel Bioink

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In recent years, there has been increased attention paid to the research of an extrusion-based 3D Bioprinter for bioprinting of hydrogel-based biomaterials will be used to develop with a flexible syringe pumps. Three dimensional Bioprinting is a gradual manufacturing process that fabricates structures and geometric shapes based on consistent layer formation guided by the three-dimensional model. Direct-ink-writing of hydrogel has become an attractive research area due to its capability to fabricate complicated, complex, and highly customizable structures at ambient conditions for various applications, including biomedical purposes. These structures are entirely bio-based, porous, and wet stable 3D structures which might have an opportunity in biomaterial fields. Printer quality would be optimized by varying print head speed, extrusion rate, concentration of hydrogel ingredients, syringe needle size and developed the Aloe Vera based hydrogel bioink for printing biostructures.

Keywords: Bioprinter, Bioink, Hydrogel, 3D structures.

Extraction of Nanocellulose from Sugarcane Bagasse and PETG as Capping Agent for Prosthetic Applications

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Sugarcane bagasse is collected from sugar industry as waste material, it has fibrous material containing cellulose as its main component. Although cellulose is commonly used in paper industries, research is going on the extraction of nanocellulose with the different mechanical and chemical treatments. Here the Sugarcane bagasee helps to extract the cellulose. The extracted nanocellulose has diverse applications in composite material production. The extracted nanocellulose was inspected by Fourier-Transformed Infrared Microscopy (FTIR) which verifies the removal of lignin and hemicellulose during cellulose extraction from Sugarcane bagasse. The extracted nanocellulose is binded with Polyethylene Terephthalate Glycol (PETG) and made into a filament. For instance, STL file for finger prosthetic is created and printed by bioprinter. Finger and partial finger amputations are most frequently encountered forms of partial hand loss. In addition to immediate loss of grasp strength, finger absence may cause marked psychological trauma since they have high expextation for the appearance of prosthetics. The developed prosthetic is the duplicate of the missing structure of the patient who can be use the prosthetic fearless. Likewise the filament can be used various prosthetic applications.

Keywords: Sugarcane bagasse, Nanocellulose, Acid hydrolysis, Fourier-Transformed Infrared Microscopy, Polyethylene terephthalate glycol, Standard Triangle Language (STL), Bioprinter, Finger and Partial finger amputation, Biomaterial prosthetics.

Android App Development for Healthcare

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1. INTRODUCTION:

Android app development for healthcare is a growing field that has the potential to revolutionize the way healthcare is delivered. With the increasing prevalence of mobile devices,more and more patients are turning to apps for managing their health and wellness.Thedevelopment of healthcare apps for Android is not only beneficial for patients, but it can also help healthcare professionals to manage their work flow more effectively.In this field,developers can create Android apps that can help patients manage their medical conditions, keep track of their medications, and monitor their vital signs. Additionally, these apps can help healthcare professionals to access patient records, monitor patient progress, and communicatewith patients in real-time. As the field of healthcare app development continues to evolve, thepotential for innovation and impact is limitless. By leveraging the latest technology, healthcareapps can help to improve patient outcomes, reduce costs, and increase access to care. In this introduction, we will explore some of the key aspectsof Android app development for healthcare and the potential benefits it can provide.

2. MATERIALSANDMETHODS:

To develop an Android app for healthcare, you will need a combination of programminglanguages, development tools, and coffers. Then is a general overview of the accoutrements andmethodologyyoucan use forAndroid appdevelopment inthehealthcaresphere.

2.1. ProgrammingLanguages:

Java: The sanctioned language for Android app development.

Kotlin: An indispensable language that is gaining fashion ability for Android development. It's completely compatible with Java.

2.2. IntegratedDevelopmentEnvironment (IDE):

Android Studio: The sanctioned IDE for Android app development. It provides a completesetof tools fordesigning, erecting, and testingAndroid operations.

2.3. DevelopmentMethodology:

Agile: Agile methodologies, such as Scrumor Kanban, can be used to manage the development process in an iterative and incremental manner. This allows for flexibility and quick adaptation to changing requirements.

2.4. User Interface (UI) Design:

Material Design: Google's design system that provides guidelines and factors for creating a visuallycharmingand initiative user interface.

2.5. BackendDevelopment:

Server - Side Technologies: Depending on your specific conditions, you may need todevelop a backend system to handle data storehouse, processing, and communication withthe app. Common technologies includes Node.js, Python, or Java, along with fabrics like DjangoorSpring.

2.6. APIsandDataIntegration:

Integrating with healthcare- related APIs: Depending on your app's functionality, youmay need to integrate with healthcare-specific APIs similar as electronic health recordsystems (EHRs), health data aggregators, or medical device APIs. exemplifications include FHIR (FastHealthcare Interoperability coffers) or HL7(HealthLevel7).

2.7. SecurityandPrivacy:

Health data privacy and security: Given the sensitive nature of healthcare data, it'scrucial to ensure propersecurity measures. Utilize encryption,secure communication

protocols (e.g., HTTPS), and follow industry best practices such as HIPAA compliance (ifapplicable).

2.8.   TestingandQualityAssurance:

Automated testing: Use testing fabrics like JUnit and Espresso for unit tests and UI tests, independently. Also, consider integrating nonstop integration and nonstop deployment (CI/CD) tools to automate the figure, testing, and deployment processes.

2.9.   DeploymentandDistribution:

GooglePlayStore: The sanctioned distribution channel for Android apps. Follow the guidelines and conditions for app submission and release.

3.   RESULTSANDDISCUSSION:

The Results and discussions for Android app development in the healthcare sector can coservarious aspects, including the app's features, user feedback, impact on healthcare delivery, andpotentialchallenges. Here aresomepossible results anddiscussions forsuch anapp:

3.1.   AppFeatures:

The developed Android app includes features like appointment scheduling, medication reminders, symptom tracking, telemedicine capabilities, access to medical records, and health education resources.These features provide convenience and accessibility for patients, allowing them to manage their health care more effectively

UserFeedback:

User feedback surveys and ratings indicate a positive reception of the app, with usersexpressing satisfactionwith its usability, functionality, and convenience. Users appreciatethe ability to easily schedule appointments, receive reminders, and access health informationon their mobile devices. Feedback also highlights the app's potential to improve patient engagement, empowerment, and adherence to treatmentplans.

3.2.   Impact on Healthcare Delivery:

The Android app has resulted in improved healthcare delivery by reducing the burden on healthcare providers and streamlining administrative tasks. Patients can book appointmentsonline, reducing the number of phone calls and administrative work for clinics and hospitals. Telemedicine capabilities allow for remote consultations, enabling healthcare professionalsto reach patients in remote areas or those with limited mobility. The app's features supportproactive healthcare management, leading to better patient outcomes and reduced hospitalreadmissions.

3.3.   Challenges and FutureImprovements:

Integrating the app with existing health care systems and ensuring inter operability remains a challenge. Efforts should be made to facilitate seamless data exchange between the app and electronic health record(EHR)systems.Addressing privacy and security concerns is crucial to ensure the protection of sensitive patient information. Ongoing app maintenance, updates, and continuous user support are necessary to ensure its effectiveness and address emerging user needs.

3.4 Scalability and Adoption:

The app's scalability and potential for widespread adoption depend on factors such asmarketing efforts, user awareness, collaboration with healthcare providers, and integrationinto existing healthcare infrastructure. Collaborating with healthcare organizations, clinics, and hospitals can help promote the app and facilitate its adoption among a larger patientpopulation. Continuous monitoring of user metrics, app performance, and user feedback willhelpidentifyareasforimprovement andguidefuturedevelopment.

4. CONCLUSION:

In conclusion, the Android app developed for healthcare has shown promising results byproviding convenient features for patients, improving healthcare delivery, and enhancing patient engagement. However, challenges related to integration, privacy, and ongoing maintenance need to be addressed to maximize the app's potential and ensure its long-term success in the healthcare industry.

5. ACKNOWLEDGMENT:

The authors would like to express appreciation for the support of the sponsors. [ProjectNumber=BM187].

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Fabrication and Characterisation of PVA-Hesperidin Loaded Electro Spuns Caffolds

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1.   INTRODUCTION

Nanofibers have garnered attention in the fields of tissue engineering and wound healing due, totheir characteristics. These nanofibrous membranes, which are employed as wound dressings possess a multitude of advantages such as a surface area, porosity and similarity to tissues. As aresult they facilitate gas exchange, delivery of nutrients and disposal of waste.

Polyvinyl alcohol (PVA)also known as PVA is a polymer that has found use in various applications, including the realm of wound healing. When utilized as nanofibers in the context of wound healing PVA nanofibers offer benefits owing to their properties.[1]

In the realm of wound healing, hesperid in,a present,infruits has exhibited promising potential.It has demonstrated the ability to enhance collagen synthesis and angiogenesis while concurrently reducing inflammation.

2.   MATERIALS AND METHODS

PVA, short, for alcohol is a man-made substance extensively employed in healing applicationsparticularly in the form of nanofibers. These tiny fibers possess a ratio of surface area to volumeallowing them to effectively absorb and retain the fluid discharged from wounds thus facilitatinghealing. Moreover, PVA nanofibers closely resemble the matrix providing vital structural support preventing scarring and stimulating tissue regeneration.[1]

Hesperidin, a flavonoid abundantly found in the rinds of fruits such as orange, sweet

orange and mandarin offers a multitude of advantages. It boasts properties including anticarcinogenic, antihypertensive, antibacterial and vasodilator effects.[2] The PVA Hesperidine layers primarily comprise of alcohol (PVA)and hesperidine.PVA is a water polymer recognized for its compatibility, with living tissue and ability to form thin films. It is frequently used in wounddressings to establish a moist environment that fosters wound healing.

Solution of PVA-HESPERIDIN was prepared for the purpose of electrospinning a nanofibrelayer for wound healing. Solution of dimethylformalide was used to reduce viscosity. Solution was elector spunnedusingelectrospinning machine with a highvoltage electricfield applied to polymer solutions or melts, resulting in the formation of charged jets. As the solvent evaporates, nanofibers are formed and collected on a positively charged surface. The fiber mat of PVA/HESwas produced with a size of 14×9 cm. The electrospun nanofibers were vacuum dried for complete elimination of the solvent.

3. RESULTS AND DISCUSSION

3.1 SEM analysis of electro spun scaffolds.

Figure1shows the SEM micrographs of PVA/HES bead free electrospun mat with 20wt%Hesperisinwith average fiber diameter of 700 and 900 nm respectively. Addition of Hesperidinto the polymers not significantly altered the viscosity of the polymer solution and showed bead free nanofibers. The concentration of HES is an important parameter which determines the production of fibers devoid of beads.
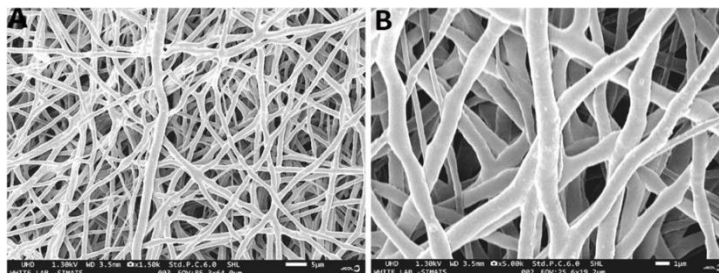
Figure1-Electrospun Nanofibers A andB-PVA-HES1500 and 5000 magnification

3.2 X-ray diffraction

A diffraction pattern of PVA reveals a broad peak at 2θ=29.291° (Figure 2). Indicating the presence of the amorphous phase in the polymer. Hesperidin powder on the other hand exhibitsdiffraction peaks at various angles: 2θ = 12.341°, 23.697° 29.291° 35.842°, 39.302°,43.130°47.473°,48.430°and 57.410°. When it comes to PVA/HES electrospun fibers, a broad amorphouspeak at 2θ = 29.291° is observed without any characteristic diffraction peaks of curcumin in both electrospun fibers due to loss of crystallinity during electrospinning.
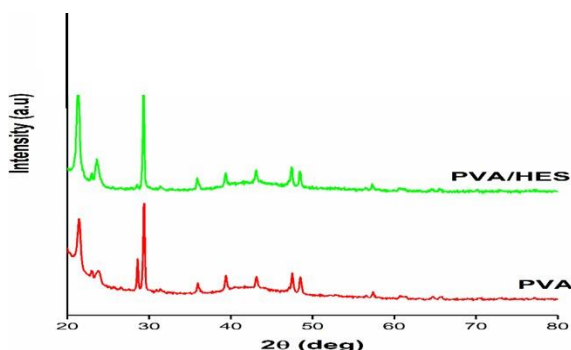
Figure2-XRD pattern of PVA and PVA-HE Snanofibers

3.3. Water contact angle study

The contact angle of PVA/HES was 18.9 ± 1° at 0 s decreased to 10.6 ± 0° after 10 s due to thepresence of hydrophillic HES (Figure 3) This improved hydrophilicity of PVA/HESmay lead tobetterswelling, controlled drug release, better cell adhesion and proliferation. Contact anglemeasurement showed the scaffolds surface hydrophilic capacity by placing a drop of ultra-purewater, when compared to PVA-HES scaffolds showed highly hydrophilic characteristics than the earlier. Hence, this improved hydrophilicity will increase the cell adhesion and proliferation for better wound healing of the sandwich scaffolds.
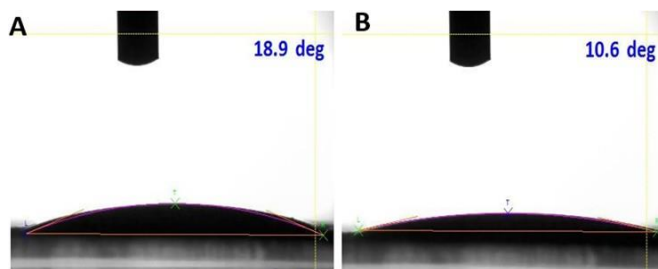
Fig3.Contac tangle measurement PVA-HES

3.4 MTT assay - Cell viability with human dental pulp stem cells (hDPSCs)

Figure 6 shows the cell viability of the PVA and PVA-HES nanofibers showed higher cellviability (>75%) for the duration of 24 and 72 h. This improved cell viability leading to thescaffolds of hesperidin which potentially helps for faster regeneration of the wound. This clearlyindicates the faster wound healing of diabetic, burns and chronic wounds could be possible withPVA-HES scaffolds.
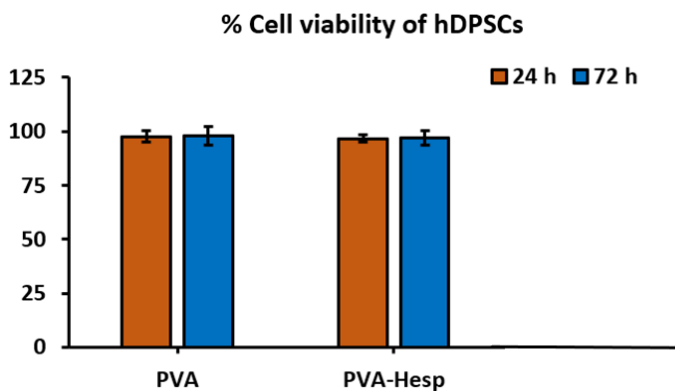
Figure4-CellviabilityofPVA&PVA-HESnanofibres

3.5 Invitro Hesperidin release from the electro spun scaffolds

The cumulative drug release studyfrom the PVA/HES electrospun scaffolds were showed (Figure5) controlled ultra fast release of Hesp achieved. This clearly shows that Hesperidin containing PVA-Hesp showed faster release from the scaffolds due to its high hydrophilicity. Finally, the scaffolds showed uniform nanofiber morphology with random alignment, highlyhydrophilic, controlled and ultrafast release of the incorporated active molecules such as Hespwith high cell viability. The developed scaffolds could used as potential for diabetic and chronic wound healing, requiring hydrogel with higher drug release for effective wound care management.
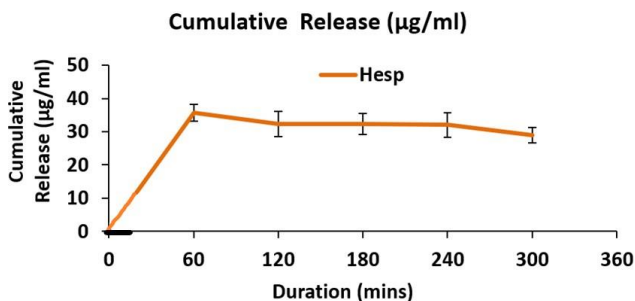
Figure5-Cumulation Hesperidin release from scaffolds

4. CONCLUSION

Hesperidin containing PVA-Hesp showed faster release from the scaffolds due to its high hydrophilicity. Finally, the scaffolds showed uniform nano fiber morphology with random alignment, highly hydrophilic, controlled and ultrafast release of the incorporated active Hesperid in molecules with high cell viability.

5. ACKNOWLEDGEMENT:

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Non-Invasive Method for Blood Group Identification

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1.   INTRODUCTION

Blood is a body fluid within the circulatory system of human and other vertebrates that offers essential substances such as vitamins and oxygen to the cells, and transports metabolic waste products faraway from those equal cells. It has 4 predominant additives: plasma, erythrocytes, leukocytes and thrombocytes. A blood kind is a class of blood, primarily based at the presence or absence of antibodies and antigens on the floor of the red blood cells. The four essential blood types are A, B, AB and O. Each group may be either RhD positive or RhD negative, which means there are eight blood times in general.

Blood typing is achieved previous to transfusion and for classifying person's blood at some point of donation of blood. Whilst blood is drawn for blood test, it could purpose bleeding underneath the skin, fainting, and infections at the specific place. Frequencies of ABO blood type vary among distinct population wherein some have resistance against an infectious sickness. Medical blunders all through blood transfusion leads to common cause of dying. If wrong transfusion is given after or all through surgical procedures it leads to agglutinations, blood clumping which ends up with deadly outcomes. Aside from this, it also outcomes in ache and discomfort, infection, bruising and swelling and affects through blood borne pathogens.

The proposed idea is a non- invasive method for the identification of blood type of a patient without pricking the skin of the affected person. When the optical signals travels via the affected person's pores and skin, light serves as a supply and the detector adjusts up the wavelength. Here, evaluation of blood type is completed using the wavelength fee which are received. The blood organization O are known as DONORS due to the fact that it miles well matched with any blood kind. The blood institution AB are known as ACCEPTORS because it has no antibody within the plasma to attack the antigens on the red blood cellular of donor. Maximum existing blood type identity strategies are tube slide, gel contemporary, micro plate techniques, and so forth. In

those methods, the blood sample of the person are taken and tend to be mixed with antibody solution after sometime agglutination may additionally or might not arise.

Accordingly, blood group can be determined after the formation of agglutination. In this method, there are more probabilities of human error which are feasible and therefore mismatching of blood institution may also occur. Gel method is an automated managing machine which is designed in particular to be used with current gel generation. It changed the identification method into determined as it was reliable, easy to apply and absolutely alarmed. Tube approach in each ahead (cell), as well as opposite (serum) grouping is performed. In ahead grouping, blood cells are present in two tubes with saline as a diluent media. Then one drop- of each anti-A and anti-B is introduced one at a time inside the samples. Micro plate method is good for big wide variety of blood samples. The ones that is processed via micro plate method can be incubated and centrifuged. The effects may be photographed for archival storage.

To avoid all of the affects listed above and to conquer the demerits of the already present techniques, this is our proposed concept of non- invasive technique for the identification of blood type of a patient without pricking the pores and skin of the patient. When the optical indicators pass through the affected persona's pores and skin, light serves as a source and the detector picks up the wavelength. Right here, evaluation of blood type is accomplished by the usage of the wavelength value which might be acquired. This traditional procedure takes from 10-20 mins and contemporary detectors can reduce this time to achieve consequences inside 5 mins. Given the large quantity of the health and safety risks, the fee effectiveness and the duration of the detection length, its miles comprehensible that non-invasive blood grouping methods will certainly reduce the chance of sickness unfold.

2. MATERIALS AND METHODS

The working of our non-invasive blood grouping tool is same just like that of the IR thermometer. The IR sensors are touchy to the infrared radiation emitted by way of gadgets. When this device is geared toward an object, the sensor detects the infrared radiation emitted by means of the item's surface. The wavelength received varies consistent with the absorbent stage of the antigens present in the RBC. Then we use optics, consisting of lenses or mirrors, to cognizance the infrared radiation onto the sensor.

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The optics help to capture and direct the infrared radiation towards the sensor, improving the accuracy and sensitivity of wavelength measurement. The microcontroller can also consist a reference point to offer an accurate identification of the blood type. This device requires to be calibrated to make sure about obtaining correct readings. Calibration involves setting the device to a recognized fee of reference. This technique compensates for any mistakes or deviations inside the size due to elements like sensor drift or ambient conditions.

The measured temperature is then displayed on the OLED screen. It additionally has a distance-to-spot ratio, also referred to as the optical resolution or area of view. This ratio shows the dimensions of the place being measured in terms of the distance among the device and the object. The consumer must position the device at the suitable distance to gain correct readings, thinking about the ratio specific via the device.

The IR sensor module is composed specially of the IR Transmitter, Photodiode Receiver, LM393 Comparators IC, Variable Resistor (Trim pot), power LED, and output LED.

An IR LED is a specially designed light-emitting diode (LED), its emitting infrared rays. Infrared rays wavelength ranging is from seven hundred nm to at least one mm.. Usually an IR LED looks like a regular LED. It has two terminals, the longer one is positive and the smaller one is negative. While IR LED operated at a power supply, it begins emitting infrared.

Typically IR receivers are photodiode. It is a semiconductor which has a P-N junction. A photodiode is capable to detect infrared rays. It's operated in opposite Bias. The photodiode has very high resistance inside the absence of infrared rays and becomes low when infrared rays fall on it. Also, it has two terminals, the longer one is positive and the smaller one is negative.

IR sensor has an on board variable resistor (potentiometer). This variable resistor is a 10k preset. It's far used to set the variety of operation. If the preset knob turned around clockwise, the detection range might increase. If it turned around counter clockwise, the detection range might reduce. This on board LED indicates the IR Sensor energy deliver is ON or OFF. Whilst we activate the IR Sensor power supply, Red LED is also activated. Whilst infrared contemplated returned to the IR receiver and the sensor

detects an obstacle, the green LED lights up. So, the green LED is used to suggest the sensor senses an obstacle.

How IR Sensor Module Works:

When we join the IR sensor module to 5v power supply. On the identical time, Infrared LED (IR-TX) starts emitting infrared rays. Then set the threshold voltage on the non-Inverting input (three) of the IC by rotating the potentiometer knob for putting the sensor sensitivity. If infrared rays attain to item's surface and some of the radiation contemplated again to the IR receiver (IR-RX). The Photodiode or IR receiver (IR-RX) detects the infrared light. Whilst reflected infrared light falls at the Photodiode, the resistance of the photodiode falls down from a massive cost and the voltage throughout the photodiode drops. So, a high amount of voltage from the photodiode is given to the Inverting enter (2) of the IC. Then the LM393/LM358 IC compares this voltage with the brink voltage.

On this situation, the Inverting input voltage is greater than the non-Inverting input voltage so the IC output is Low (0). So, the sensor output is Low (zero). Whilst the Photodiode or IR receiver (IR-RX) does not locate the infrared light, then the resistance of the photodiode will be very excessive. So, a Low amount of voltage from the photodiode is given to the Inverting input (2) of the IC.

Then the LM393/LM358 IC compares this voltage with the threshold voltage. On this circumstance, the Inverting input voltage is much less than the non-Inverting input voltage so the IC output is high (1). So, the sensor output is excessive (1).

AT89C51Microcontroller:

The AT89C51 is a low strength, high overall performance CMOS 8-bit microcontroller with a four Kilobytes of Flash Programmable memory and Erasable read only memory(PEROM). It additionally consists of 128 bytes of RAM, 32 I/O strains, two 16-bit timers/counters, a five-vector -level interrupt structure, a full duplex serial port, on-chip oscillator, and clock circuitry. This microcontroller is used for this thermometer implementation. It consists of a forty-pin package deal which has five ports namely port A, port B, port C, port D, and port E. This microcontroller is commercially to be had anywhere which makes it extra financial and less difficult.

OLED Display:

OLED works like an LED but makes use of natural molecules as opposed to different semiconductors to supply light. Energy flows from the cathode to the anode through the emissive and conductive layers generating colored light. The primary OLED substances are yellow and blue. Colour filters are then used to make the rest of the colour.

The primary advantages of the OLED show are excessive shade contrasts, wider viewing angles, and versatility. The real blacks of the OLED shows make the other colours stand out more. OLEDs also lose less colour comparison at wider viewing angles compared to LCDs. LCDs most effective have high colour contrast whilst viewed head-on. OLEDs are also fantastically thinner than other presentations because they do not want a backlight. The shortage of a backlight also allows them to be made on curved surfaces, so roll able and foldable gadgets are made viable.
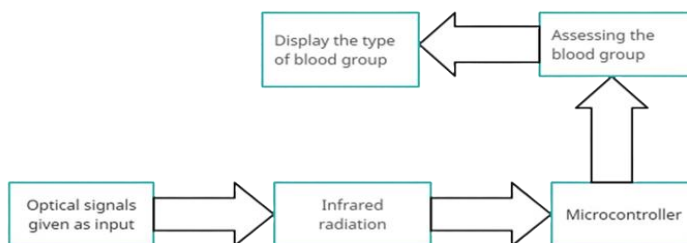
3.   RESULTS AND DISCUSSION

This method includes setting the device near the forehead in a sort of way that light passes through it and the versions of blood in the forehead is sensed through the sensor.

And the form of blood type is diagnosed through the device is anticipated to be displayed on the LED screen that is attached to the device.

There are 8 exclusive blood groups, together with Rhesus aspect, as a result the output for each of the identified blood kind could be one of a kind. To verify the hyperlink among the wavelength of the light that is being emanated out after having penetrated via the skin, and the optical houses of antigen present at the RBCs, there's a need to gather more records and analyse it.

4.   CONCLUSION

We had referred many reputed journal papers and understood the various strategies for figuring out blood type. There have been advantages and barriers within the following papers, we had gone through them and got here up with a new solution with the help of these papers. From the evaluation, it is concluded that the blood group may be recognized without difficulty using non-invasive approach with tolerable blunders. This paper indicates a non-invasive way for figuring out different blood types primarily based on the optical traits of blood with the use of an IR sensor.

Light serves as a source for optical signals which might be authorized to bypass via wrist and the detector detects the wavelength. As the optical homes of blood exchange for exceptional antigens present on red blood cells, the obtained wavelength value additionally adjusts. This paper performs predominant function in biomedical area in which the transfusion of blood, loss of blood and different blood sicknesses can be nullified.

Tremendous amount of proof exists to prove that the improvement of a technique to stumble on blood agencies non-invasively is successful. The most important hassle is the accessibility of the antigens from the outside surroundings, because the human frame is composed of several layers. If this barrier can be overcome, more correct outcomes might be acquired. This is also less expensive yet relatively precise detection devices that might be used as an alternative to the pricey detectors which are currently in use.

We had cited many reputed magazine papers and understood the diverse methods for determining blood group. There have been advantages and barriers inside the following papers, we had gone through them and got here up with a brand new answer with the

help of those papers. From the evaluation, it is concluded that the blood institution can be effortlessly diagnosed the usage of non-invasive approach with tolerable blunders.

This research suggests a non-invasive manner for figuring out distinctive blood kinds based totally on the optical traits of blood using an IR sensor. Light serves as a source for optical indicators which might be authorized to bypass via wrist and the detector detects the wavelength. Because the optical properties of blood alternate for specific antigens present on red blood cells, the obtained wavelength value additionally adjusts. This paper performs primary role in biomedical field where the transfusion of blood, lack of blood and other blood diseases may be nullified.

As a result, our study might be based totally on a low-cost, lightweight, and an accurate wearable NIR spectrometer that can non-invasively identify blood type in scientific and forensic settings, crime scenes and war zones to locate the blood type in a small-time span with high accuracy.

This innovation could contribute to a giant improvement within the fields of biomedical engineering, computer technology and medical field. From the analysis and samples, it's proved that the blood group may be diagnosed correctly through the usage of non-invasive approach.

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Aquasense: Sensor – Based Water Quality Monitoring Device

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Water is an essential part of living organisms. The Industrialization has causedimmense contamination ofpotable water. Hence water quality monitors play an important role indetection of contamination in these water bodies. There are many water quality monitors availablein the market for thedetection of level of contamination. In our paper, we discuss theeffective usageof Arduino UNO board, sensors to measuretemperature, TDS and pH to measure the water quality. Hence, the main aim of this research is to find the TDS, temperature and pH of the water samplescollected from various places in Bangalore City, Karnataka, and conclude regarding the qualityofthe water whether it is portable to use for drinking and domestic purpose.

Keywords—Arduino, contamination, temperature, TDS, pH, water quality

Diagnosis of SLE through ANA Image Pattern Recognition and Biomarkers Taken from Pathological Study

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This study focuses on diagnosis of systemic lupus erythematosus through antinuclear antibody image pattern recognition and biomarkers taken from pathological study. SLE is an autoimmune disease. In the human body the immune system attacks its own healthy cells, this results in widespread inflammation and tissue damage and affects the organs like skin, brain, lungs, kidneys, and blood vessels. ANA(Antinuclear Antibody) test (screening test) detects antinuclear antibodies in your blood. After this ANA screening test, Investigation called the anti-dsDNA (anti-double stranded DNA) test is conducted for confirmation of SLE. This study is to replace this anti-dsDNA confirmatory test with pattern recognition of anti-nuclear antibodies which is more economic and time savings. Majorly in three patterns SLE probability is high. They are: homogenous pattern, cytoplasmic pattern, speckled pattern. From the image of the ANA screening test, the single cell pattern image is cropped and a watershed algorithm is used to get segmentation of the nucleus, followed by extracting of shape features from the segmented image. With these shape features we can classify the patterns of ANA cells. This pattern recognition is used for pre-screening. Further, along with appropriate patterns of SLE, clinical biomarkers, blood biomarkers, and organ specific biomarkers are also considered and get accurate diagnosis of SLE.

Keywords—*systematic lupus erythoromatosus, Anti-ds DNA, Antinuclear Antibodies, Anti-immune disease,*

Arrhythmia Detection Using Wavelet Scattering and Deep Learning Model

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Arrhythmia is a condition where the heart beats irregularly, too fast, or too slow. It can be caused by various factors such as heart disease, high blood pressure, or electrolyte imbalances. Arrhythmia is defined as an irregularity in the heartbeat rhythm. Recently, many people were affected by cardiac diseases, due to covid19. So, we proposed the deep learning model to automate the detection and classification process to help the doctors for quick results. We use ECG signals that were downloaded from the Physio-Net database as our input.The Dataset undergoes a process to change the signal into a space with many dimensions using some basic functions. Using wavelet scattering, we extract the characteristics. Wavelet scattering is a signal processing technique that decomposes a signal into its constituent waveforms, allowing for the identification of patterns that may indicate arrhythmias. Then Convert 1D ECG Signal to 2D scalogram images by using Continuous wavelet Transform (CWT). Arrhythmia detection is done by using deep learning (Efficientnet-B0) model and compared it with other models. Such as Efficientnet- b0 is 97.9%, Alexnet is 86.67%, Resnet50 97.78%, Densenet 89.26%.

Keywords—Arrhythmia, Wavelet Scattering, Deep Learning, Continuous wavelet Transform Efficientnet-b0, and Scalogram.

Methodology for Development of Ruggedized Medical Devices

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Medical devices are essential tools that enable the provision of healthcare services to everyone. However, commercially available medical devices designed for diagnosis and treatment are often not suitable for harsh environments. In scenarios like war zones or disaster relief operations, ruggedized medical devices are necessary to ensure reliable performance. Unfortunately, there are only a few Indian manufacturers and products available in the rugged medical devices market. This paper offers a brief overview of the steps involved in the design and development of rugged medical devices and proposes a robust methodology for a holistic approach to creating such devices for harsh environments. Firstly, we introduce several certification standards applicable to medical and clinical settings. Next, we delve into MIL-STD-810G, which provides insights into accounting for the environmental aspects during the device's entire useful life. Finally, we outline a material selection criterion and discuss the factors to consider when choosing materials for developing ruggedized medical devices. With the Government of India's push for indigenization, India has transformed from an importer to a defense equipment exporter. We believe that the knowledge presented in this work will facilitate the design, development, and indigenization of ruggedized medical devices, thus contributing to our nation's economy.

Keywords— ruggedization, medical device, indigenization, productdevelopment, MIL-STD-810G

Internet of Things (IoT) Based Centralized Glanceable Display as an Assistive Technology for Hospitals

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This research paper presents a novel implementation of IoT-based centralized glanceable displays to revolutionize hospital operations. The proposed solution controls real-time tracking of doctor availability, bed occupancy, patient's waiting time in queue and other facilities, enhancing patient and staff navigation within the hospital. By providing estimated waiting times for doctor visits, the technology aims to reduce patient anxiety and improve overall satisfaction. The paper highlights the potential benefits of this implementation, including streamlined operations, improved patient care, and an enhanced hospital experience. The study delves into the technical aspects of the IoT-based centralized glanceable displays, emphasizing the integration of IoT sensors and data analytics to deliver real-time information. The system offers a user-friendly interface that allows staff to easily update information about facilities. By providing estimated waiting times, patients can make informed decisions and better manage their expectations during their hospital visits. The proposed implementation demonstrates its potential to optimize hospital operations. Real-time data on doctor availability and bed occupancy enables efficient resource allocation and workflow management. This optimized resource utilization can lead to improved patient flow, reduced waiting times, and increased operational efficiency. Through this research, a novel implementation of IoT-based centralized glanceable displays is introduced, highlighting its potential impact on hospital operations. By implementing this technology, hospitals can enhance patient care, streamline operations, and ultimately elevate the overall hospital experience.

Keywords— *Internet of Things, IoT-based assistive technology, centralized glanceable displays, real-time tracking, estimated waiting times, operational efficiency, enhanced hospital experience, patient-centric solutions, IoT-enabled healthcare.*

Misinformation Detection on Social Networks Usingmachinelearning

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Dr. Rangarajan Dr.Sakunthala EngineeringCollege, Chennai

1.   INTRODUCTION

Online amusement has made it astoundingly basic for us to talk quickly and actually with family, partners and associates, share our experiences and proposition our points of view and convictions with others..These assumptions and convictions could interface with world events and close by endeavors, administrative issues and religion, interests, affiliations,affiliations, things, people, and various subjects. Our conversations and comments arehabitually centered around or shared by and large and can flow around the web dependentupon the point. Tragically, virtual amusement is moreover consistently involved byscoundrels for comparable reasons referred to already. Various miscreants "hide away"behind real factors they can't immediately perceive and offer expressions they would nevertell them straightforwardly, which can considered criticize. Online abuse takes many designs, and setbacks aren't confined to geniuses. They work in all positions and experience everywhere, paying little regard to get older, direction, sexual course, social or ethnic establishment.

2.   MATERIAL HARDWARE

System:
- Processor: Intel Core i3
- Hard Disk: 500GB
- RAM: 4GB

Software:
- Operating System: Windows 7/Ubuntu
- Coding Language: Python
- IDE: Anaconda IDE
- Database: MySQL

3.   RESULTS AND DISCUSSION

Detecting spam comments infers or chest rating comments as spamor non-spam. YouTube isone phase that uses computer-based intelligence to normally channel spam comments andsafeguard creators from spam comments. Need to sort out some way to see spam comments using computer based intelligence. Spam comment revelation is the control of message portrayal in simulated intelligence Spam comments by means of virtual diversion stages aresorts of comments introduced on redirect clients to another electronic amusement record, site, or content.

3.1 OffensiveData

3.2 Non-OffensiveData

4.   GRAPH

A deep neural network is a simulated ntelligence backslide computation for planning on instructive assortments including harsh comments through electronic diversion. Simulated intelligence models require at on of data to workfittingly. Normally while setting up a computer based intelligence model, you truly need to assemble a gigantic representative datatest from your planning set. The data

from the readiness set can go from a corpus of text, agrouping of pictures, or data accumulated from individual clients of the assistance. Whilegetting ready computer-based intelligence models, care should be removed to hold back from overfitting. A pre-arranged model got from skewed data can provoke skewed or trouble some estimates. Algorithmic tendency can occur because the data isn't totally prepared for planning.
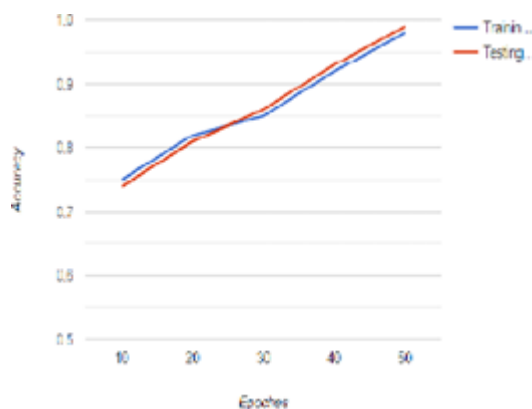
4.1Trainingwith Algorithm

5.   CONCLUSION

In this design, we've successfully enforced a system of effective discovery and identification of vituperative commentary over social media. The vituperative commentary dataset istrained using arbitrary timber classifier, a machine- learning algorithm. The presentdiscovery styles are inaccurate and hamstrung. The system has handed an easy and effectiveresult at veritably cost-effective approach. Hence, The thing of our design is to filter tweets or commentary using machine literacy algorithms and to produce an terrain which is healthyfor commerce and transfer of information between individuals. We as the unborn generationare responsible for precluding the ongoing poisonous terrain in social media and produce a healthy terrain in social media.

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Designing and Simulation Study of Lung on Chip

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The lung is an important organ that facilitates blood oxygenation through breathing. The organon-chip (OOC) platform enables faster, better, and less expensive drug development, disease modeling, customized treatment, and insights into human health by providing flexibility and robustness in drug testing. Previously, rats were utilized as a model for drug testing. Animal models, on the other hand, have failed to provide effective and efficient drug testing results since different species have distinct characteristics. Here, we report a lung-on-chip (LOC) aiming at mimicking the basic physiological response of human breathing lungs in vitro. This microfluidic device will perform the mechanical movement of 3D cyclic stretching inspired by breathing movements. This device consists of 2 parts, the fluidic, and pneumatic parts. In between the midplate and pneumatic plate, there is a 40 μm thin membrane made of polydimethylsiloxane (PDMS) that will act as a microdiaphragm by employing pressure. This proposed microfluidic chip has two methods of operating, one is breathing mode and another one is medium exchange mode. The simulation of the lung-on-chip is done in the Ansys workbench by using static structural and Computational Fluid Dynamics (CFD). The proposed microfluidic chip has great potential for drug testing and new drug development and has a wide range of applications.

Keywords— LOC, Microdiaphragm, PDMS, CFD, Static structure, Drug testing

A Smart Wearable Device to Improve Sitting Posture

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The increased use of electronic devices has led to more people adopting poor sitting postures, resulting in health issues like back discomfort, neck pain, and muscle tension. To address this problem, a smart connected system has been developed to monitor sitting posture in real time. The system includes wearable posture detection sensors that continuously collect data on the user's sitting position. This data is wirelessly transmitted to a software application using Bluetooth Low Energy (BLE) technology. The software provides users with visual, auditory, and haptic feedback to encourage them to correct their posture and maintain an ergonomic sitting position. Advanced data processing Madgwick filter is used to accurately identify improper sitting positions, enabling timely intervention. The system is customizable to meet individual needs, offering personalized coaching and feedback to promote healthy sitting habits. The proposed wearable system has the potential to increase posture awareness, foster positive behavioral changes, and reduce the risk of musculoskeletal disorders (MSDs) associated with improper sitting posture.

Keywords—*Sitting posture detection, continuous monitoring, smart wearable device, Inertial measurement units (IMU), BLE*

Investigation on Cyber Security and Its Challenges

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Cybersecurity is the process of defending against intrusive assaults on networks, computers, servers, mobile devices, electronic systems, and data. Cybersecurity is a major problem for everyone, including people, companies, and governments. Keeping our data secure in a world where everything is online, from simple entertainment videos and travelogues to our credit card information, is one of the major challenges in cybersecurity. Ransomware, phishing, virus attacks, and other issues with cyber security exist. This article goes into detail on important research that has been done on the subject of cyber security and the difficulties it faces. In order to examine cyber security and its difficulties in contemporary research, a thorough comparative analysis and debate are offered in this study.

Keywords—Artificial Intelligence, Cyber Security, Data Breach, Intrusion detection, Machine Learning and Network Security.

Emotion – Based Media Playback system for Autistic children

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Children with Autism find it hard to associate with people socially and setting apart themselves. While normal people identify the facial expression very quickly, children suffering from Autism Spectral Disorder (ASD) having problems in interacting with their own people. This paper presents an innovative methodology to recognize facial expressions of children with ASD. An Emotion detection through facial expression recognition and detection of stress level using GSR (Galvanic Skin Response) sensors for ASD children is proposed.

Keywords- *Autism, facial expressions, emotion detection, recognition, Galvanic skin response.*

Clinical Analysis of Multiple Breath Biomarkers and Its Relationship with Chronic Obstructive Pulmonary Disease Using Spirometer

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Chronic bronchitis and emphysema are the usual causes of Chronic Obstructive Pulmonary Disease (COPD), a progressive respiratory condition characterised by persistent airflow limitation. It places a heavy strain on people and healthcare systems around the world as a main cause of morbidity and mortality. While smoking is the main cause of COPD, other environmental factors, such as carbon monoxide (CO), have also been linked to the onset and development of the condition. In both smokers and non-smokers, exposure to high levels of CO has been linked to an increase in respiratory symptoms, a decline in lung function, and a higher chance of developing COPD. Additionally, those who already have COPD are more vulnerable to the negative consequences of CO exposure, developing the condition more quickly, having more exacerbations, and having worse outcomes. Long recognised as a risky behaviour for one's health, excessive alcohol intake has been linked to a number of systemic illnesses, including liver disease, cardiovascular problems, and several forms of cancer. According to recent studies, severe and ongoing alcohol use may potentially contribute to the severity and development of COPD. Due to its ability to cause oxidative stress, decrease mucociliary clearance, and inhibit immunological response, ethanol can have an immediate impact on the respiratory system.

Keywords: COPD, breath biomarkers, spirometer

Sterlization of Surgical Instruments using UV C Light

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Most medical and surgical devices used in healthcare facilities are made of materials that are heat stable and therefore undergo heat, primarily steam, sterilization. However, since 1950, there has been an increase in medical devices. Within the past 15 years, a number of new, low-temperature sterilization system have been developed and are being used to sterilize medical devices. Sterilization destroys all microorganisms on the surface of an article or in a fluid to prevent disease transmission associated with the use of that item. There are many methods of sterilization like steam sterilization, dry heat sterilization, chemical sterilization, Sterilization of surgical equipment is crucial in preventing the spread of infections and diseases. One effective method of sterilization is using UV-C light. So this paper reviews destroying microorganisms by the method of UV STERILIZATION KIT. The equipment placed inside the kit gets 360degree sterilization on their surface in the most effective way using ULTRA VIOLET – C light source with 265 nm wavelength. UV-C light has been clinically proven to be one of the best ways to sterilize the surface. UV-C light has been proven to be highly effective in killing bacteria, viruses, and other pathogens. This method of sterilization is non-toxic, non-corrosive, and environmentally friendly. It also has the added advantage of being able to sterilize equipment quickly and efficiently. UV-C light can be used to sterilize a variety of surgical equipment, including instruments, tools, and surfaces. With the increasing concern over antibiotic resistance and the need for effective sterilization methods, UV-C light offers a promising solution for the future. This abstract highlight the benefits and effectiveness of using UV-C light as a method of sterilization for surgical equipment.

Keywords: UV C sterilization, surgical instruments, cost effectiveness, non toxic, non corrosive, infection prevention, hazardous waste, antibiotic resistance, automatic shut off, buzzer.

PVA Based Biphasic Biomimetic Scaffold for Effective Osteochondral Regeneration

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1. INTRODUCTION

Osteoarthritis (OA) is most common type of arthritis or degenerative joint disease and it is the highest-ranking disease among the musculoskeletal diseases. It is a progressive musculoskeletal disorder caused by gradual loss of articular cartilage. In the early stage of OA, medication and physical therapies are used as conservative treatments for the purpose of reducing pain and to delay the progressive structural deterioration in affected joints. Several surgical interventions such as microfracture, autologous chondrocyte implantation (ACI), osteochondral autograft transfer, joint replacement and osteotomy (OAT) are used in order to restore tissue function. [5]. But these treatments modalities do not completely restore the native function of articulating cartilage as the tissue formed is composed of collagen I which is inferior to collagen II. Therefore, tissue-engineering strategies have been developed to restore and regenerate collagen II rich hyaline cartilage. Various biomaterial scaffolds, cells and bioactive molecules have been used alone or in combinations as promising substitutes for functional cartilage regeneration.

Among several biomaterials, hydrogels are widely used as a potential artificial articular cartilage substitutes due to their structural similarity to cartilage. Hydrogels are biocompatible, three-dimensional porous structures that permit tailorability of physicochemical and biological characteristics. Due to the existence of crystalline regions that serve as physical crosslinks, Hydrogel prepared by freezing and thawing techniques shows an increased mechanical strength. An ideal scaffold for repair of osteochondral injury necessitates to regenerate and facilitate the restoration of both cartilage and subchondral bone simultaneously. Hence, in this study, biphasic scaffold by freeze-thaw technique has been designed by constituting glycosaminoglycan in the chondral layer (articular cartilage) and nanohydroxyapatite in the underlying calcified tissue (subchondral bone).

2. MATERIALS AND METHODS

Aqueous solution of PVA and gelatin of the ratio 8:2 was prepared by blending at 60º C for 5 hours. The polymeric blend was allowed to come down to room temperature prior to addition of specific biochemical signalling molecules 2% of nanohydroxyapatite (nHA) for the subchondral part and 2% glycosaminoglycan (GAG) for the chondral part was added and mixed. After ensuring uniform dispersion of nHA and GAG in the gel precursor polymeric solution, it was cast into a 6 well plate. Care was taken to avoid air bubble formation. It was then subjected freezing at 4ºC for 24 hours and thawing at room temperature for 3 hours. The freeze-thaw cycles were repeated twice and lyophilized for 48 hours. The hydrogels thus obtained were stored in vacuum at room temperature. The nHA layer was frozen for 20 minutes prior to overlaying with the GAG rich layer and the above procedure was repeated to obtain biphasic hydrogel.

3. RESULTS AND DISCUSSION

The surface morphologies and the porosity of the PVA/gelatin, PVA/gelatin /nHA, PVA/gelatin/chs, PVA/gelatin/nHA/Chs of hydrogel scaffold were analyzed by SEM. Fig.1)A-D shows the surface morphology and Fig.1)E-H shows the cross sectional image of the scaffold. From the image, it was revealed that the porous hydrogel scaffolds were developed.
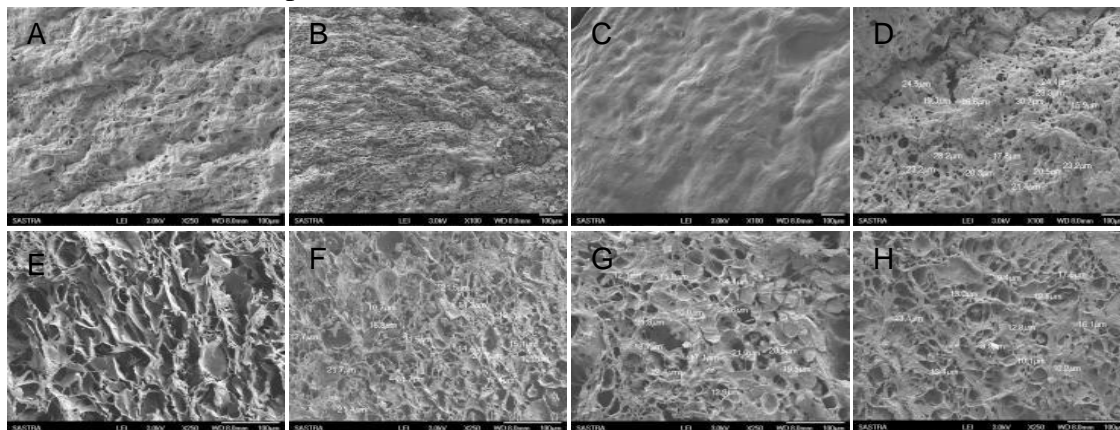
Figure1. Scanning Electron micrograph of hydrogel scaffold: Top surface of A) PVA/gelatin B) PVA/gelatin/Chs C) PVA/gelatin/nHA D) PVA/gelatin/nHA/Chs. Cross section image of E) PVA/gelatin F) PVA/gelatin/Chs G) PVA/gelatin/nHA H) PVA/gelatin/nHA/Chs.

5. CONCLUSION

The biphasic hydrogel scaffold incorporated with nanohydroxyapatite for subchondral layer and chondroitin sulphate for chondral layer has been successfully fabricated by freeze – thawing method. The porous nature of the scaffold was revealed by Scanning electron microscopy and the porosity was estimated as 83%. The presence of chondroitin sulphate and hydroxyapatite in the biphasic scaffold has been confirmed by staining procedure and also quantified by biochemical and thermogravimetric analysis. The swelling and degradation study show the water uptake capacity and slow degradation profile of the scaffold. The release kinetics of chondroitin sulfate from the scaffold has been evaluated. Thus, the biphasic scaffold has been developed with ideal physicochemical properties promising as potent articular cartilage substitutes. Further, the chondrogenic potential of the scaffold will be evaluated using chondrocytes.

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An Intelligent Braille Communication Using Translation Glove

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This project presents a novel approach to enhance communication for individuals with deafblindness through the use of an intelligent Braille communication system facilitated by a translation glove. Deafblind individuals often face challenges in participating in various forms of communication, and this solution aims to bridge that gap. The smart wearable glove serves as a communication interface by translating text messages into the Braille alphabet system, which is widely utilized by the literate blind population. The design incorporates mini vibrational motors on the palmar side of the glove, enabling the perception and interpretation of incoming messages through tactile feedback patterns. Additionally, the glove prototype includes pushbuttons on the dorsal side, allowing users to convey pre-defined messages. In case of emergencies, the glove is equipped with a GPS module to transmit the user's current location. Compared to existing systems for visually and hearing-impaired individuals, this proposed method offers superior features such as convenience, affordability, portability, and haptic feedback for effective interpretation of incoming messages.

Ultrasonic Based Method for Detecting Wound Using Phantom Model

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Skin surface level wound is usually due to rupture or damage to the underlying tissue or membrane. This can be caused by external mechanical or thermal forces leading to skin tearing and connective tissue damage. In general skin level changes like change in colour, temperature or inflammation show up in the beginning. Though these can be inspected visually by naked eye, small changes especially due to inflammation go unnoticed. Hence, proposed here in the system that used ultrasonic sound rays to find the distance between transmitter and the skin. The time to incident and return back gives the distance. Therefore, sensor circuitry comprising transmitter and receiver are placed in a conveyor to make the linear movement. By taking physical dimension layers like skin, muscle, fat and blood layers are prepared using gel and oil to form phantoms. Normal skin and injured skin are developed and tested using ultrasonic sensor circuitry. Result of this method shows the possibility of detecting inflammation upto 1mm thickness. Hence this idea could be developed to monitor bed side injury.

Keywords: Skin injury, ultrasound sensor, phantom

GSR Based Sleep Detection and Automatic Speed Reduction System

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ABSTRACT

Road accidents became a matter of concern due to the huge increase in traffic. The primary cause of accidents is due to the drowsiness of drivers in the nighttime. Fatigue and drowsiness are some of the leading causes of major accidents on Highways. The only solution to this problem is detecting the drowsiness and alerting the driver. So, in this project, we have thought of building a Driver Drowsiness Detection and Alerting System for Drivers using Arduino Uno, GSR Sensor, Buzzer and Warning light. The basic purpose of this system is to track the Driver's Galvanic Skin Response using GSR Sensor and if the driver is feeling drowsy, then the system will trigger a warning using a loud buzzer alert and install Warning light indicating system to let the neighboring vehicles know about the issues. Also, when the accelerometer reading exceeds the threshold limit, it reduces the speed of the motor.

Keywords: Driver Drowsiness Detection and Alerting System for Drivers, Arduino Uno, GSR Sensor, Buzzer and Warning light, accelerometer.

1.   INTRODUCTION

Drowsy driving is a serious problem [1] that can lead to accidents and fatalities. It is important for drivers to be aware of the signs of drowsiness, such as yawning, difficulty keeping their eyes open , and drifting out of their lane, and to take steps to prevent drowsy driving [2], such as getting enough sleep, taking regular breaks, and avoiding driving during times when they would normally be sleeping but these may always not be helpful. So this paper gives a solution to the problem by using a sleep detection [3] ie; GSR sensors. Galvanic Skin Response (GSR) sensors, also known as Electrodermal Activity (EDA) sensors, measure the electrical conductance of the skin, which is closely related to emotional arousal and sweat gland activity. By monitoring changes in the skin's electrical conductance, these sensors can provide valuable information about various sleep stages, including the onset of sleep, REM (Rapid Eye Movement) sleep,

and deep sleep. By leveraging the electrical conductance of the skin, these sensors provide valuable data for assessing sleep patterns and identifying potential sleep disturbances.These data when reaches the threshold limit will automatatically decrease the speed of the vehicle, which in turn activates the warning lights and buzzer.[4]

2.   MATERIALS AND METHODS

The implemented hardware design contains GSR grove sensor [5], Arduino controller and alerting system. The GSR senor is placed in the index and middle finger, which is used to monitor the drowsiness state of a user. The output of the GSR sensor is input to Arduino controller, when GSR value crosses the threshold the buzzer and warning lights will be activated to alert the driver and the neighbouring vehicle. Also, to ensure the road safety the Automatic speed reduction (ASR) system [4] is integrated with this device. The ASR system contains motor driver IC which runs by the feedback from the Arduino controller.The relationship between GSR and sleep is that when the driver falls asleep, his/her skin conductance level decreases and this value is given to Arduino uno. As soon as Arduino receives signal, the device turns on the buzzer and reduces the speed of the motor.
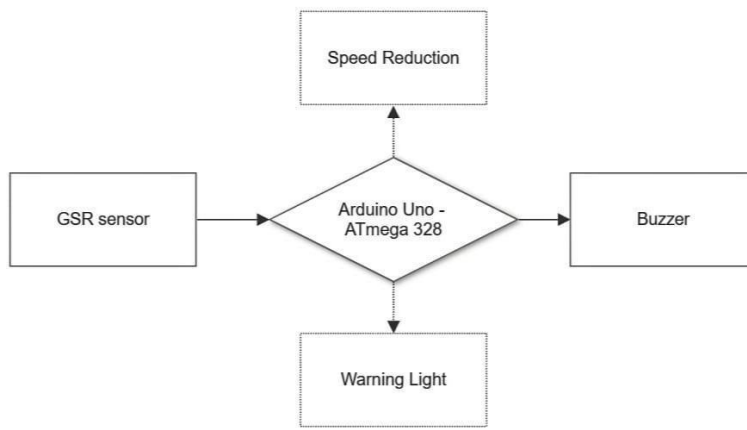
Figure 1.Block Diagram

3.   RESULTS AND DISCUSSION

We took a survey on drowsiness detection of subjects during nighttime. Considering the average GSR values of the subject over few seconds, we found the threshold limit to be 0.5µs. Which shows that during the drowsy state conductance value decreases? The

graph shows the decrease of conductance value for subjects over a period of time indicating drowsiness state. The system will reduces the speed of the vehicle over 25% of the actual speed and at the same time the buzzer and the warning light will turn ON.
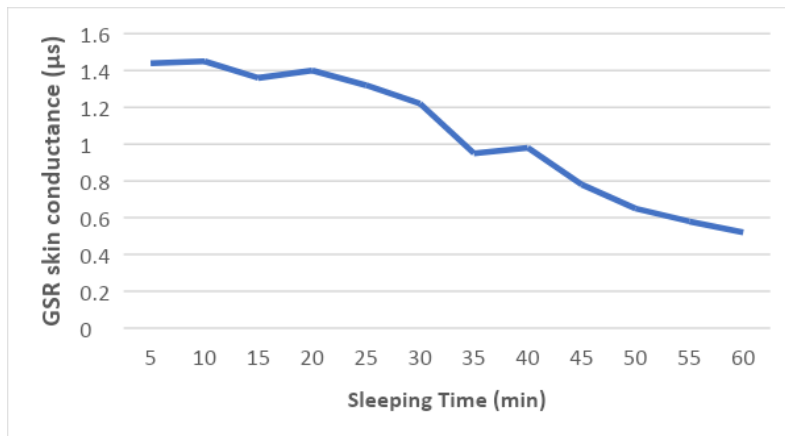
Figure 2. Skin conductance vs Sleeping time

4.   DEVELOPED PROTOTYPE

Figure 3. Final prototype of GSR based and ASR system

5.   CONCLUSIONS

The purpose of this paper is to decrease the accidents due to rash driving and drowsiness.

By this system we can achieve it.In the proposed paper, the parameters we have taken in the system can further be modified by addition of more sophisticated designs. If the device detects drowsiness or sleep in the driver, it can alert the driver with audio or visual cues, such as a loud beep or a warning light. In severe cases, the device can also automatically take control of the car and bring it to a stop in a safe location. Overall,

GSR-based sleep detection for drivers is a promising technology that can help prevent accidents caused by drowsy driving.

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QR Prescription

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Many countries worldwide prefer the printed prescription as it seems to be a safer option and provides utmost clarity as well. The printed prescription even consists of the database of the patient's history of medication. In Maharashtra, during March 2019 hundreds of doctors concluded in a meeting that the unclear handwriting of the doctors proves to be harmful for the patients. Medscape India, a non-profitable organization has conducted a number of campaigns in order to bring this particular issue into the notice of people and physicians. The handwriting of most of the doctors is not understandable and due to this almost 7000 deaths are reported annually by the Institute of Medicine (IOM). We are in the urging need to avoid those mistakes which is indirectly known as medical errors. So our idea is to connect the prescription with the internet technology what we have today. As we all know, our daily life starts and ends with a mobile, this motivated us to create a mobile application that can read a prescription so that this will help the patient and the pharmacist to get the desired medicine what the physician prescribed. Our theme is based on the QR (Quick read) code, where the prescription is uploaded as a word document in the code and it is again scanned and taken whenever it is needed.

Keywords: QR (Quick read) code, prescription, medication, mobile application

Brain Tumor Radio Genomic Classification Using Efficient Net 3d

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Because of their young age and increased susceptibility to illness, the elderly and children have the greatest prevalence of brain tumors. This dangerous kind of sickness is characterized by the uncontrolled growth of brain cells within the skull, and it brings with it the risk of causing death. It is also known as a malignant form of illness. Because there is such a vast variety of tumor cells, it is infamously difficult to categories cancer cells. This is something that is widely recognized. The method of machine learning described as convolutional neural networks, which is more often referenced to as CNNs, is the technique that is utilized the most frequently for both visual learning and the diagnosis of brain tumors. CNNs are also the name of the methodology that is most commonly utilized. The 3,260 images were categorized by the researchers via the usage of a CNN-based dense Efficient Net that was normalized by the min-max method. For the purposes of this investigation, the T1-weighted contrast-enhanced MRI brain pictures that were produced were classified into four distinct groups (glioma, meningioma, pituitary, and no tumor). This new network was constructed on top of the foundation laid by Efficient Net and has additional thick or drop-out layers. In alternative to someone using data augmentation or min-max normalization, the scientists enhanced the contrast between normal and cancerous cells. This action was taken with the intention of raising awareness among the general public about cancer cells. A CNN model with a high number of hidden layers has the ability to efficiently categories a limited picture set. This is one of the advantages of using a CNN model that is incredibly dense. This is the reason why the technique that has been presented produces such outstanding outcomes overall. According to the findings of the trial, the recommended model was successful at a rate of 99.97% throughout training but only 98.78% during testing. Because of its high level of accuracy and positive F1 score, the recently developed Efficient Net CNN architecture has tremendous potential for use as a decision-making tool in the ongoing study on brain tumor diagnosis. Because of the relatively recent architectural developments, this option exists.

***Keywords**—Brain tumor, Radio genomic, Machine learning, Efficient Net network*

Deep Drusnet– A Customized Deep CNN for Identification and Classification of Drusen Stage in OCT and Fundus Retinal Scans

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Drusen are the abnormal lesions, made up of proteins and lipids and are present as exudates in the retina. Though the etiology of drusen is not clear, it may be one of the causes of Age–Related Macular Degeneration (AMD), which leads to vision loss in elderly people. The presence of drusen for a longer time may cause Dry AMD, which inturn leads to Wet AMD. Hence it is very crucial to detect the presence of drusen at the earlier stage in order to prevent AMD at the later stage. With the advancement of artificial intelligence and deep learning, it is possible to automatically diagnose drusen from the fundus and Optical coherence tomography (OCT) scans of retina. In this work a modified deep convolutional neural network is developed from the VGG 16 and EfficientNetB3 architecture which could automatically identify the presence of drusen from the fundus and OCT images.In the classification of OCT images this model achieved an accuracy of 90.15%, an AUC of 0.95, aprecision of 86.89%, and a recall of 9138%. For the classification of Fundus images, this model achieved an accuracy of 95.9, an AUC of 0.99, a precision of 98.91%, and recall of 91.00%. The proposed architecture may be used by ophthalmologists as a clinical decision tool to identify drusen deposits at an early stage to prevent AMD.

Keywords—Drusen, OCT, Fundus Retinal Images, Deep CNN

IoT Based ECG Monitoring with Ad8232 ECG Sensor and ESP32

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1.   INTRODUCTION

Utilizing the Internet of Things' (IoT) capabilities to improve healthcare monitoring and diagnostics has drawn more attention in recent years. The electrocardiogram (ECG) monitoring industry has shown a lot of promise for IoT. An ECG, a commonly used diagnostic technology that offers important information about cardiac health. Real-time monitoring and remote healthcare solutions are made possible by IoT technology and ECG sensors. The ESP32 microcontroller and AD8232 ECG sensor make a potent match for creating an IoT-based ECG monitoring system.

An IoT-based ECG monitoring system's primary goal is to gather ECG signals from patients, wirelessly transmit the data to the cloud, and offer real-time monitoring and analysis. With the patient's comfort and freedom of mobility in mind, this enables medical personnel to remotely monitor patients' cardiac activity, identify anomalies, and deliver prompt therapies.

2.   MATERIALS AND METHODS

AD8232 ECG sensor, ESP32 board, Breadboard, Jumper wires for connections, Power source (e.g., USB cable, battery).Arduino IDE with Required libraries for ESP32 and AD8232 (e.g., ESP32WiFi, PubSubClient).MQTT communication protocol for data transmission and Cloud platform account.

ECG signal (output) is connected to an analog input pin on the ESP32RLD (Right Leg Drive). 3.3V power is supplied from the AD8232 to the 3.3V pin of the ESP32GND (ground), and vice versa. Ensure that the AD8232 and ESP32 are both receiving the necessary power. Open the Arduino IDE and Include the ESP32 and AD8232-specific libraries. Define the variables, such as Wi-Fi login credentials, MQTT broker details, and storage for ECG data. Utilize the ESP32Wi-Fi library to configure the Wi-Fi connection. Connect to the MQTT broker to send data to the cloud platform. Utilize the

analog input pins of the ESP32 to implement the code necessary to read the ECG data from the AD8232. Publish the data to the MQTT broker. Implement error-handling procedures, data integrity checks, and suitable data transmission delays.

Check the Cloud platform's data processing and reception to make sure the ECG waveform is shown correctly. Deploy the system in the intended context (such as a hospital setting or at-home monitoring) after it has been tested and validated.

3.   RESULTS AND DISCUSSION

This method successfully evaluated the precision of the ECG readings the AD8232 sensor provided. And calculated pertinent metrics such as heart rate, R-wave detection precision, and signal quality. It also determined that the ESP32's data transmission to the cloud platform is dependable and stable. The data delivery success rate to find any potential problems was analysed. It was found thatthe system can offer real-time monitoring, alarms, and any user engagement features. Most importantly It helped us to identify areas that require greater attention and development, such as adopting cutting-edge signal processing algorithms, adding extra sensors for more thorough health monitoring, or investigating new communication protocols.

Figure 1. ECG Waveform obtained in serial monitor and Ubidots platform.
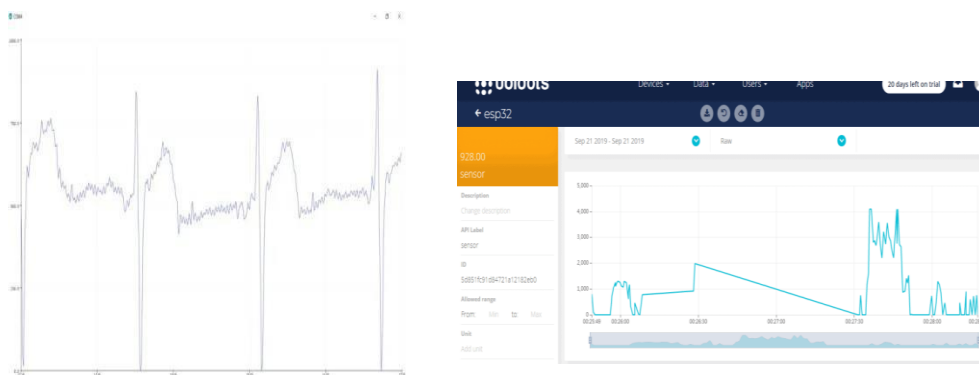
4.   CONCLUSIONS

In conclusion, the Internet of Things-based ECG monitoring system using the AD8232 ECG sensor and ESP32 microcontroller offers a potential alternative. Healthcare personnel may acquire precise ECG data allowing them to track patients' cardiac

activity, spot anomalies, and administer prompt interventions. The system evaluation's findings show that the AD8232 ECG sensor accurately records ECG waveforms, enabling accurate measurements of heart rate and R-wave recognition. The ESP32 microcontroller's connectivity and data transfer features guarantee effective and steady communication with the cloud platform, enabling safe and real-time data transmission. Healthcare practitioners can gain insightful information from the cloud platform's ability to accept and analyse ECG data. The IoT-based ECG monitoring system provide patients and healthcare professionals with a user-friendly interface.

Although the technology shows promising results, there are several issues that need to be resolved. The accuracy of the data can be impacted by issues such signal drift, motion artifacts, and noise interference. To support more users and more datasets, the system's performance and scalability should be significantly improved.

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Carbon Quantum Dots Loaded Nanofiber Based Optical Sensor for Sensing Hydrogen Peroxide

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Wounds are disruptions in the integrity of the skin or underlying tissues, often resulting from trauma, surgery, or pathological conditions, which may be worsened by underlying pathology and inadequate tissue oxygenation. However, wound healing is a complex and dynamic series of events that aims to restore tissue structure and function, influenced by both intrinsic and extrinsic factors. Reactive oxygen species (ROS) such as hydrogen peroxide (H_2O_2) plays a pivotal role in the orchestration of the normal wound-healing response and also induces cellular damage at inappropriate concentrations which gives rise to an arrest during cell cycle progression, causing cell death. Recent observations indicate that formation of hydrogen peroxide (H_2O_2) during tissue injury is an essential feature of the ensuing wound healing response, and exhibits antimicrobial properties, helping to control and prevent infection in the wound, which is crucial for successful healing. In this work, the sensor is developed by dispersing the carbon quantum dots in PVA solution. CQD exhibits good biocompatibility and photoluminescence properties which offer great potential in sensing biomolecules. They possess high sensitivity and selectivity towards hydrogen peroxide, enabling accurate detection even at low concentrations. CQD- PVA based nanofibers were fabricated using electrospinning methods and characterization techniques such as scanning electron microscope, goniometer is used to study the morphology of the nanomaterials. Further the accuracy of the biosensor was tested using biomimetic fluid and the fluorescent spectroscopy method produced quantitative estimation of H_2O_2 which directly related to the degree of wound healing.

Keywords: *Carbon Quantum Dots, PVA nanofibers, Wound healing, fluorescence spectra electrospinning, H2O2.*

Modelling Ultrasound-Based Blood Flow Measurement through Simulation with COMSOL

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This paper presents a method for detecting the pressure ulcers using ultrasound imaging and COMSOL Multiphysics software. Pressure ulcers also known as bedsore are common problem that can occur in individuals who are immobile for extended periods. They can result in tissue damage, infection and even life-threatening complications if not detected and treated early. Early detection is important for effective treatment and prevention of serious complications. Ultrasound imaging is a non-invasive technique that can be used to visualize internal structure of body to detect abnormalities. The COMSOL Multiphysics software is a powerful tool that can be used to simulate ultrasound imaging and analyse the result. The proposed method has several advantages over the traditional method. First this is non-invasive and does not require contact with the skin, which reduces the risk of infection and discomfort to the patient. Second it can provide the detailed visualisation of the internal structures of the affected area, including the extent of tissue damage and presence of fluid build-up which can aid in diagnosis and treatment of pressure ulcer. Third it can provide real time monitoring of the affected area which can be used in detecting the progression of ulcer and evaluating the effectiveness of the treatment. This method involves creating the three-dimensional model of the affected area using COMSOL Multiphysics and simulating ultrasound imaging to detect pressure ulcer. The model includes surrounding structure and fluid flow to provide a realistic representation to the affected area. The acoustic streaming phenomenon is also analysed to determine the fluid motion induced by the sound waves.

Keywords- *COMSOL Multiphysics, ultrasound imaging, pressure ulcers, early detection, tissue damage, fluid accumulation, blood flow*

Footstep Power Generator with Insole Warmer

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This project aims to develop a system that can generate power from the motion of walking or running, using piezoelectric crystals embedded in the shoes. Piezoelectric crystals generate an electric charge when subjected to mechanical stress, such as the pressure and motion of walking or running. The generated electricity will be stored in a battery, which can then be used to charge the insole of the shoes. The insole will be designed to produce heat, which can keep the feet warm during cold weather. This technology can be particularly useful for people who live in areas with cold climates, where the feet are often exposed to low temperatures. The proposed system has several advantages over traditional methods of generating power. First, it utilizes the energy that is usually wasted during walking or running, making it a more sustainable and environmentally friendly option. Second, it is a self-contained system that does not require external power sources or complex wiring, making it easy to use and maintain. Finally, it can provide a reliable source of power for personal use, such as charging electronic devices or powering small appliances. The project will involve several stages of development, including the design and fabrication of the piezoelectric crystals and the insole, the development of the battery storage system, and the integration of all the components into a functional prototype. The final product will be tested for its performance, durability, and usability, and improvements will be made based on the results.

Keywords: *Piezoelectric crystals, Mechanical stress, Electricity generator, Battery, Insole warmer.*

Brain Tumour Segmentation in MRI Images Using U-NET and Visualization in Virtual Reality

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Brain tumour is the growth of abnormal cells in brain some of which may be malignant or benign. The conventional method for brain tumour imaging is Magnetic Resonance Imaging (MRI). From the MRI images, information about the abnormal growth of tissues the brain has obtained. In various research works, detection of brain tumour is done by applying Machine Learning and Deep Learning algorithms. When these algorithms are applied on the MRI images the prediction of brain tumour is done very fast and a higher accuracy helps in clinical decision making and improved patient care. This prediction also helps the radiologist in making quick decisions. In the proposed work, a self-defined Convolution Neural Network (CNN) is applied in detecting the presence of brain tumour segmentation using U-net algorithm. In addition to this, for better understanding of tumour characteristics and for treatment planning. 3D visualization using Virtual Reality would be very much helpful for neurosurgeons. Hence, in this work segmentation of tumour area is performed using deep neural networks and visualized through using meta quest 2 (virtual reality tool). Moreover, for comparison, the segmented region is also 3D Modelled through 3D Slicer, SolidWorks and Blender tools. Through this study it is observed that meta quest 2 gives better visualization. This work could be very much helpful for neurosurgeons for their treatment planning.

Keywords- *U-Net, MRI (Magnetic Resonance Imaging), CNN (Convolutional neural networks), 3D Slicer, SolidWorks and Blender, VR (Virtual Reality).*

Incompressible Oil for BCG Sensor

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Background:

Cardiovascular monitoring at home is highly desirable for monitoring heart diseases. It is being monitored through smart bands and watches. Though it has many advantages, it provides some inconvenience such as skin irritation, charging and maintenance. So, we go on with Low-cost cardiovascular monitor which monitors the BCG signal generated by the heart during ejection of blood.

This Low-cost cardiovascular monitor is to be designed using an oil-filled latex rubber tube, pressure sensor, amplifier and Data acquisition module. The oil filled latex rubber tube acts as sensor which senses the BCG signal caused by heart beat and convert to pressure change which is detected by pressure sensor. The compressibility of the oil filled in the rubber tube decides how far the BCG signal is converted to pressure signal. This method of increasing the sensitivity of oil filled rubber tube is based on Boyle's law where PV=constant.

Objective:

This paper is to study about the compressibility of the oil by using Ultrasonic Interferometer.

Methodology:

1.Determine the velocity of ultrasound wave through the oil sample using Ultrasonic Interferometer setup.

2. Calculate the compressibility of the oil by using a formula,

$$\beta = \frac{1}{\rho v^2}$$

ρ is the density of the oil sample

v is the velocity of the ultrasound wave through oil sample.

The samples used for the Ultrasonic interferometer experiment are:

- Acetone
- Castor oil
- Glycerine

Result:

Samples	Velocity of ultrasound wave Through sample ms^{-1}	Compressibility of sample $m^2 N^{-1}$
Acetone	790	$0.92*10^{-10}$
Castor oil	956.14	$0.96*10^{-10}$
Glycerine	1260	$21*10^{-10}$

Conclusion:

Therefore, by comparing the compressibility of above samples Glycerine tends to be more compressible. Hence, we choose Glycerine to fill the rubber tube in order to increase the efficiency of converting the BCG signal to pressure change by reducing the air volume inside the rubber tube.

Human Breath Analyzer

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1. INTRODUCTION

Diabetic ketoacidosis (DKA) is a severe and potentially life-threatening medical emergency that may manifest in individuals with diabetes, particularly those diagnosed with type 1diabetes. The condition arises due to insufficient insulin levels within the body, resulting inelevated blood glucose levels and the utilization of fat as an energy source instead of glucose. Consequently, this metabolic process generates acidic substances referred to as ketones,which have the potential to accumulate in the bloodstream, leading to a hazardous stateknown as acidosis.

2. MATERIALSANDMETHODS

The main components used here are:

- MQ135 gas sensor
- DHT22 sensor (temperature and humidity sensor)
- Arduino Uno microcontroller
- serial monitor
- connecting wires.

The MQ135 gas sensor is a type of gas sensor that can detect a variety of gases in the air, including volatile organic compounds (VOCs)like acetone. The sensor operates on the principle of the change in resistance of a tin dioxide ($SnO2$) sensing element in response tothepresence of different gases.

When a person exhales, the breath contains a small amount of acetone, which is a volatileorganic compound. The MQ135 sensor detects the presence of acetone by measuring thechange in resistance of the sensing element when exposed to the breath sample. The sensing element of the MQ135sensor is coated with a sensitive layer made of a metaloxide semiconductor material.

When exposed to acetone, the metal oxide semiconductor material undergoes a chemicalreaction, causing a change in the resistance of the sensing element. This change in resistanceis measured and converted into an electrical signal, which can be processed by an Arduinomicrocontroller to determine the concentration of acetone in the breath.

3. RESULTS AND DISCUSSIONS

In this investigation, a new method was developed to detect acetones in breath non-invasively as an indicator of diabetic ketoacidosis (DKA). Using the MQ135 gas sensorand Arduino microcontroller, changes in resistance of a tin dioxide (SnO_2) sensing element were measured. Acetone levels between 1.6 and 3 mmol/l indicated a DKA risk, requiring additional rapid insulin doses. Levels above 3mmol/l necessitated larger doses and medical consultation. Further research is needed to validate and integrate this method into diabetescare.

4. OUTPUT

```
Temp: nan
 CHumidity: nan
 %Blow into sensor
Human BreathalyzerAcetone (ppm): 5.29
Acetone (mg/l): 10.56
Temp: nan
 CHumidity: nan
 %Blow into sensor
Human BreathalyzerAcetone (ppm): 0.37
Acetone (mg/l): 0.75
Temp: nan
```

Figure 1 shows two readings: the first reading is the output acquired when a perfume is sprayed, and the second reading is when a normal human breathes."

5. CONCLUSION

In conclusion, this project successfully designed a non-invasive method using an MQ135 gas sensor to detect acetones in breath as an indication of diabetic ketoacidosis (DKA). The method allows for determining acetone concentration, with values between 1.6 and 3 mmol/lindicating a DKA risk and levelsabove 3 mmol/l requiring larger correction doses.

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Navigation System for Deaf-Blind Population

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Most of the visually disabled people are still suffering to take independent mobility. There are a large number of visually disabled or visually impaired individuals in this world who consistently need assistance. In this innovation-controlled world, where individuals endeavor to live autonomously, this task proposes a navigation stick for visually disabled individuals, especially deaf-blind, to assist them with increasing individual autonomy. Since this is conservative and not massive, one can utilize it without any problem. This undertaking causes visually challenged subjects to explore easily by accessing an advance innovation. The stick is incorporated with ultrasonic sensors, water sensor and light sensor to securely explore the pedestrian blind people. This framework utilizes a microcontroller combined with a yield vibro-tactile feedback to alarm the concerned. The framework aides and caution the visually impaired as well as deaf-blinded individual of strolling route and furthermore alert other passerby about the nearness of visually disabled individual in the dark surrounding through light sensor. The implementation is done and the whole arrangement capacities utilizing the microcontroller.

Keywords: Deaf-Blind, Blind stick, microcontroller, ultrasonic sensors, and obstacle

EEG Based Sleep Detection System for Vehicle Drivers

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INTRODUCTION

Driver sleepiness and exhaustion are serious issues with road safety, causing many accidents andfatalities around the world. The creation of an EEG-based sleep detection system for driving has receivedinterestrecentlyasasolution to this problem [1]. The electroencephalogram, or EEG, is a non-invasive neuro physiological testing tool that captures the electrical activity of the brain and offers important information on the health and functioning of the brain [2].An EEG-based sleep detection system's main goal is to track the driver's brain activity and precisely as certain their current state of wakefulness or sleep. The system may identify the beginning of drowsiness or sleepiness by examining the EEGsignals, enabling promptaction or alerts to stop mishaps.

Overall, an EEG-based sleep detection system for drivers of moving vehicles has the potential to improve traffic safety by offering aproactive method to track and avert accidents caused by driver weariness. It offersa promising technological development for the auto sector, seeking to improve driving conditions and lessen the dangers of fatigued driving.

MATERIALSANDMETHODS

The EEG-based sleep detection system presents a viable solution for monitoring driver weariness andidentifying sleep-related events in real-time, intending to improve road safety. It combines the Neuro SkyMind Waveheadset, MATLAB, and the proposed signalprocessing approaches. The NeuroSky MindWave headset will be used for data collecting in the proposed EEG-based sleepdetection system for car drivers, and MATLAB will be used for signal processing. The EEG signals arepreprocessed by the system using Finite Impulse Response (FIR) filters. The Fast Fourier Transform (FFT) isthen applied to the filtered signals to provide the frequency domain representation [3]. Using Power Spectral Density (PSD) analysis, theta and beta waves—which are

representative of various stages of sleep—arelocated. The signal processing toolbox in MATLAB is used to carry out these processes. To determine the stages of sleep, the theta and beta frequency bands are examined. These phases are implemented using MATLAB's signalprocessing capabilities and algorithms, which enables effective analysis and detection of sleeppatterns.

RESULTSANDDISCUSSION

This method was successful in identifying theta and beta waves linked to various stages of sleep,according to the data.With regard to wakefulness and sleepiness, the power spectral density analysis showed significant peaks in the theta and beta frequency regions. The system successfully identified changes in the driver's sleepstate by examining the relative power inthese bands.The technology successfully identified real-time sleepiness episodes during testing, sending the drivers pertinent alerts. In order to reduce accidents brought on by driver sleepiness, the system's capacity to identify and alert drivers to probable drowsiness is essential.In addition, the Neuro Sky Mind Wave headset demonstrated to be a practical and unobtrusive tool for EEG data gathering, making it appropriate for practicaluses.The findings of this study demonstrate how EEG-based sleep detection systems might improve driver safety.Such technologies can efficiently identify and reduce the hazards related to driver drowsiness by continuously monitoring brainwave patterns. The number of accidents brought on by fatigue-related impairment may be greatly decreased if such technologies are implemented in automobiles.
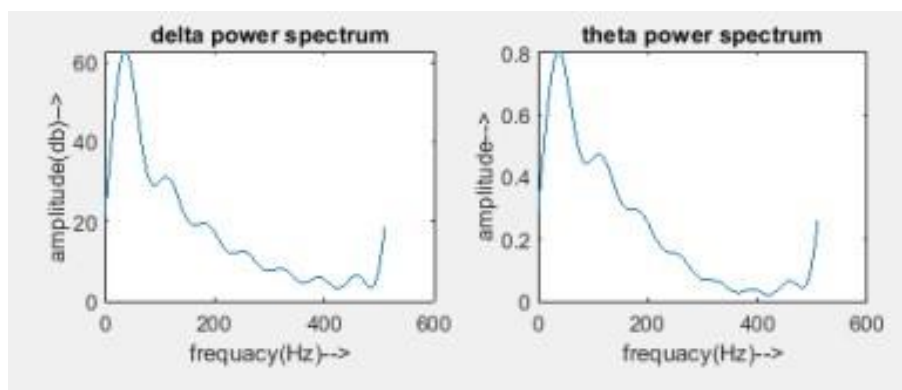
Fig2.1MATLABoutputforPSDofDeltaandThetawaves

CONCLUSIONS

In conclusion, the EEG-based sleep detection system for drivers has demonstrated encouraging resultsin detecting theta and beta waves utilizing the NeuroSky MindWave headset, FIR filters, and power spectral density analysis.The device can precisely identify these brainwave patterns and offer useful insights regarding the driver's sleep status, which is essential for assuring road safety. Future work is required, though,to improve the system's functionality and dependability. For example, machine learning methods could beused to increase the accuracy of sleep detection, and real-time feedback mechanisms should be developed to warn drowsy drivers.To assess the system'sefficacy and viability,it should also be evaluated inactual driving situations.

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Recycling Surgical Masks into Filament for 3d Printing

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1.   INTRODUCTION:

The majority of disposable face masks are made of polypropylene and are not biodegradable, the global pandemic has caused a dramatic increase in their use, raising environmental concerns about mask waste. Here, we offer you a technique for recycling polypropylene masks to create filament for 3D printing. This novel method not only addresses mask waste but also allows for the printing of filaments onto any desired material. We build a more sustainable future, lessening our impact on the environment, promoting the circular economy, and increasing the efficiency of 3D printing by turning used masks into filament. This initiative pushes the boundaries of innovation while addressing critical environmental issues, demonstrating the transformative power of recycling and sustainable practices.

2.   MATERIALS AND METHODS:

Firstly, the process starts by collecting all the used masks and processing them to remove the dirt and remove all the microorganisms with a potential to cause infectious diseases. Now these masks are combined with plastic waste or shredded plastic waste from 3d printers and reformed into molds.

This can be done at specific temperatures based on the proportion of plastic and masks. A new model that transforms the filament generation process by combining polypropylene masks and plastic waste has been developed in the search for more environmentally responsible and sustainable solutions. By simultaneously addressing the proper disposal of used polypropylene masks and the conversion of plastic waste into 3D printing filaments, this novel approach aims to address two urgent problems.

The "Polypropylene Mask and Plastic Waste Filament Generator" (PMWG) is a newly proposed model, where both polypropylene masks and waste plastic are converted into high-quality filaments through a multi-step process. In the beginning, the polypropylene masks are gathered and sterilized to ensure hygienic handling. After being torn into small pieces, the masks are combined with other suitable sources of plastic waste, like

PET bottles. The plastic waste and polypropylene mask mixture is then carefully heated and converted to molds. The new model takes advantage of the advantageous qualities of polypropylene by incorporating polypropylene masks into the filament generation process, which also lessens the environmental impact of mask disposal. The new design represents, all things considered, a significant advance in the production of sustainable filament.

2.1   **Block Diagram**
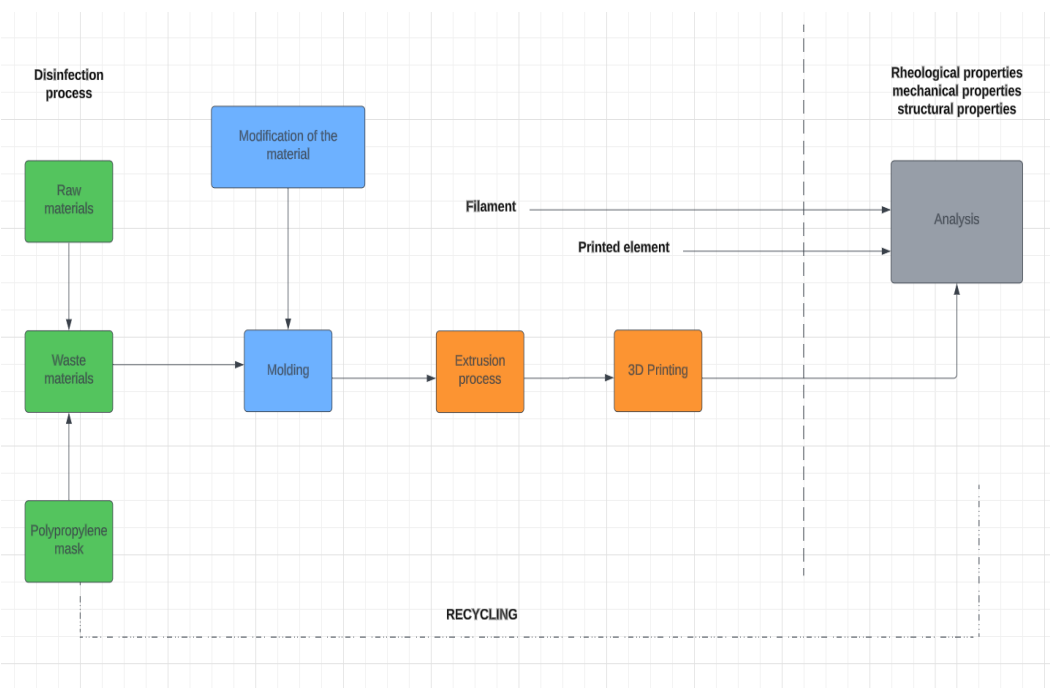
3.   **RESULTS AND DISCUSSION:**

Improved recycling effectiveness: The new model boosts recycling effectiveness by incorporating polypropylene masks and plastic waste. It offers a workable way to convert waste plastic and readily accessible polypropylene masks into filaments suitable for 3D printing.

4.   CONCLUSION:

The new model, which incorporates multiple sources of plastic waste, shows the synergistic potential of sustainable practices. It exemplifies how combining various recyclables and recycling streams can maximize environmental advantages and support a more circular and environmentally friendly economy.

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Impact of Mobile Phone usage on Sleep Quality among Students of an Engineering College

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1. INTRODUCTION:

Smart phones have become an indispensible element of people's everyday life. While smart phones provide convenience, mobile phone addiction caused by excessive use has become a prevalent occurrence among college students. Students can retain a good attitude and cope with difficult occurrences if they have a high level of psychological resilience. Poor sleep quality is often linked to lifestyle choices such as cell phone use. The purpose of this study was to determine the association between sleep quality and mobile phone misuse and social network involvement.

2. METHODOLOGY:

The current study sought to investigate the serial mediating function of psychological resilience and perceived stress in college students' physical exercise and mobile phone addiction.
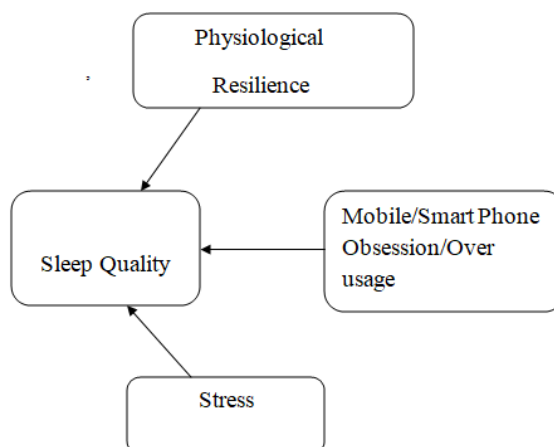
Figure 1: Major Factors Affecting Sleep Quality

College students were researched using the Structural Equation Model (SEM) which an organizational and behavioral science model. (1) Physical activity has no substantial direct influence on cell phone addiction, according to the findings. (2) Psychological resilience acts as a strong moderator between physical exercise and smartphone addiction. However, perceived stress does not. (3) There is a chain mediation between psychological resilience and perceived stress.

3. RESULTS:

There are generally four physiological resilience factors. Some of the elements that appear to make a person more resilient have been discovered by psychologists, such as a positive attitude, optimism, the capacity to manage emotions, and the ability to regard failure as a kind of beneficial feedback.

4. CONCLUSION:

Physiological resilience can be boosted by physical exercises which in turn will relieve perceived stress thus eventually alleviating mobile phone addiction. As an extended research, EEG can be captured and analyzed for sleep quality or sleep disruptions due to mobile phone usages.

5. KEYWORDS:

Physiological resilience, perceived stress, sleep disruption, Structural equation model

6. ACKNOWLEDGEMENT:

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Vein Pattern Recognition

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Introduction: Vein pattern recognition is a biometric authentication technology that identifies individuals based on the unique patterns of veins in their hand or finger. Vein patterns are considered highly secure and difficult to replicate, making them suitable for applications where strong security is required.

Objective: The process of vein pattern recognition involves capturing an image of the hand or finger using a specialized imaging system, typically with the assistance of near-infrared (NIR) light. NIR light is used because it is absorbed by haemoglobin in the blood, making the veins appear as dark lines against the lighter surrounding tissue.

Once the image is captured, various techniques are employed to extract and analyze the vein patterns. This typically involves preprocessing steps such as image enhancement, segmentation to isolate the veins from the background, and feature extraction to represent the unique characteristics of the vein patterns.

Technologies to vein pattern recognition are :

1. Image-based methods: These methods analyze the captured vein images directly. They can use techniques like edge detection, texture analysis, and pattern matching to identify and compare vein patterns.

2. Model-based methods: These methods construct a model or template of the vein pattern from the captured image. The model can be based on statistical representations, mathematical models, or machine learning algorithms. During recognition, the model is compared to the input image to determine the similarity or match.

3. Hybrid methods: These methods combine image-based and model-based techniques to leverage the strengths of both approaches. They may utilize image analysis techniques for preprocessing and initial feature extraction, followed by model-based approaches for matching and identification.

Vein pattern recognition systems have advantages over other biometric modalities. Veins are internal features that are not easily altered or forged, making them highly

secure. Additionally, vein recognition is contactless, which reduces hygiene concerns and enables non-intrusive authentication.
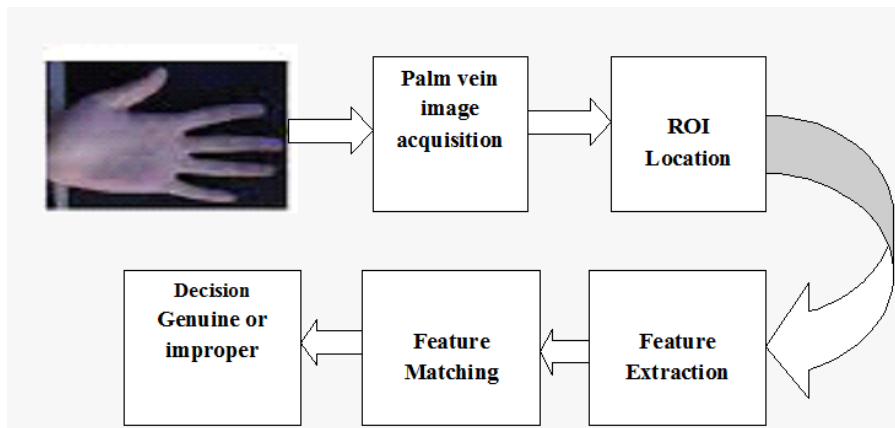
Applications of vein pattern recognition:

1. Biometric authentication: Vein patterns can be used for secure access control systems, such as in workplaces, banks, or high-security areas. They provide reliable identification and prevent unauthorized access.

2. Healthcare: Vein pattern recognition can assist in patient identification, medical records management, and medication administration in hospitals or healthcare facilities. It can also aid in the diagnosis of vascular diseases and monitoring of conditions such as diabetes.

3. Financial transactions: Vein pattern recognition can be employed for secure and convenient payment methods, such as in ATMs or mobile payment systems. It adds an extra layer of security to financial transactions.

4. Forensics and law enforcement: Vein patterns can be used in forensic investigations to identify individuals based on collected evidence, such as fingerprints or palm prints. It can assist law enforcement agencies in criminal investigations.

5. Limitations of vein pattern recognition. Factors such as changes in vein patterns over time, variations in image quality, and potential errors during image acquisition can affect the accuracy and reliability of the system.

Conclusion: Ongoing research and development efforts aim to address these challenges and further enhance the capabilities of vein pattern recognition technology.

MediTrack: Enhancing Efficiency and Security in Hospitals with IoT Equipment Management

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INTRODUCTION:

Acquisition of new medical equipment is crucial for hospitals to meet the demands of the patients care and technological advancement. However, maintaining the equipment is equally more important to ensure its optimal performance longevity and patient safety.

The implementation of Internet of Things (IoT) technology in hospitals has revolutionised the way the medical equipment has to be maintain. By integrating IoT capabilities into medical devices, hospitals can establish a sophisticated system that detects and reports equipment malfunctions or errors in real-time. This proactive approach enables timely maintenance and thus reducing the equipment downtime and ultimately enhancing patient care and safety. This paper explores the practical and efficient approach of implementing IoT technology for equipment monitoring in hospitals and emphasizing the technical aspects involved in creating a successful IoT-enabled ecosystem.

MATERIALS AND METHODS:

The first step involves consulting with the equipment manufacturers to identify devices that were IoT ready or could be retrofitted with IoT components. IoT module involves ESP8266/32 (for small scale) were chosen to collect and transmit data from the selected equipment.

Assigning individual IP address to each equipment plays a crucial role in precise identification and tracking of equipment, facilitating efficient monitoring and maintenance. To implement this approach, hospitals need to ensure that their network infrastructure supports enough IP addresses to accommodate all the IoT-enabled medical devices.

The IoT-enabled devices must have built-in algorithms to detect errors or malfunctions in real-time. These algorithms can analyse the collected data to identify anomalies or deviations from expected patterns. When an error is detected, an error log containing relevant information, including the device's unique identifier, error type, timestamp, and possibly additional contextual data to the dashboard of the system of the Biomedical Engineer. In case for the equipment in the Operation Theatres, wards, or ICUs, if there is a malfunction occurring within the equipment, the error log is prioritized and sent to the engineer's dashboard.

A cloud-based storage system can be created using SQL for storing data from IoT enabled equipment. By choosing a cloud provider like Google Firebase, we can design an appropriate database schema, ensuring secured data transmission, configuring efficient data storage and retrieval. A specialised dashboard will be created exclusively for a Biomedical Engineer in order to monitor and keep track of equipments.

RESULTS AND DISCUSSION:

The implementation of an IoT-based equipment monitoring system in hospitals yielded significant improvements in maintenance efficiency and equipment reliability. Real-time error detection and logging facilitated prompt maintenance actions, reducing equipment downtime and enhancing patient safety. The centralized dashboard provided biomedical engineers with valuable insights into equipment performance and allowed prioritized handling of critical issues. The integration of cloud connectivity enabled data storage, backup, and advanced analytics for predictive maintenance. Overall, the IoT-based system improved operational workflows, reduced costs associated with equipment failures, and contributed to the overall quality of patient care.

The data that is sent from the medical devices through cloud will be encrypted. This method of secure communication prevents third parties from accessing the confidential data. Only the intended person can decrypt it. The decrypted message will be displayed on the dashboard of the system of Biomedical engineer.

CONCLUSION:

In conclusion, implementing an IoT-based equipment monitoring system in hospitals has proven to be practical and efficient. It has improved maintenance processes, reduced equipment downtime, and enhanced patient safety. The system's real-time error detection and centralized dashboard provided valuable insights for prompt maintenance

actions. Cloud connectivity enabled secure data storage and advanced analytics. Overall, the IoT-based system has improved equipment management, reduced costs, and ultimately enhanced patient care in hospitals. The use of IoT technology in healthcare shows great potential for further improvements in equipment monitoring and patient outcomes.

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Biomedical Waste Disposal-A Sustainable Alternative

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INTRODUCTION

Biomedical waste, also known as healthcare or medical waste, refers to the waste generated during healthcare activities, including diagnosis, treatment, or immunization of human beings or animals. The proper disposal of biomedical waste is crucial to prevent the spread of infectious diseases and protect public health. There are several methods of disposing of biomedical waste, including incineration, autoclaving, chemical treatment, and land filling [1]. Incineration is a common method that involves burning the waste at high temperatures, which can be effective in destroying pathogens. However, it can release harmful pollutants into the air, such as dioxins and furans, and require significant amounts of energy to operate. Autoclaving involves subjecting the waste to high pressure and temperature to sterilize it, but it can be expensive and energy intensive. Chemical treatment involves using disinfectants or other chemicals to destroy pathogens, but it can be hazardous to workers and the environment. Landfilling involves burying the waste in a designated landfill, but this can lead to contamination of soil and groundwater and pose a risk to public health. In addition, it can take years for biomedical waste to decompose in a landfill, leading to long-term environmental impacts. Overall, each method of disposing of biomedical waste has its disadvantages, and it is essential to consider the environmental and public health impacts when selecting a disposal method. Proper training and monitoring of workers and adherence to regulations and guidelines can help minimize the risks associated with biomedical waste disposal. The idea of this project is to make bricks without any heating process that is associated with conventional brick making. It aims at reducing the pollution caused by both brick kilns and the biomedical wastes. Incorporation of cleansed biomedical wastes from hospitals in preparation of bricks for construction will be a major step towards prevention of environmental pollution and spread of infection due to dumping the waste in landfills. Autoclaves [2] (steam sterilization) can be used to treat the hospital wastes before they are processed into bricks. Since the major component of the PPEs and other biomedical wastes are plastic this is a versatile material. They can be

repulsed and changed into desirable shapes after the disinfection process. This will maintain the sustainability of the environment and prevent the spread of harmful viruses. This will be a more cost effective way and can also help the economically weaker sections of the society.

MATERIALS AND METHODOLOGY:

The main raw material for this project is the biomedical waste from the hospitals. The waste materials are collected and are sterilized using autoclave. Autoclave uses steam to sterilize the equipment and the water can be reused as many times as required. The sterilized materials are then segregated into plastics and non-plastics and are shredded. The shredded materials are then layered in the mold on a layer of cement [fig.1.1]. The layering has a layer of non-plastic followed by a layer of plastic and is repeated till the required size is obtained. The brick is sealed with an outer coating of cement.

Fig1.1Setting of brick layered with biomedical waste
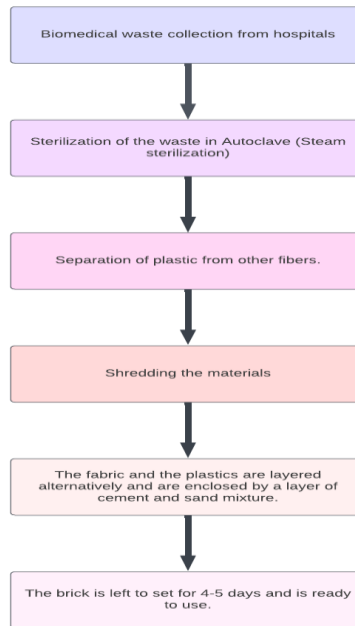
Fig1.2The flowchart explains the materials area cquired and the processof manufacturing.

RESULTS AND DISCUSSION:

The main advantage of this project over the existing ones is that the bricks are not subjected to high temperature heating and the layering technique employed eliminates the need to use high pressure and temperature. This also reduces the cost of manufacturing which ultimately reduces the market price of the product. The product [fig2.1] has the combined strength of plastic concrete and fabric hence substantially increasing the strength [3]. The future scope of this project is to improve the strength of the brick and to implement it in construction.

Fig2.1Thefinishedproduct

CONCLUSION:

The bricks produced are comparatively cheaper than the conventional bricks. This method doesn't require heating of plastics that is followed by many plastic brick manufacturers. The bricks don't require waterproofing like the Paper bricks since the main constituent is plastic which is water resistant. This innovation not only solves the Environmental issues but also helps people in disaster prone zones and poverty line to have a cheaper alternative to construct their buildings with.

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An Integrated Study of Crisis Management Using Science and Technology Based on the Novel Invader - Sars-Cov2

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In December 2019 a new virus infection emerged, initially named 'Novel Corona virus 2019 nCoV' and later renamed severe acute respiratory syndrome corona virus 2 (SARS CoV 2). It originated in Wuhan, Hubei Province, China and quickly spread to various parts of China and other countries worldwide. As of April 28 2020 COVID 19 has been detected in 210 countries and territories. Implementing measures to control the transmission of the infection is crucial in order to prevent further spread and effectively manage the pandemic situation. The use of rapid telecommunications systems and telemedicine technologies has played a significant role in ensuring timely delivery, monitoring, and management of healthcare services while minimizing direct contact between healthcare workers and COVID 19 patients. Dental professionals and patients are particularly vulnerable to contracting COVID 19 in dental settings. Robot assisted surgery (RAS) can potentially reduce hospital stays for patients who urgently require complex oncological surgeries. Thus freeing up rooms for COVID 19 patients.Unlike open surgery or standard laparoscopic procedures. RAS offers the advantage of reducing infection risk while requiring fewer clinical staff for the care of both COVID 19 patients and regular patients. This article examines the issue of nosocomial infections in dental settings and provides recommended management protocols for dentists operating in areas affected by the virus. Additionally. It explores the potential use of telemedicine and related technologies as effective strategies to control the spread of COVID 19.In response to SARS-CoV-2, this article will unite the data on Robot assisted medical procedure, the role of behavioral science in combating COVID-19, and the impact of social media on emergency preparedness.

Keywords: *Telemedicine, dental practice management, RAS, Behavioral science and Social media response*

The Future of Robotics Surgeries: A Comparative Review of Conventional and Remote Surgical Robotic Units

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The market for surgical robots is poised for significant growth. The use of a teleoperation setup, where the surgeon operates a master system and a robot mimics their actions as the slave, is a standard configuration in surgical robotics. The da Vinci Surgical Robotic system is a well-known surgical robot that provides several benefits compared to traditional laparoscopic surgery. These advantages include enhanced depth perception, minimized hand tremors, and precise surgical cutting. While the conventional robotic system is trusted and designed for specific procedures, advanced robotic systems such as NeuroArm, MicroSurge, and Sofie surgical system have emerged. Among these systems, the ZEUS and da Vinci robotic units have gained notable prominence. This article examines the statistical comparison between these two robotic systems and explores the application of advanced technologies in robotic surgeries.

Keywords—da Vinci, Robotic Surgery, ZEUS, TORS, Autonomous System, Laparoscopic Surgery, Surgical Instruments.

Patient Treatment Classification Using Machine Learning

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Clinicians and specialists often face the challenge of determining whether a patient requires inpatient or outpatient care by analyzing the results of laboratory tests. But this process is a time consuming and demanding, as it requires significant effort from doctors to make accurate decisions. Moreover, there is a high risk of making incorrect judgments, which can jeopardize the patient's life. This research article intends to utilize a range of machine learning algorithms to categorize patient care as either inpatient or outpatient, with the goal of alleviating the workload on doctors and enhancing the quality of services delivered. This study employed machine learning to construct six models: Support Vector Machine, Logistic Regression, K-Nearest Neighbors (KNN), Decision Tree, Naive Bay's and Random Forest. These models utilized patients' conditions and laboratory test results to predict whether they should be categorized as inpatient or outpatient. The selection of the best model was based accuracy. For this purpose, a dataset from a private hospital in Indonesia was used. The dataset consisted of patients' laboratory test results, extracted from their electronic health records (EHR). The models were built using this dataset and subsequently tested. The findings indicated that among the different algorithms tested, the Random Forest model exhibited the best accuracy rate of 92.44%. These findings demonstrate the potential of utilizing machine learning in improving the accuracy and efficiency of classifying patient care, thereby reducing the occurrence of human errors that could pose risks to patients' lives and financial burdens to their wallets.

Keywords - *K-Nearest Neighbors (KNN), Support Vector Machine, Machine Learning, Decision Tree, Electronic Health Record, Random Forest, Classification, Naive Bay's, Logistic Regression.*

Skin Interfaced Patch for Measuring Vital Parameters

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Typically, as individuals grow older, they frequently encounter physical conditions such as diabetes, hypertension, and cardiovascular disease. Therefore, it is essential to monitor the health of older people in order to be prepared for any potential emergencies. The primary objective of this project is to present a prototype that focuses on a blood oxygen level monitoring and alert system. The aim is to create a specialized real-time monitoring system for the elderly that can accurately measure heart rate and peripheral capillary oxygen saturation level (SpO2), and also issue alerts for abnormal blood oxygen levels. Our main goal is to replace multiple electrical cords used to measure vital signs like heartbeat, body temperature, motion, and falls, with a single wireless patch that interfaces with the skin. The patch is designed to be user friendly for both healthcare professionals and patients, enabling continuous monitoring of the parameters round the clock, 24/7. Additionally, it can be used for remote patient monitoring, reducing the need for frequent hospital visits due to minor inconveniences. Pulse oximetry is employed as a test to assess the oxygen content in the blood. It is a quick and painless method to evaluate how effectively oxygen is reaching the body's extremities, including the arms and legs. The real-time monitoring system outlined in this research facilitates the assessment of heart rate and peripheral capillary oxygen saturation level (SpO2) in elderly individuals. This is made possible through the use of a wireless patch applied to the skin surface. An alerting system is also implemented to notify caregivers and surrounding individuals in the event of any abnormalities. The suggested model functions as a real-time monitoring solution specifically designed for the elderly, providing measurements of heart rate and SpO2. A SpO2 sensor is utilized to obtain the blood oxygen level, which is then updated in the cloud through an IoT module and stored locally in a database using an SD card module. If there are any abnormal blood oxygen levels, an alert is triggered through SMS notifications for caregivers and an audible buzzer for those nearby.

Keywords: SpO2, Heart Rate, IOT, SD Card module.

Noninvasive Technologies in Healthcare: Soft Computing Approaches In Medical Diagnosis A Review

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Soft Computing (SC) became a powerful technique to detect the inner structure and hidden patterns in the dataset. It tries to learn the environment and respond to it, as of human beings. This paper focus on studying and reviewing the soft computing technique applied in healthcare especially in medical diagnosis. It aims to provide insights into the various soft computing techniques that has been effectively used in the healthcare field. The study also reveals that there is a high interest in soft computing-based diagnosis in all fields of medicine that includes cardiology, neurology, physiology, radiology, genetics etc.

Keywords: Soft Computing, Genetic, Algorithm, Fuzzy, Neural Networks, Active learning

Traffic Light Controller Using Verilog and Xilinx

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This Traffic light Controller is implemented withVerilog which controls the traffic and allows the vehiclesfrom the farm road (non-busy road) to cross a highway road(busy road) without traffic. This Traffic light controller usesa sensor which is present in the farm road to detectthe presence and absence of vehicles in the farm road andchange the traffic light controls and timings. The mainprimary objective of the Traffic light controller is to have aneffective, efficient and safe traffic light management systemwhich allows the vehicles from the farm road to cross thehighway safely. Using the clock timing sequences and the sensorinputs from the sensor which is present in the farm road thetraffic light controller's functionality is controlled by usingthe Verilog code (HDL). It is also made sure that all thepossible traffic conditions are taken into consideration. Hence this Verilog based traffic light controllermakes sure that vehicles from the farm road crosses thehighway road safely and effectively without any traffic.

Keywords: Traffic Light Controller, Verilog coding, Clock, Farm Road, Highway Road, Traffic

Smart Restroom Management System for Improving Hygiene in Healthcare Facilities

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Restroom management in healthcare facilities presentsunique challenges that necessitate solutions to ensure hygiene andoptimize operational efficiency. A Smart Restroom Management System (SRMS) based on the Internet of Things (IoT) is beingdeveloped in this study to address challenges faced by healthcarefacilities. The SRMS is a retrofittable system incorporatingautomatic flushing capabilities and touchless flush options toimprove hygiene. The SRMS uses servo-flush technology forflushing to achieve significant water savings. Furthermore, theSRMS optimizes cleaning schedules by intelligent data-drivenanalysis, potentially enhancing operational efficiency. Overall theSRMS improves hygiene and decreases water, energy, labour, andmaintenance costs, all of which contribute to making a moresustainable restroom environment in healthcare facilities.

Keywords—Restroom management; Healthcare facilities; SmartRestroom Management System (SRMS); Internet of Things (IoT); Hygiene; Operational efficiency; Automatic flushing; Touchlessflush; Servo-flush technology; Water savings; optimized cleaningschedules; Data-driven analysis; Labour efficiency; Sustainability; Retrofitting; Sustainable restroom environment.

Smart Intravenous Drip Monitoring and Control System

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INTRODUCTION

Intravenous (IV) drip mode is one of the most used modes for drug delivery. It delivers the drug into the blood circulation directly. It is widely used because of its advantages like its affordability, safety, effectiveness, and speed of delivery of pharmacological substances and other fluids. Albeit its many advantages, a few complications could arise in its usage if it is not administered properly. In this paper we discuss the advantages and risks of IV drip set, the importance IV drip rate, existing infusion pumps and their drawbacks, attempts made to overcome the drawbacks of infusion pumps and finally the need for next generation IV drip set which can not only monitor but also control the drip set. Intravenous therapy is the infusion of fluid substances directly into a vein. Intravenous simply means "within vein". IV system may be used to correct fluid imbalances, to deliver machines, for blood transfusion or as fluid. In Medical field, many devices to introduce a drastic change for monitoring the body measures like blood pressure, heart beat rate, diagnosis of heart attack symptoms and much more automatically with interdisciplinarynature.

MATERIALS AND METHODS

In our prototype, the IV (glucose) drip which is being attached with the mechanical valve gets drained with respect to time and hence when the weight of the iv bag is becomes lesser, then the elastic mechanism with a current conducting material reaches the copper wire. As it reaches the copper wire the indication is given through a LED and a alarm using a buzzer. IV drip system is commonly used in health care system; however, IV drip system need to be regularly monitored and replaced. In order to reduce the work load of nursing staff and overcome critical situations like backflow of Blood, we proposed a system called automated IV monitoring and controlsystem.

RESULTS ANDDISCUSSION

FIGURE 2.1 IV Drip monitoring system

In our working model, when the IV drip reaches a certain level (ending point) as the drip drains, the LED and a alarm indication is observed.

FIGURE 2.2 Circuit board with buzzer

CONCLUSION

The current literature review shows smart pump technology boosts safe administration and prevention of infusion errors. The evidence shows an improvement in smart pump technology. Smart pumps can decline error rates of programming but some errors happen after introducing smart pump technology to hospitals, like medication drug administration and incorrect patient information. Still, an absence of integration with hospital systemsmay decrease the support of smart pumps as drug library compliance is critical for a successful smart pump infusion. Each hospital has to enhance the rate of compliance using the pump technology and the medication library to work as desired by the proposed strategies, progression, upgrading, and development of medication libraries. Therefore, keeping a current medication library is recommended to maximize reducing errors, avoid drug update delays, and avoid alarm fatigue that could occur from several factors such as alarm desensitization. Smart pump technology grows rapidly as new merits are introduced, like adjusting a drug library to be suitable for home use and a program for alertreduction.

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IOT Based Patient Monitoring System

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INTRODUCTION

A ground-breaking method that uses the Internet of Things (IoT) to improve patient outcomes and healthcare services is the IoT-based patient monitoring system. By enabling real-time, remote, and continuous monitoring of patients' vital signs and health indicators, this system intends to address the problems with conventional patient monitoring techniques. A sensor in this health monitoring system will collect information about the patient'shealth condition.It is smaller in size, faster, and more affordable. This system can be used to measure the oxygen saturation level, heart rate, and temperature of the human body and display the results on a web-based platform. The physical, logical, and application layers are the three layers of the system[1]. Patients are facing a problematic situation of unforeseen demise due to the specific reason of heart problems and attack which is because of nonexistence of good medical maintenance to patients at the needed time.This is for specially monitoring the oldage patients and informing doctors and loved ones.So we are proposing a innovative project to dodge such sudden death rates by using Patient Health Monitoring that uses sensor technology and uses internet to communicate to the loved ones in case of problems. This system uses Temperature and heartbeat sensor for tracking patients health [2].

MATERIALS ANDMETHODS

The iot based patient monitoring system present a viable solution to enhance patient care by monitoring a patient's vitals continuously regardless of their location. This real time monitoring helps detect early signs of deterioration allowing for timely interventions and personalised treatment plans. The system aims to address the limitation of traditional patient monitoring method and bring out best results in patient care.Here Esp 32 and Arduino software is used to detect vitals like body temperature

and blood pressure Temp Im35 is used for measurement of temperature and pulse sensor is used for blood pressure measurement. Arduino's adaptability, afford ability and the ease of use makes it valuable tool in the development of patient monitoring system. The completed system consists of the pulse rate sensors and the body temperature sensor connected to an Arduino.The Arduino is connected to a device with the help of a USB, which will help power up the system. When we upload data to the Arduino, the system starts working, and the measurement data will be shown in the serial monitor of the Arduino Integrated Development Environment (IDE) and the Light Emitting Diode (LED) display,and the data will also be shown in a mobile application with the help of a Bluetooth module.

RESULTS AND DISCUSSION

TheIoT-based patient monitoring system has advantages suchas earlier health issue detection, lower hospitalization rates, and better overall patient care. The technology also enables healthcare facilities to better manage their resources, which improves the efficiency and effectiveness of providing medical care.The technology successfully identified real time patients body temperature andpressure.
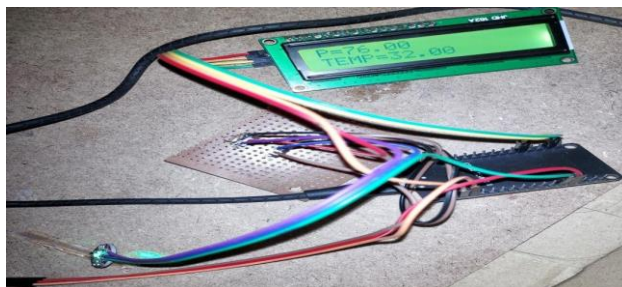
Fig 2.1 Circuitconnection
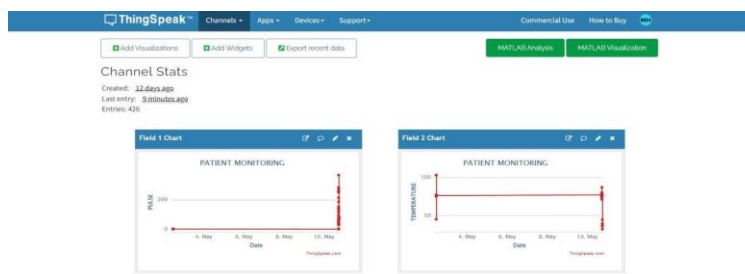
Fig 2.2 Thinkspeakoutput

The findings of this study demonstrate the patient's temperature and bloodpressure regardless of the temperature of the surrounding environment.

CONCLUSION

The design and implementation of a health monitoring system using IoT are presented in this study. This IoT-based device allows users to determine their health parameters, which could help regulate their health over time. Eventually, the patients could seek medical assistance if the need arises. They could easily share their health parameter data instantly within one application with the doctor. The IoT is now considered one of the most desirable solutions in health monitoring. It makes sure that the parameter data is secured inside the cloud, and the most important thing is that any doctor can monitor the health of any patient at any distance. The project is about an IoT-based health monitoring system using Arduino that has been developed.The system will measure a patient's bodytemperature,the bloodpressure and send the data to the iot platform.This information is also transmitted to the LED panel,allowing the patient to see their current health state quickly. Elderly patients, asthma patients, COPD patients, patients with chronic diseases, COVID-19 patients, and diabetic patients will be able to watch their vital parameter.

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Design of H Shaped Antenna Model for the Hyperthermia detection in the Thyroidgland and the Result simulated with CST Software.

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This paper proposes the design of an H-shaped antenna for localized hyperthermia treatment of thyroid gland cancer. Hyperthermia, which involves the carefully controlled heating of malignant tissues, is a promising method to increase the effectiveness of conventional therapies. The proposed antenna operates in the ISM band, which offers favorable penetration depth and absorption characteristics for the thyroid gland. Finite Element Method (FEM) simulations are employed to optimize the antenna's dimensions and performance. The design of the H-shaped Microstrip patch antenna aims to evaluate the SAR (Specific Absorption Rate) for detecting thyroid gland cancer cells. This antenna is highly flexible and suitable for wearable applications. Its performance can be varied when placed on the thyroid gland of a human. The proposed H-shaped antenna shows promising results in numerical simulations, indicating its potential for achieving precise and efficient hyperthermia treatment for thyroid gland cancer. The H-shape MPA without a tumor exhibits a gain of 3.138dBi, VSWR of -1.0508878, Directivity of -1.975dBi, E-FIELD of 17998.5V/m, and S-parameters of -32.106559 at 2.4Hz. With a tumor, the gain is 2.299dBi, VSWR is -1.0373793, Directivity is -3.138dBi, E-FIELD is 5453.94V/m, and S-parameters are -34.728803 at 2.4Hz. The performance of the antenna changes with and without the tumor-affected area. The conductivity of the water molecule changes when influenced by the cancer cell, leading to variations in the electrical properties and gain between the tumor and non-tumor cells. An innovative H-shaped patch wearable antenna operating in the ISM band using four different substrates has been designed, and various performance metrics like SAR, VSWR, Return loss, E-Field, H-Field, Working Frequency, Directivity, etc., are tabulated. In future work, fabrication and testing will be conducted to validate the antenna's performance under different conditions

*Keywords: Dielectric constant, SAR value, FEM, Tumor size and position.*

INTRODUCTION

The Thyroid gland is found within the neck slightly below the larynx. This is

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alsonamed as the voice box. The Thyroid gland contains two lobes called isthmus. It is a butterfly inshape. Thyroid cancer starts in the thyroid gland. It also starts when the healthy cells change and form a mass called tumor. Thyroid gland cancer can spread easily over the neck and to entire parts of the body. Under microscope normal cells differ from thyroid cells. Wearable microwave imagingdevice is used for cancerdetection by the use of a flexible antenna. When the antenna is kept closeto the human body various performance like SAR, VSWR, Return loss, E-Field, H-Field, WorkingFrequency, Directivity etc., are measured for both with and without tumor cells. Different fabricmaterials can be adopted to find out the minimal return loss at low frequency.Hence we suggest silk, cotton etc can be used in the place between the human body and the antenna to avoid the losses.Else we can use sealed form of antenna can be used. The radiation features are better because theantenna issoftandflexible.
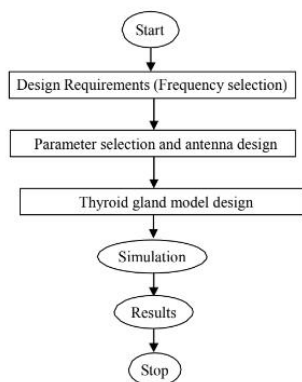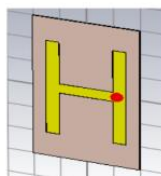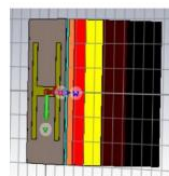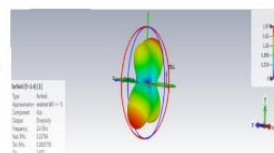
APPLICATIONANDFUTUREWORK

Early detection of thyroid cancer can lead to timely intervention and better treatment outcomes. In the future, the proposed antenna may be developed to identify the tumor fordifferent parts of the body and the antenna can be designed in different shape with variousfrequency to get a better performance. A scope is there to design a flexible implantable medicaldevicewith bio-degradable materials.

Analysis of ECG Signal for Ventricular Tachycardia

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In detection of arrhythmia with ECG signal, the instability in ventricular repolarization with premature activations (PA) hasa significant role. But the clinical detection of this instability is difficult. Hence in this research, a novel technique is presented to detect QT interval (QTI) dynamics instability and other abnormalities presenting in the ECGand to detect ventricular tachycardia based on the detected abnormalities. A feature extraction method based on Chopped displacement Gaussian (CDGa) is presented at first. The features are extracted from the CDGa signal and then they are reduced in size using Fisher discrimination analysis. Then the selected and reduced features are given to the ANFIS classifier. The ANFIS classifier performance is improved in this work by introducing Grasshopper optimization algorithm for optimizing the network parameters. Consequently, the prediction of values in the signals is accomplished with an adaptive least mean square (LMS) based prediction algorithm which is employed to predict the future condition of VT affected patients. The performance of the proposed work is observed and compared with the conventional methods.

*Keywords***—**QT interval, QT interval instability, feature extraction, classification, classifier optimization

3D Print Heart Valve Model

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Current developments in technology showed a fast-increasing implementation and use of three-dimensional (3D) printing in healthcare field which provides personalized care and creates better performing medical devices. The 3D printing technologies are progressively being used in medical industry for patient specific anatomical models and personalized surgical tools using patient's own medical imaging data. The main aim of the project is to print the aortic valve based on the patient CT and MRI image data. According to World Health Organization (WHO), most of the heart disease is caused by damage to the heart valves. Severe diseases like rheumatic fever, infective endocarditis, stenosis and regurgitation will affect the aortic valve easily. The patient's damaged aortic valve is extracted from CT and MRI scans. In this study, the CT and MRI image data are employed in DICOM format (Digital Imaging and Communication Medicine). The data set is fed to the software of the 3D printer and materials such as Acrylonitrile Butadiene Styrene (ABS), silicone and Tango plus Full cure 930 are used as printing material. The 3D printed aortic valve simulates different level of hardness, elongation and tear resistance of the existing and can be an alternative approach for treating patients with specifically designed 3D printed heart valve model using the Trans catheter Aortic Valve Replacement (TAVR) method or surgical method.

Keywords— 3D printing, Material (Polyurethane).

Integrated Metric Classification and Fault Identification for High-Quality Embedded Systems using Machine Learning

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Embedded systems play an important role in industries that require real-time interaction with the environment. Customers utilize end-user models with various devices equipped with up-to-date hardware. The software operates on the hardware and exposes services through APIs. Embedded models employ multiple levels of implementation to meet high-quality customer requirements. The existing model assesses metrics at the component level, ensuring high accuracy and performance for the entire system. Real-time systems are constructed by combining a vast array of elements, resulting in high-quality outcomes. Each element generates metrics using a pull model, which collects and stores sets of metrics in memory. These metrics are classified based on similarity and element status, enabling the identification of faulty components. Evaluation takes into account processing and storage utilization. The proposed model aims to integrate metric classification and fault identification within the system.

Keywords: *Embedded System, IoT, Memory Management, Classification, Machine Learning*

A Health Care Chatdoct System Using Decision Tree Algorithm

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In our daily life artificial intelligence ai is a big effect on our cutting-edge technological trends in such improvement of ai is chatbot a Medi-representative platform that enables undeserved groups to get right of entry to qualitative healthcare really through their internet through those developments chatting among medical doctor and their personal suffers is done in this project we suggest and enforce an ai-primarily based totally fitness Medi-representative that is probably prepared to engage with the patient the decision tree set of rules is carried out so that you can comply with a top-down looking method to identify and diagnose the problem and advocate a probable solution the gadget makes use of a questionnaire- primarily based totally method to impeach the user patient approximately numerous symptoms assisting which a preference is created and offering the required information

Keywords—*Decision Tree Algorithm, Medi-ChatDoct, Natural language processing, Virtual Doctor*

Robotic Surgery

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The term "robot" was concepted in the beginning of last century, coming originally from the Czech word "robota", meaning "labor". More recently, computer assistance and robotics based in the telepresence and virtual reality concept have been applied to surgical procedures. The application of robots in surgery dates approximately 35 years, experiencing significant growth in the last two decades fueled by the advent of advanced technologies. Despite its recent and brief status in surgery history, robotic technology has already proven its enhanced visualization, superior dexterity and precision during minimally invasive procedures. Currently, the worldwide diffused and predominant robot system used in surgery is Da Vinci by Intuitive Surgical, however robotic surgery evolution is far from over, with multiple potential competitors on the horizon pushing forward its paradigms. We aim to describe the history and evolution of robotic surgery in the last years as well as present its future perspectives. The field of surgery is entering a time of great change, spurred on by remarkable recent advances in surgical and computer technology. Computer-controlled diagnostic instruments have been used in the operating room for years to help provide vital information through ultrasound, computer-aided tomography (CAT), and other imaging technologies. Only recently have robotic systems made their way into the operating room as dexterity-enhancing surgical assistants and surgical planners, in answer to surgeons' demands for ways to overcome the surgical limitations of minimally invasive laparoscopic surgery. The Robotic surgical system enables surgeons to remove gallbladders and perform other general surgical procedures while seated at a computer console and 3-D video imaging system across the room from the patient. The surgeons operate controls with their hands and fingers to direct a robotically controlled laparoscope. At the ends of the laparoscope are advanced, articulating surgical instruments and miniature cameras that allow surgeons to peer into the body and perform the procedures.

Comparative study on the Edge Detection of Retinal Blood Vessels using MATLAB Image Processing for the Detection of Diabetic Retinopathy

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Prevalently, hyperglycemia (the insignia of diabetes) causes weakening of the walls of retinal blood vessels and leads to fluid leakage into the surrounding tissue. This phenomenon is termed as diabetic retinopathy (DR), the leading ophthalmic condition for impaired vision or blindness where the vessel gets narrowed & breaks whilst start to bleed in the retina. Diabetic patients are more prone to such threats which can be far prevented by early diagnosis & treatment of DR. As vascular anomalies fall under the manifestations of DR, an accurate assessment of eye- retinal blood vessels is the need of the hour for detection & diagnosis of DR. Hence such faultless precise blood vessel segmentation would help doctors reduce their workloads and also provide intrinsic features for diagnosis of various other retinal diseases. Nevertheless, such retinal images are prone to distortions, low contrast findings, eyelash artifacts that might deteriorate the segmentation results. Paramount image processing techniques like image registration, fusion, segmentation, feature extraction, image enhancement, morphology-pattern matching, image classification & statistical analysis are indispensable need for the perfect detection of all eye related diseases. The objective of our work is to come up with an accurate, clear & professional structure of the edge detected retinal vessels where the extracted blood vessels can be perceived distinctly using matlab. Marking boundaries and segmenting planes makes an edge to hold a valuable role in image processing. We incorporate several edge detection techniques that uplift our results. A comparative study of different masking operators used that upgrades the bounded accuracy, are also discussed in this work.

Key words: Diabetic retinopathy (DR), hyperglycemia, kernel, canny, sobel, prewitt, edge detection, matlab

IoT Based Patient Telemonitoring System for Palliative Care

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Palliative care is an approach that focuses on improving the quality of life of patients with life-limiting illnesses. It aims to relieve symptoms and provide comfort to patients andtheir families. A challenge of providing palliative care is the needfor frequent monitoring of patients. Continuous monitoring is accessible to people in India mostly in a hospital setting to facilitate palliative care. In this effort, we explore an internet of things-based solution to facilitate remote monitoring of patients in an at-home setting. We utilize commercial off-the-shelf components todevelop a proof-of-concept to explore the feasibility of a medicaldevice for palliative care application. Our preliminary test resultsindicate that the developed proof-of-concept device is capable of enhancing the accessibility to patient information for the physician. Additionally, the built-in chat interface allows swift communication between the chat interface to facilitate swift communication to the patient care-givers. We hope such a medical device will enable effective a synchronous tele-monitoring of patients requiring palliativecare at the convenience of their home,thus reducing the costs required for treatment.

Keywords—internet of things, medical device, palliative care, commercial-off-the-shelf, proof-of-concept

Generating Electricity using Waste Material

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In this paper, we use waste materials for generate electricity. We show in this paper one electricity generating fire box when we have waste materials like plastic, paper and other than we burn that materials in fire box and when burning start then heat going to heating panel then heating panel convert the heat into electricity. We store that electricity in battery and use that electricity for bulb glowing and many others work. This is live working idea for generate electricity by plastic and waste materials. In this paper, when electricity start storing that time output power supply off because we use heating sensor so when the heating sensor activates the output power supply and an LED light starts to glow, we can demonstrate how electricity is generated from waste materials in real time.

Keywords: Heating Panel, Heating sensor.

Vine Robot: A Promising Tool for Advancements in the Biomedical Industry

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The field of biomedical engineering continually seeks breakthrough technologies to advance medical procedures, diagnoses, and patient care. Robotics has emerged as a promising tool with the potential to revolutionize the healthcare landscape. Among robotic platforms, the Vine Robot has gained significant interest. Inspired by plant growth and movement mechanisms, the Vine Robot offers unique characteristics that make it a compelling tool for the biomedical industry. This manuscript aims to comprehensively explore and analyze the potential applications of Vine Robots in the biomedical sector. Leveraging the inherent capabilities of Vine Robots, various aspects of biomedical research and healthcare can be transformed. From minimally invasive surgeries to targeted drug delivery and patient monitoring, Vine Robots provide distinct features that can drive advancements in these fields. However, to fully capitalize on their potential, several challenges need to be addressed. These challenges include power source limitations, miniaturization, biocompatibility concerns, and control complexity. Researchers and industry professionals should focus on improving power efficiency, developing miniaturized versions for precise interventions, ensuring biocompatible materials and design, and advancing control algorithms to enable autonomous and intuitive operation. Continued research and development efforts are vital to unlock the transformative potential of Vine Robots, ultimately benefiting patients, healthcare providers, and the biomedical field as a whole.

Keywords— Vine Robot, soft robotics, biomedical industry, minimally invasive surgeries, targeted drug delivery, patient monitoring, healthcare.

Automatic Segmentation of AMD using Deep Learning Models

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1. INTRODUCTION

Age-related macular degeneration (AMD) is a degenerative condition of the retina that is acquired over time. It results in substantial impairment of central vision during its advanced stage. It is the primary cause of permanent blindness in individuals aged 50 years or older in developed countries. The population with retinal disease has drastically increased worldwide in recent years. The identification of retinal diseases by physician is laborious and time consuming. The automatic identification of retinal disease using deep learning technique could be a potential alternative for manual image analysis. The aim of this research is to develop an automated segmentation tool for retinal diseases specifically for age-related macular degeneration from Optical Coherence Tomography (OCT) images using deep learning algorithm. In this work, the segmentation of retinal layers and retinal fluids was performed utilizing deep learning models, specifically U-Net and Deep lab. The predominant focus of the research papers was on the segmentation of either the retinal layers or retinal fluids, rather than the concurrent segmentation of both.

2. MATERIALS AND METHODS

The OCT images were obtained from the AROI database. A total of 3072 B-scans were obtained for 24 patients, out of which 1136 B-scans (37% of the total) were annotated with respect to retinal fluids and layers. The annotations were conducted by expert ophthalmologist.

3. RESULTS AND DISCUSSION

The identification of the stages of age-related macular degeneration is significantly enhanced by the automated segmentation of retinal layers and retinal fluids. Consequently, our research efforts were directed towards the segmentation of retinal

layers and retinal fluids. Out of the total of 1136 images, 70% (795 images) were allocated for training purposes, while 20% (228 images) were chosen for testing purposes, and the remaining 10% (113 images) were set aside for validation. Figure 1 depicts the utilization of U-Net and Deep Lab for the automated segmentation of age-related macular degeneration. When comparing Deep Lab and U-Net, it can be observed that U-Net outperforms Deep Lab in terms of dice coefficient, accuracy, and mean Intersection over Union (mIoU).
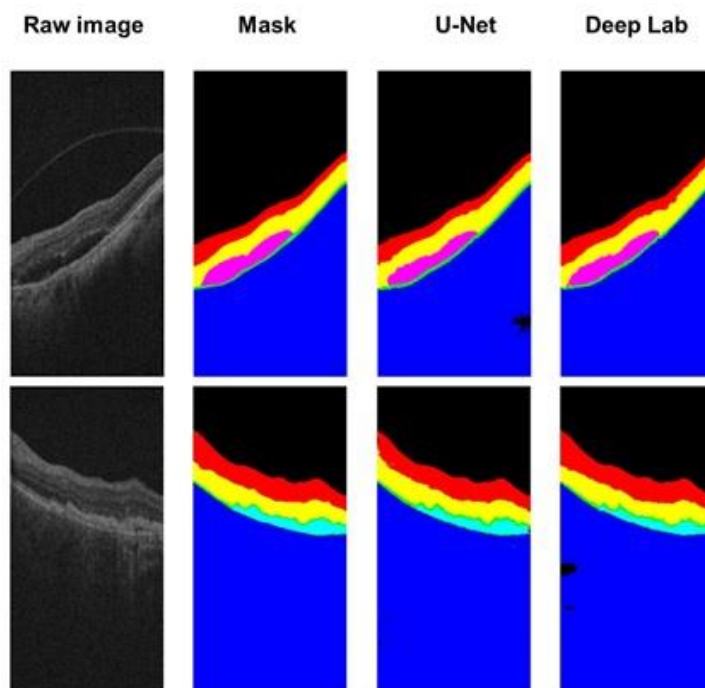
Figure 1. Segmentation Results for AMD

Model	Accuracy %	Sensitivity %	Specificity %	Dice coefficient	Mean IoU
Deep Lab	92	93	91	0.86	0.68
U-Net	95	95	97	0.9	0.8

Table1. Segmentation Metrics for Deep Learning Models
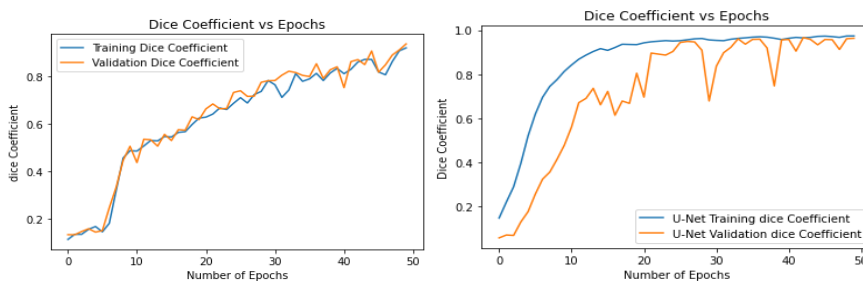
Figure 2. Dice coefficient plot a) Deep Lab b) U-Net

4. CONCLUSION

Neovascular age-related macular degeneration elicits significant pathological alterations throughout all retinal layers. Clinicians encounter challenges in distinguishing between the distinct layers of the retina. Our forthcoming research endeavors will involve the development of a novel model aimed at automating the segmentation process and classifying the different stages of Age-related Macular Degeneration.

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Comparative Analysis of Machine Learning Algorithms on Prediction of Alzhemier from MRI

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Alzheimer Disease is well-known reason which causes dementia in the elderly people, which affects an expanding number of individuals. The sources and movement modalities of AD are intricate and still not completely perceived. Neuro-imaging methods, like Magnetic Resonance Imaging (MRI) are more complex and explicit investigations of the infection can be performed, offering an important apparatus for both analysis and early identification of AD. In any case, handling huge amounts of clinical images is certainly not a simple assignment, and specialists have revolved their consideration in the direction of machine learning strategies which is a cluster of computer aided techniques which naturally adjusts their result close to the planned objective. In this Paper, Various types of machine learning technique were implemented for detecting Alzheimer's disease. A web application for the same has been developed which can be used by physicians to automatically predict the status of a patient.

Keywords: Alzheimer Disease (AD), Magnetic Resonance Imaging (MRI), Machine Learning, web development.