



ICCDBD 2022



**BMESI SPONSORED**

**INTERNATIONAL CONFERENCE ON CLINICAL  
DIAGNOSIS AND BIOMEDICAL DEVICES**

**CONFERENCE PROCEEDINGS**



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**DEPARTMENT OF BIOMEDICAL ENGINEERING**

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**SRI SHAKTHI**  
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**



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EMPOWERING THE NATION

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Sri Shakthi Institute of Engineering and Technology (SIET) was established in the year 2006 by our honorable Chairman Dr.S. Thangavelu, with the zeal to provide quality Engineering Education to the young minds and to make them innovative employable Engineers. Sri Shakthi is accredited by NAAC with A grade and also SIET is the youngest institution in India, accredited by National Board of Accreditation (NBA) for six departments ECE, CSE, EEE, IT, Mechanical engineering and agriculture engineering .We have been consecutively recognized as the best industry connect institute with platinum ranking by the AICTE-CII survey of Industry- linked technical Institutions for the years from 2014 to 2017 and received awards under Established Engineering Institution for Electronics & allied courses in 2017 and in 2014 as Emerging Engineering Institution category as close competitor. Sri Shakthi symbolizes 'creative & progressive power' of dynamic youth and is ranked among top 10 per cent of 3000 colleges across India to receive National Employability Award and The Times Group Award for Excellence in Education.

We are the pioneer Institute in India, chosen by Indian Electronics & Semiconductor Industries Association to launch their premier courses on VLSI design and embedded product design The inspirational leaders such as Padmashri A. Sivathanu Pillai, Padmashri R.M. Vasagam, Mylswamy Annadurai, Dr. Sandeep Garg, P. Venkat Rangan, Mr. Sanjeev Keskar, Mr. Srikantan Moorthy, A.K.Pattabiraman, Mr. Varadharajan, Ms. Hema Gopal, Mr. K. Ganesan, Madhusudan Atre, Mr. Vivek Pawar, Kamesh Namuduri, Mr. Jayaram Pillai, Mr. Veerappan, Mr. Parthasarathy, Mr. VA Shiva Ayyadurai, Kiran Bedi, Prof. John A Davis, KaviPerarasu Vairamuthu, Mr. Chetan Bhagat, Mr.Rajesh Nair, Mr.Kannan Ramamaniand, Mrs.Anuradha Srinivasan have visited our campus to inspire our students. The institute is also collaborated with worldwide universities and industries to support our mission. Oracle, CISCO, National Instruments, Cadence, Xilinx, Infosys, Wipro, MindTree, AMI, Siemens, Dassault Systems, TTK prestige, HP Enterprise, Virtusa Polaris, Gyan Matrix, IESA, NASSCOM, IEI, ISTE, IEEE and ITB are few among them. The institute currently offers ten bachelor's degree programs in the field of Agricultural, Bio Medical, Bio Technology, Electrical and Electronics, Electronics and Communication, Computer Science, Food Technology, Information Technology, Mechanical and Civil, and master degree programs in the fields of VLSI Design, Engineering Design, Structural Engineering, Computer Science and Engineering, Embedded System Technology

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## Message from Chairman

The ICCDBD 2022, conducted in the month of November by Sri Shakthi Institute of Engineering and Technology is the forum of great novelty. More than 100 research papers are received and around 40 are selected for presentation after the review by the experts of research. The research articles are received from across the globe. Research papers are received in the recent technologies like Machine learning, Artificial Intelligence, Computational Intelligence, Medical device design, embedded systems, IoT, Robotics, Network Security and Biomedical sciences.



The conference of this kind would provide a great platform for the higher educational institutions to understand the various real time industry based research needs. In turn, this would provide a road map to enhance the overall quality of higher education. Another important aspect is the interdepartmental research. In today's world of internet of things, augmented reality, virtual reality and machine learning, the interdepartmental research has become imperative and felt necessary. Further, research should be focused to improve the production and the overall quality of life by avoiding all types of pollutions. This Conference would play a major role to full fill the above dream. The main focus of conference is aimed to take up research in the growing, need based, market segments, where there is a lot of scope for bringing out high-tech products and for registering patents. The papers presented in the conference would be sent to peer reviewed Scopus Indexed Journals for publication.

My best wishes to the conference.

Dr.S.Thangavelu  
Chairman

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### **Message from Secretary**

ICCDBD 2022 has provided a cross-disciplinary venue for researchers and practitioners to address the rich space of computational intelligence and biomedical instrumentation. The Keynote presentations, panels and planned social events will provide ample opportunities for discussions, debate, and exchange of ideas and information among conference participants. We look forward to an insightful presentations, discussions, and sharing of technical ideas with colleagues from around the world. We thank you for attending the conference

**Er. Deepan,  
Secretary**



### **Message from Joint Secretary**

The conference would not have been possible without the enthusiastic and hard work of a number of colleagues. We would like to express our appreciation to the Technical Program Chairs and Advisory committee members for their valuable contribution in assembling the high quality conference program. We are also grateful to all the authors who trusted the conference with their work. Special thanks to the Keynote Speakers, Dr L Ashokkumar, Dr Amaladoss anburaj and Dr Rajendra kumar and all the panelists for sharing their views on current research topics. We appreciate the support of our sponsors BMESI.

**Er. Sheelan,  
Joint Secretary**



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## **Message from Principal**

I am delighted to meet you through this platform. Education is not only an act of acquiring knowledge but learning a skill to lead life and grooming ones' personality. Education of the highest order aims at guiding, inspiring, motivating and leading young men and women to become successful leaders to serve the country better. Research is the key parameter to promote the individuality to horizon. In order to create the best Engineers, the college has been providing environment to enhance the research activities even from the budding student Engineers since its origin. I hope this forum will provide enlightening contributions from researchers of Engineering filed this year. With immense pleasure, I welcome all the contributors for ICCDBD 2022.



**Dr A R Ravi Kumar**  
**Principal,**  
**Sri Shakthi Institute of Engineering and Technology**  
**Coimbatore**

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## **Message from Dean –Academic**

It is my immense pleasure to welcome you all to the BMESI sponsored ICCDBD 2022. The conference offers a premise for global experts to gather and interact intensively on the topics of computational intelligence and artificial intelligence for diagnostic and therapeutic device design. I hope eminent speakers will cover the theme computation and innovation from different perspectives. The success of this Conference is solely on the dedication and efforts of innumerable people who started working on the preparations for almost a year in many ways to make this conference become a reality. Eventually I express my special thanks and appreciation to all.

**Dr S Prakash,  
Dean of Academics,  
Sri Shakthi Institute of Engineering and Technology,  
Coimbatore**



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**ISBN: 9789393522160**



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## PREFACE

The 2022 International Conference on Clinical Diagnosis and biomedical Device ICCDBD 2022 aims to provide an outstanding opportunity for both academic and industrial communities alike to address new trends, challenges and emerging technologies on topics relevant to today's technological advancements in the areas of Clinical diagnosis, Computational Intelligence and Biomedical device design. The conference features invited keynote talks and highly commended paper presentations. The vision of ICCDBD 2022 is to foster communication among researchers and practitioners working in a wide variety of areas.



On this occasion, I feel immensely happy and proud in welcoming everyone for the conference and I would like to thank the Organizing secretary Ms. Sindhuja R, AP/BME who has shown interest in the conference, the technical committee members for their valuable time and all the faculty members who supported for the conference. The success of the conference depends ultimately on many teachers who have worked with us in planning and organizing both the technical program and supporting social arrangements. I would like to thank our honorable Chairman, Secretary, Joint Secretary, Principal, Director and Dean (Academics) of Sri Shakthi Institute of Engineering and Technology for their strong support, motivation and valuable guidance for the successful conduct of this grand event. I would also like to extend my heartfelt thanks to our sponsor, BMESI (Biomedical Engineering Society of India)

**Dr R V SHALINI**  
**Head of the department**  
**Department of Biomedical engineering**  
**Sri Shakthi Institute of Engineering and**  
**Technology Coimbatore**

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## SCOPE OF THE CONFERENCE

The International Conference on Clinical Diagnosis and Biomedical devices ICCDBD 2022 (formerly International Conference on Computational Intelligence and Devices in Biomedical Engineering ICCBME - 2021) is held during November 11 and 12, 2022 at Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India. This conference attracted global participants to share their knowledge and explore the new realm of Clinical Diagnosis; Computational Intelligence (CI). This conference created an open and warm atmosphere between scientists and engineers and promoted quality research and real-world impact in the field of Biomedical Engineering.

The ICCDBD 2022 created a forum for the people involved in Engineering R&D activities to discuss about:

- Unique Opportunity to Partner for Maximum Visibility & Community Engagement
- An outstanding opportunity for both Academic and Industrial Communities to debate and address new trends and challenges with
  - Focused sessions for specific verticals
  - Master Classes for hand-holding on issues on the ground
  - Share common challenges
- Avenue to ideate about emerging Technologies on topics relevant to today's fast moving areas of Biomedical engineering in
  - Exploring strategies
  - Listening to the best of engineering minds
  - Creating a common framework for the future
- Forum to collaborate with
  - a. Research scholars and PG students
  - b. Business Connect
  - c. Global leaders
  - d. Academia
  - e. Analysts
  - f. Peers

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**INTERNATIONAL CONFERENCE ON CLINICAL DIAGNOSIS AND  
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**ICCDBD 2022**

**Sri Shakthi Institute of Engineering & Technology, Coimbatore- 641062 | 11&12**

**November,2022**

**KEYNOTE SPEAKERS**

<b>Session Details</b>	<b>Speaker</b>
<b>Conference Inaugural Session</b> 11.11.2022 - 9:00 AM - 9:10 AM	Head of the department, Department of Biomedical Engineering
<b>Inauguration Speech</b> 11.11.2022 & 9:10 AM - 9:25 AM	Principal, Sri Shakthi Institute Of Engineering And Technology
<b>Keynote Speaker</b> 11.11.2022 & 9.30 AM - 10:45 AM	Dr. L Ashok kumar Department of Electical and Electronics Engineering, PSG Instiute of Technology,Coimbatore.
<b>Keynote Speaker</b> 11.11.2022 & 10.45 AM - 11.30 AM	Dr.Rajendra kumar, Professor, Department of Nano science and Technology, Bharathiyar University Coimbatore
<b>International speaker</b> 11.11.2022 & 1.10-1.45PM	Amaladoss Anburaj Senior Lecturer/SeniorScientist School Of Applied Science,Temasek Polytechnic Singapore
<b>International speaker</b> 12.11.2022&12.00PM-12.30PM	Mr Siva Senior Technical Support Engineer-LabDiagnostic, Gulf Corporation For Technology, Bahrain
<b>Valedictory speaker</b> 12.11.2022&2.00PM-3.00PM	Dr. Sanjeev Kubakadi, CEO and Founder, Itie Knowledge solutions , Bangalore.

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## DEVELOPMENT AND ANALYSIS OF BREAST TISSUE AND DIAGNOSING ABNORMALITIES USING LASER OPTICS IN COMSOL SIMULATION

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### ABSTRACT

The aim of our project is to develop and analyze the breast phantom and detect the abnormalities embedded into the breast tissue using the optical method of numerical simulation. For breast cancer detection, near-infrared diffuse optical tomography imaging of tissue is becoming a viable tool for mapping haemoglobin concentrations within the tissue. An effective image reconstruction method is required for accurate data recovery using numerical modelling. The diffusion equation (DE) in diffusive optical tomography systems is easily simulated with COMSOL Multiphysics. We simulate a frequency domain diffusive optical tomography system two orders of magnitude quicker than the traditional Monte Carlo approach of light transport in tissues using our implementation. Simulation studies show the ability of each reconstruction method to restore the real values of absorption coefficients. The performance of standard C's MC simulation and Comsol's finite element (FEM) simulation in terms of running time, reconstructed outcomes, and accuracy ratio is estimated. The simulation and testing findings confirmed that optical tomography could resolve inhomogeneous tumour growth. Moreover, Comsol's FEM technique could provide a more efficient and accurate simulation.

**Key words – Numerical simulation, FEM, diffusive optical tomography, scattering coefficient, Absorption coefficient**

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ISBN: 9789393522160



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## **ASSISTIVE TECHNOLOGY FOR PEOPLE WITH HEARING DISORDERS**

Sobika<sup>1</sup>, Monica Deepthi<sup>1</sup>, Bavithra<sup>1</sup>, P Raja Rajeswari Chandni<sup>1</sup>, S. Shobha Christila<sup>2</sup>  
Student<sup>1</sup>, Assistant Professor<sup>2</sup>

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### **ABSTRACT**

Around the world there are over 5 percentage of people affected by hearing loss in which 432 million are adults and 34 million are children by WHO (World Health Organization). Hearing loss can be a hinder for the people in the way like lack of educational and job opportunities because of communication lag. They are unable to involve in social gatherings and communicate with others effectively. This leads them to drop out the level of self-esteem and confidence as the subjects face different challenges in their daily life. The proposed system provides a device that transmits sound through vibration and makes the people, to experience music people who are unable to afford hearing aids or cochlear implants. D-Tunes is one of the best ways to hear sounds for people with hearing impairment. This device is equipped with FM Radio amplifier which amplifies the sound received from the Bluetooth module which connected to the mobile, then transmits the vibrations through DC Motor that is connected by the copper wire to the FM.

***Keywords—FM Radio Amplifier; DC Motor; Copper Wire.***

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**ISBN: 9789393522160**



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## **ELECTROCARDIOGRAM DATA ANALYSIS FOR DISEASE DIAGNOSIS**

S. V. Evangelin Sonia<sup>1</sup>, R.Nedunchezian<sup>2</sup> M. Rajalakshmi<sup>3</sup>

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<sup>2</sup>Professor, Coimbatore Institute of Technology, Coimbatore, India

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### **ABSTRACT**

In recent years, electrocardiograms have been found to be an effective method of detecting and classifying cardiovascular diseases (CVDs). Physicians sometimes have difficulty classifying ECGs. The deep learning era has been characterized by the creation of some models by professionals, and the scientific world has proved that these models are actually effective. A review of ECG detection and classification technology that uses deep learning algorithms in medical technology applications is presented in this work, along with research motivations, challenges, and recommendations. ECG signals are classified and compared using some neural network structures in this paper. Ultimately, the model that works best will be determined, so that medical application developers can develop programs to assist physicians.

***Keywords: Neural Networks, CNN, ECG, Cardiovascular disease.***

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ISBN: 9789393522160



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## **CYBER RESILIENCE AGAINST ADVANCED PERSISTENT THREAT (CRAPT) BY APPLYING PROACTIVE AND REACTIVE DEFENSE MECHANISM IN INDUSTRIAL CONTROL SYSTEM (ICS)**

Diana Arulkumar <sup>1</sup>[0000-0003-2980-2827] and K.Kartheeban <sup>2</sup>Kalasalingam Academy of Research and Education, Krishnankoil, Tamilnadu, India.

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### **ABSTRACT.**

Cyber Resilience Advanced Persistent Threat (CRAPT) is challenging concern for network security. In this pandemic covid season, the cyber warriors use disruptive cyber weapons as inexorable tide of the cybercrimes, data breaches, industrial espionage, and budding ruin of national infrastructure. The cyber incident reports leaves footprint impression and covering the tracks of new pernicious threats and drowning in tides of new risks. The challenges are due to sheer lack of knowledge about the new tools launched in the market and their consequence, the allocation of unsophisticated budget in mitigating the advanced cyber threats and unreliable attack vectors (one click, water holing, drive by downloads etc.). Industrial control system (ICS) technique contains data related to several applications. The APT attackers focus on assets involved in ICS application hence it is necessary to isolate targeted assets. Tactics Techniques and Procedures (TTPs) are emerged to retain the information related to attacks in the ICS system. This defence strategy incorporates defender within the system for protecting data from attacker. Analysed results demonstrated that among the several assets IP address is 100% targeted by attackers than the other assets. Through incorporation of defence strategy attacker performance decreases and defender performance increases. Keywords: Advanced Persistent Threat (APT), Tactics Techniques and Procedures (TTPs), Industrial control system (ICS) ,Biometric.

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ISBN: 9789393522160



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## **ARTIFICIAL INTELLIGENCE IN MEDICINE: THE FUTURE OF DIABETES CARE**

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Assistant Professor in Computer Applications,  
The Tamil Nadu Dr. Ambedkar Law University, Chennai.  
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### **ABSTRACT**

Artificial Intelligence (AI) is an emerging field and its applications to diabetes improve patient care by its process speed, accuracy and effective management. The technologies of AI such as machine learning, deep learning are booming in the year 2021. These technologies have been used to develop algorithms that implement predictive models for identifying the risk of developing diabetes or its consequent complications. It can make advanced inferences based on a large amount of data. Application of AI has a potential to enhance diabetes care in terms of detection, diagnosis and remote monitoring which makes AI as a promising and efficient technology. AI allows a continuous and burden-free remote monitoring of the patient's symptoms which helped to detect and predict it earlier for betterment of the life of the people. Nowadays, many articles discussed about the machine learning algorithms for evaluating Electronic Medical Records (EMR) for detection and diagnosis at primary and advanced stage. This article aims at sketching out a detailed overview of AI technologies and its algorithms on diabetes detection and diagnosis.

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**ISBN: 9789393522160**



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## **COLOR FUNDUS IMAGE PROCESSING BASED METHOD TO DETECT CONJUNCTIVA NEVUS AND CHOROIDAL NEVUS BY AUTOMATED MASK GENERATION TECHNIQUE FOR DIABETIC RETINOPATHY SCREENING**

Dr. Anitha.S<sup>1</sup> Mr. Madhusudhan.S<sup>2</sup>

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AIEMS, Bidadi, Bengaluru  
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### **ABSTRACT**

Diabetics are becoming a global cause for eye - related problems, from infants to older aged persons, eye diseases are more intense in the case of people suffering from diabetics. The number of ophthalmologists to the number of patients ratio suggests that an automated technique is needed to screen patients, especially those present in remote locations or rural parts of the country, for fast and accurate diagnose of eye related problems. The eye diseases include conjunctiva nevus, which is a freckle or mole-like spot around the iris and needs to be diagnosed before it becomes a type of cancer called melanoma. Also, Choroidal nevus which is present inside the eye under retinal tissue called the choroid will be of multiple colours and needs to be examined before it can become small choroidal melanoma. This paper presents an automatic technique to screen conjunctiva nevus and choroidal nevus for diabetic retinopathy screening by an automated novel colour intensity mask generation technique.

***Key words: Conjunctiva nevus, Choroidal nevus, Diabetic Retinopathy Screening, Data base, KNN classifier.***

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ISBN: 9789393522160



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## WRIST-HAND POSE RECOGNITION USING ELECTROMYOGRAPHYSIGNAL BY AI

Mr. Sunderlin Shibu D<sup>1</sup>, Mrs. Remcy A<sup>2</sup>, Mrs. Bhuvaneshwari M<sup>3</sup>, Ms. Pavithra S<sup>4</sup>Mr.A.Andez Raj<sup>5</sup>

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### ABSTRACT

Electromyography (EMG) signals perceived at the skin layer on the forearm can be used to exactly infer positions of wrist in hand. But only when the EMG sensors are accurately positioned over particular arm muscles is this possible. Wearable technology cannot guarantee this because it is possible for it to collect EMG from any location on the forearm. As a result, these devices detect smaller poses, less exactly. This work explains a method which resolves the drawbacks in EMG signal analysis. It shows that, when the proposed algorithm runs at host, it can easily identify the EMG signal peak point and can reduce the computational complexity and can aid the hand pose identification. This latter allows the simulation for wrist-hand movement detection using artificial intelligence techniques with no reduction in detection performance. It is shown how this can be further reduced channels or features, whilst maintaining good detection performance.

***Keyboard—Electromyographic (EMG) signals, Hand pose identification, Computational complexity, Artificial Intelligence techniques.***

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ISBN: 9789393522160



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## BABY CRADLE MONITORING AND SECURITY SYSTEM

Ms. Keerthana. R <sup>1</sup>, Lavanya. S <sup>2</sup>, Nega Vaidheesvari. M <sup>3</sup>,  
Saranya. B <sup>4</sup>, Yashini. M <sup>5</sup>.

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Sri Shakthi Institute of Engineering and Technology, Coimbatore

### ABSTRACT

People nowadays appear to be continuously preoccupied with their profession, and they may not be able to always supervise the youngster. To overcome this challenge, a baby monitoring system based on the Internet of Things (IoT) has been developed. The baby monitoring system is an alarm system that uses infrared sensors to detect a baby temperature, heart rate, and other vital signs, and then transmits the information to the appropriate authorities via a display. Baby monitoring has been conceived and developed utilizing Arduino as the control unit in the proposed system. Different sensors, such as the temperature sensor and the infrared sensor, are interfaced with the Arduino to help with infant monitoring. The system has a display that shows the output as well as the baby temperature. The proposed works outcome demonstrates an easier and more convenient method of baby monitoring for busy parents. The suggested method makes it easier and more convenient for working parents to care for their children.

**Keyword:** *Smart Cradle, IR sensor Temperature, Heart rate, Arduino.*

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ISBN: 9789393522160



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## SMART BLIND STICK USING VOICE MODULE

Ms. S. Anitha<sup>1</sup>, Ms. P. Nithya<sup>2</sup>, Mr. M. Naveen Kumar<sup>3</sup>, Mr. T. E. Samrood Muhammed<sup>4</sup>,  
Ms. S. Sowmiya<sup>5</sup>.

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<sup>1</sup> anithasbm@siet.ac.in

Sri Shakthi Institute of Engineering and Technology, Coimbatore

### ABSTRACT

The concept of smart stick aims to provide smart electronic assistance to the visually impaired. People who are blind or have low vision have difficulty recognizing obstacles as they walk down the street. The system is said to use the Arduino UNO and Voice Module to provide artificial vision and object detection, water detection, fire detection, and real-time support. The main goal of our project is to provide well-founded support for the visually impaired. Existing devices for the visually impaired focus only on moving from one location to another. This device is intended to assist the visually impaired with the same operations as a visually impaired person. A brief survey was conducted to understand the different issues associated with this project. This includes intelligent electronic assistance for the visually impaired to provide artificial vision and object recognition, and actual assistance using the Arduino Uno, Voice module and RF modules. Our project focuses primarily on the visually impaired, who are unable to move around independently. The system consists of ultrasonic sensors and feedback is received by voice. The system-wide goal is to provide visually impaired people with cost-effective and efficient navigation and obstacle detection assistance, and artificial by providing information about scenarios around static and dynamic objects around them. It about giving a sense and allowing them to walk independently.

**Keywords:** *Ultrasonic Sensors, Arduino Uno, Rf Module, Voice Module*

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ISBN: 9789393522160



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## DIAGNOSIS AND PROGNOSIS OF BREAST CANCER USING MACHINE LEARNING

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### ABSTRACT

Breast cancer is one of the most common unbearable diseases all around the world. There are different types of cancer, but breast cancer is one such painful and it has still remained the second leading cause of death worldwide. Breast cancer affects both men and women, but it has a greater prevalence among the female population. The main target indicated by this proposal is to survey various techniques used for the diagnosis of breast cancer and the research work carried out focuses on the application of machine learning methods, data analytic techniques, tools, image processing and frameworks in the field of breast cancer research with respect to cancer survivability, cancer recurrence, cancer prediction and detection among the general population. Dataset can be referring to Wisconsin university.

***Keywords: Breast cancer, survivability, prediction, Wisconsin database, metastatic, discomfort***

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ISBN: 9789393522160



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## POSTURE ANALYSER TO MONITOR AND AVOID SPONDYLOSIS CONDITION

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### ABSTRACT

Postural analysis determines postural deviations, imbalances, muscle weaknesses, or any other faults in the movement patterns that cause pain or discomfort. Most people do not know the correct sitting posture which causes numerous posture-related health issues. But recent technologies have made more viable options such as pressure sensors which are used to generate electrical signals based on the applied pressure. With the help of pressure sensors, estimation of the current posture of the person is possible. So, data from the body can be collected through these sensors. By this body position analysing method, improvement in the sitting position of an individual can be corrected. Sitting with proper alignment improves blood flow, helps to keep nerves and blood vessels healthy, and supports the muscular system. Ultimately, people spending 40% to 45% of a day in a sitting position can be benefited from our product by avoiding spine disorders such as Arthritis, degeneration of the disc, Spinal stenosis, and Spondylosis in the future. The main aim of the proposal is to maintain a healthy seating position for an individual by placing pressure sensors in the chair utilized and also to monitor the actual sitting posture and deliver comments to the user if an unhealthy way of sitting is identified. The product design is thin and flexible with comfortable material so that it can be used during regular working hours for a long time. Different voice command is used to correct the wrong posture of the individual utilizing the sensor output thereby avoiding pain in the future. This will help in improving the sitting posture of an individual.

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ISBN: 9789393522160



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## TRAILBLAZING ENDOCAPSULE

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### ABSTRACT

Capsule endoscopy is the most recent advancement in the field of ICT and healthcare. The capsule is equipped with a light source, camera with optional inbuilt storage, a wireless transmitter, and a microprocessor. It also has a nano motor to help with locomotion inside the body. Diseases in the human digestive are caused by a number of factors and there are multiple methods of scanning to devise solutions for the ailments. The conventional methods include CT, Ultrasound, X-rays, and a lot more, but they have a lot of risks, multiple long procedures, and the results are always not very clear. This is where the endoscopy capsule comes in, and provides a risk - free, quick, and minimally invasive procedure of scanning that takes little to no effort by both the physician and the patient. This saves a lot of time which is usually involved in the otherwise very complicated procedure of conventional scanning methods. With advantages such as clarity of scans, ease of use and a massive reduction for scanning costs. The capsule is used to monitor small bowel diseases, oesophageal diseases, and colonic diseases. Existing capsules export either only photos or a video with a very low frame rate. The best means of improvement can be achieved through improving the video quality, while maintaining the size of the capsule and increasing the power efficiency. Another means of improvement can be achieved by having control over the orientation of the capsule, which is also another aim for improvements. The use of an endoscopy pill eliminates the procedures required for traditional endoscopy. A wireless communication module and a battery pack to power all the components is also attached as a part of the capsule. It also has a built-in micro-LED strip to illuminate the path of the pill. Such a device will exist as a great breakthrough in the field of modern medicine and can easily be used by anyone, with no limitations to the number of uses, age, and also requires a reduced number of medical professionals to assist during the procedure.

**Keywords :** *Healthcare, Endoscopy, ICT*

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ISBN: 9789393522160



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## SMART INTRAVENOUS ALERTING SYSTEM

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### ABSTRACT

A variety of IV poles are used in hospitals and HealthCare centres for delivering saline, glucose and other solutions through intravenous lines to patients. Due to their busy schedules, most observers fail to change the saline bottle at the right time. Consequently, many patients have died from not receiving proper care from nurses. In general, IV bags filled with fluid should follow a gravity-based flow. Thus, the pole height needs to be from 4 to 7feet. In fixed poles this creates problems such as neck sprains and arm sprains in nurses while hanging the I bags and also risks of toppling the stand. In height adjustable poles it requires a lot of time to manually lower and increase height each time while replacing IV bags. Sowed provide more effective and easy healthcare through automating such vital procedures. Our proposal is to use Arduino UNO to create a Smart Intravenous Alerting System that eases the measurement process and solves bubble formation problems in drips. Also, a LED and buzzer will alert the patient when a level of fluid has been reached in the IV bag. A stopper will stop fluid flow in critical condition.

**Keywords—Load cell Amplifier, weight sensor, Arduino Controller LED.**

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ISBN: 9789393522160



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## IOT BASED ASSITIVE GLOVE FOR VISUALLY CHALLENGED PEOPLE

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### ABSTRACT

The paper aims to help visually impaired individuals navigate more accurately. It is well known that visually impaired people find it difficult to detect obstacles in and around their environment and rely only on other individuals or devices for assistance, such as the white cane and dog, which have now proven to be quite inefficient and outdated. In particular, a portable, low-powered hand glove is designed that is cost effective and portable that providing assistance to visually impaired individuals to overcome their lack of vision, As they walk and carry out their everyday tasks, become aware of unforeseen obstacles. It was designed to be compact and require little or no training for users. A user-friendly design was the main goal of the project. The blind sticks are usually used to detect objects on the floor, while the smart gloves are usually used to detect objects above the knee and below the abdomen. Sensor sends the signal, detects obstacles, and lets user know by vibrating a motor and buzzer. In case of any emergency situations, the user can send the current location to his/her guardian through GPS Module by press down the push button.

**Keywords:** *Visually impaired people, Navigation, Sensors, GPS Module, Glove*

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ISBN: 9789393522160



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## DESIGN OF COST AND SIZE EFFECTIVE VENTILATOR

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### ABSTRACT

Ventilators are major life saving equipments in hospital that act as an external support for lungs, and push air into the respiratory system. However, they are quite bulky, not easily portable and expensive. As an alternative to the available ventilator, we provide a less expensive model which is also easily portable. The use of cam actuated BVM compression is a viable option to achieve low cost, portable ventilator technology that provides essential ventilator features at a fraction of the cost of existing technology. On an average, ventilators cost about 3-7 lakhs in Indian rupees, which makes them difficult to afford for both hospital managements and patients. By designing minimal expense ventilator, every single medical clinic can bear the cost of it, and rustic region people groups additionally can get benefited by it. And large number of transportations can be done by providing portable ventilator.

**Keywords:** *Breathing Valve Mask (BVM), Ventilator, Portable.*

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ISBN: 9789393522160



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## DESIGNING AND SIMULATIONSTUDY OF LUNG ON CHIP

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### ABSTRACT

The lung is an important organ that facilitates blood oxygenation through breathing. The organ-on-chip (OOC) platform enables faster, better, and less expensive drug development, disease modelling, 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 mid-plate and pneumatic plate, there is a 40  $\mu\text{m}$  thin membrane made of poly dimethyl siloxane (PDMS) that will act as a micro diaphragm 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 mechanics (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, Simulation, CFD, Static structure, Drug testing.*

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ISBN: 9789393522160



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## **APRIORI ENABLED SUPER MARKET RACK REARRANGEMENT AS A MEANS OF MAKING RECOMMENDATIONS**

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### **ABSTRACT**

Making recommendation to the customers is the utmost need of all the E-commerce sites. Many researches have been made in this domain and many are still evolving. While this is the case with the online stores, in case of retail supermarkets are also in need of making recommendations to the customers. This work considers making recommendation in retail stores as making associated products easily accessible and visible to the customers. In this context, based on the information retrieved from the outcome of the Apriori algorithm, a method is proposed to rearrange the racks in the retail supermarkets. Rearranging the racks here refers to the replacement of items in the respective racks. While most of the existing works related shelf placement strategies in the retail stores evaluates their model with the profit obtained, this work proposes two new parameters called as the Number of Categories Accessible (NCA)/Number of Racks Accessible (NRA) and Distance between the Racks(DBR). These parameters are considered as another mean of making recommendations to the customers. The values of these parameters before and after rearranging the categories in the store are compared.

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**ISBN: 9789393522160**



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## **WEARABLE SENSOR NETWORK FOR QUANTIFICATION OF INFANT GENERAL MOVEMENTS FOR THE DIAGNOSIS OF CEREBRAL PALSY**

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### **ABSTRACT**

Sudden Infant Death Syndrome (SIDS) is one of the significant reasons for death among new born children during their rest. To expand the security of the new born children, we matched different emanant research fields for the improvement of Child Night Watch. This Savvy Wearable Framework (SWS), created under the setting of the European Texas Instruments Development Challenge (TIIC) 2015, is made by the accompanying components: a Wearable IoT Gadget, a Door and the H Clinical Connection point. The Wearable IoT Gadget is a remote sensor hub coordinated in a Chest Belt, and it has the ability to screen the accompanying boundaries: internal heat level, heart and breathing rates and body position. After a negligible information handling, this arrangement of data is shipped off the Passage, by means of ZigBee innovation, and it is open to the client through the H Clinical Connection point. On the off chance that a basic occasion happens, the gadget will set off a caution, noticeable and perceptible in the vicinity, and sends a pain message to a portable application. The Child Night Watch is a significant apparatus for clinical examinations, since it permits the representation of past physiological information and commodity it to various kinds of datasets. Trial tests have demonstrated that the SWS can possibly recognize circumstances that could be possibly perilous for a baby.

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ISBN: 9789393522160



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## **RF BASED ICU PATIENT MONITORING USING WEB AND MOBILE APPLICATIONS THROUGH ONLINE**

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### **ABSTRACT**

The patients in the Intensive Care Unit (ICU) needs a continuous monitoring of their ECG results, temperature, blood pressure (BP), heart rate monitoring and other various parameters. Whenever there is an abnormality felt by the patient, the doctors can rush to the patient. So, the main purpose of the working model is, if the patient has anything abnormal, the health parameters of the patient will be sent to the doctor through wireless technology mode. Even when the patient is under unconscious condition, all the parameters will be sensed and send to the doctors. The sensors are interfaced to PIC microcontroller with GSM module Wireless Network, so that the condition of a patient can be analysed by doctors in any part of the hospital wherever they are, thus it reduces doctors workload and gives more accurate results. If there is any abnormality the alarm is produced with the help of buzzer. This project is a functioning prototype that uses sensors in conjunction with RFID technology and GSM module to measure and transmit important vital parameters. Now a days the current technologies uses telecommunication systems and Zigbee with a high cost for sending a patient vital parameters in ICU, To avoid high cost our proposed system consist of RFID based tracking system to communicate the health parameters of the patient in Intensive Care Unit. The idea of upholding an ICU monitoring system and sharing has been put up using RFID technology to make it simpler.

***Keywords: ICU, ECG, RFID, GSM module.***

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**ISBN: 9789393522160**



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## HEART ATTACK PREDICTION USING MACHINE LEARNING

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### ABSTRACT

Heart disease has long been regarded as one of the leading causes of mortality. The causes of cardiovascular illnesses account for around 31% of all fatalities worldwide each year. The majority of patients don't become aware of their symptoms until it's too late, and some struggle to reduce risk factors for heart diseases negative impacts. So, this project consists of Machine learning algorithms which have shown to be highly effective in producing results with a high degree of accuracy, preventing the emergence of cardiac illnesses in many people and lessening their effects in those who are already afflicted. It has helped further the progress of the healthcare industry manifolds With such a tool, medical professionals and researchers have been able to diagnose and detect diseases with much accurate precision. This project has aided medical professionals and researchers throughout the globe in seeing trends in patients that have led to earlier identification. This project helps to predict whether the patient is likely to be diagnosed with a heart disease or not using the medical history of the patient. In this project we used different algorithms of machine learning such as logistic regression and KNN to predict and classify the patient with heart disease.

**Keywords:** *Machine learning, Artificial Intelligence, Logistic regression , KNN.*

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ISBN: 9789393522160



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## INTELLIGENT DECISION-MAKING SYSTEMS (IDMS) FOR DETECTION AND RECOGNITION OF ALZHEIMER DISEASE AND PERSISTENCE MONITORING OF PATIENTS

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### ABSTRACT

Alzheimers disease is accompanied by an abnormal development of proteins in and around brain cells. To study the social cognition and real-time intelligent decision-making system deficiencies in Alzheimer's patients. Wireless sensors and IoT devices together with the software, monitor patients health in various techniques. Alzheimer's disease analysis has been improved by advances in data management systems enabling individuals can create, gather, and handle massive cloud amounts of data. The challenges are facing memory loss face significant brain atrophy, mortality in elderly people, brain disease, and mild cognitive impairment. Deep learning (DL) is a computer learning approach that trains computers to accomplish things that humans learn instinctively. The DL-assisted fast advancement of neuroimaging methods (NM) has created large-scale multimodal neuroimaging data, activity in Alzheimer's disease early detection and automated classification has been spurred by this studies. Conventional neural networks (CNN) can reduce memory loss, face significant mind-stimulating activities and improve brain atrophy through exercise, can help prevent memory loss and maintain the body in condition. Recurrent neural network (RNN) can reduce the risk of mortality in elderly people and control brain disease, and various protective qualities for the brain were attributed to these meals. Module neural network (MNN) can improve cognitive health and decrease the danger of mild cognitive impairment and stroke, and the symptoms of major depression. The chance of favourable outcome from treatment increases if Alzheimer's disease is detected with DL. As a result of their earlier diagnosis, individuals are eligible to participate in clinical trials can benefit from the research and medical advantages they gain.

**Keywords**— Brain-Computer-Interface (BCI), Alzheimer's disease (AD), Intelligent Decision-Making System (IDMS), Adaptive Harmonic Noise Model Wiener filter (AHNMF), Digital Signal Processing (DSP), PCA, ICA, EMD, DCNN, IoT.

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ISBN: 9789393522160



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## PREGNANCY WOMEN TRACKER FOR ANTENATAL CARE AND INTERVENTION USING GPS SYSTEM

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### ABSTRACT

High-risk pregnancy deaths have been a great bane which is evolved generations by generations. This is because of lack of immediate aid for such cases happened during pregnancy time. According to the survey done by World Health Organization (WHO) nearly, 33800 maternal deaths are occurred due to high blood pressure(Preeclampsia and eclampsia) and also for obsessed patients due to diabetic disorder. In-order to reduce these cases we need immediate caring of doctors. Thus, we come with a new solution of live tracking of pregnancy mothers from the day1 of their pregnancy confirmation till they give birth to a baby, their Blood pressure is monitored continuously by the physicians. When there is an emergency of high pressure for mothers, through our Pregma application the doctors get immediate notification and can track the patient using Global Positioning system (GPS) which is embedded in our application. In case of long distance, the doctor can intimate the nearby public healthcare units or near by doctors for immediate handling. We also provide safe hands fetal monitor to continuously monitor the movements of baby by placing hands on stomach. The urethane contractions are also monitored using our product. This is a compact system which we create for monitoring, and we prove that we can reduce maternal deaths with this advanced technology.

**Keywords—Pregma, GPS, Fetal monitor, Compact system**

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ISBN: 9789393522160



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## **GREEN SYNTHESIS OF SILVER NANOPARTICLE USING ALOE BARBADENSIS MILLER AND OBSERVING IT'S ANTIBACTERIAL CHARACTERISTICS AND APPLICATIONS**

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### **ABSTRACT**

Nanoparticle is an ultrafine particle ranging from 1-100 nanometer in diameter. Due to its significant physical and chemical properties, it is used in various fields including medicine, material science, cosmetics and petroleum refining. The size and shape of these nanoparticles can be controlled using nanotechnology which involves the combination of various processes. Although nano scaled materials can be produced using a variety of physical and chemical processes, it is more preferable to go by green synthesis method since it is eco-friendly and non-toxic. Green synthesis comes under the bottom-up approach of nanotechnology which involves the self-assembly of atoms to new nuclei which grow into a particle of nano scale. Our work focuses on green synthesis of silver nanoparticle from silver nitrate salt ( $\text{AgNO}_3$ ) using Aloe barbadensis Miller (Aloe Vera). We have taken diluted  $\text{AgNO}_3$  and dissolved it with Aloe vera extract by means of titration process. Aloe Vera acts as a reducing and stabilizing agent in the synthesis of silver nanoparticle. Firstly, laser light of wavelength 630-670 nm is made to pass through the sample, through which the presence of silver nanoparticle is observed. Secondly, the sample is placed in an Ultraviolet spectrometer where the U-V absorption peak of 380-400 nm is obtained determining the presence of silver nanoparticle. Further Scanning electron microscopic images of the sample were taken to examine its characteristics. Silver nanoparticle exhibits some antibacterial characteristics which can be used in various biomedical domains including catheter coating, anticancer therapy and also in wound healing. We have analysed the use of silver nanoparticle in catheter coating since catheters are the major cause of Urinary Tract Infections (UTI) which is common in majority of people worldwide.

**Keyword:** *Green Synthesis, Silver nanoparticle, Aloe barbadensis Miller, Laser Diffraction, UV Visible Spectroscopy, SEM images, Antibacterial characteristics, Urinary Tract Infections (UTI)*

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ISBN: 9789393522160



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## **3D MODELLING OF STENT- TREATED INTERNAL CAROTID ARTERY WITH PLAQUE CONDITION**

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### **ABSTRACT**

The carotid artery (CA), which passes on either side of the neck and supplies the face, neck, and brain with blood and oxygen, is more vulnerable to atherosclerosis. The diseases primary features are the development of calcified plaques, which cause the diameter of the vessel to decrease and the arteries to harden. These outcomes lead to a blood supply deficit to crucial organs like the brain, which may cause a stroke. Stroke is the third most common causes of disability and mortality worldwide, and its prevalence varies uneven over the world. The objectives of this paper was to develop a CAD model of the Stent Treated Internal Carotid Artery (ICA) close to bifurcation with and without plaque. First, geometry of different region was taken. Second, using CATIA V5 software, a Computer Aided Model (CAD) of the Internal Carotid Artery (ICA) is created both with and without plaque. SOLIDWORKS software was used to develop a Palmaz-Schatz design stent that is particular to plaques. In the end, CA and Stent were combined for further research. 3D Computer Aided Stent model and ICA with and without plaque was developed. Future computational fluid dynamics studies using the developed CAD models can be used to examine the hemodynamic characteristics of blood and perform Finite Element Analysis on stents. The results obtained from these studies will help the surgeon effectively pre-plan surgical procedure to treat atherosclerotic condition with 3D Printed model.

**Keywords:** *Carotid Artery, Computer Aided Design, Atherosclerosis, 3D printing in medicine, Plaque, Stroke.*

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ISBN: 9789393522160



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## MULTIFRACTAL ANALYSIS OF ELECTROENCEPHALOGRAM FOR MOTOR IMAGERY CLASSIFICATION

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### ABSTRACT

The human brain is the most complex system in the body. The electrical activity of the brain is recorded by using an electroencephalogram. By using, electroencephalogram brain disorders can be found, and various functionalities of the brain can be understood. For this project, the dataset was taken from the School of Electrical Engineering and Computer Science of Gwangju Institute of Science and Technology. The raw electroencephalogram was pre-processed with the band pass filter to remove the artifacts from the signal. Then the Outliers in the EEG signal were detected and removed. The Multifractal analysis method is applied to every window. The features such as singularity spectrum and Hurst exponent were extracted by using this method. The SVM classifier is used to classify the left and right motor imagery and the accuracy of the classifier is calculated. The maximum accuracy obtained through the existing method is about 94.11%. In the proposed method through the multifractal analysis method and SVM classifier, the highest accuracy of 100% can be achieved.

**Keywords:** *Electroencephalogram, Artifacts, Band Pass Filter, Motor Imagery, Multifractal analysis, Hurst exponent, Singularity spectrum, SVM classifier.*

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ISBN: 9789393522160



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## DESIGN AND DEVELOPMENT OF HOARFROST FILTERED SPECTRUM FEATURE TRANSFORMATION BASED MULTILAYER RECURSIVE NEURAL CLASSIFIER

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### ABSTRACT

The ability of hyperspectral image classification is to provide spatial and spectral information makes it a significant tool in the field of remote sensing. In recent years, it has developed and increased rapidly, leading to a wide variety of techniques for Hyper Spectral Image (HSI) classification, but still there is always scope to improve the classification performance and attain better classification model. In this paper, we present a technique to achieving higher accuracy and minimum time consumption for classify the hyper spectral image using Hoarfrost Filtered Spectrum Feature Transformation based Multilayer Recursive Neural classifier (HFSFT-MRNC). The HFSFT-MRNC process includes a number of steps, including pre-processing, feature extraction and classification with the help of multiple layers. In the proposed HFSFT-MRNC technique, the effective pre-processing is done by applying the Hoarfrost filtering. Followed by the multiple features are extracted from the pre-processed bands by applying spectrum Feature Transform and finally, the Euclidean distance between the feature vectors are calculated to accurately classify the images by employing the activation function at the output layer. With respect to the number of spectral bands, the experimental evaluation is done, and it increases 7% of Classification Accuracy, decreases the false positive rate as 5%, reduces the classification time as 4% and increases the Peak Signal to Noise Ratio (PSNR) as 4%. The simulated results and discussion show that the proposed technique outperforms the state-of-the-art techniques from previous literatures in terms of performance metrics for hyperspectral image classification.

**Keywords :** *Hyperspectral Image, Hoarfrost Filter, Multilayer perceptron, Euclidean distance, Image Classification, Feature extraction.*

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ISBN: 9789393522160



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## **DESIGN AND IMPLEMENTATION OF REMOTE INFUSION MONITORING SYSTEM**

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### **ABSTRACT**

Intravenous infusion therapy plays a crucial role in saving people's lives. Current infusion pump system requires a huge manpower for monitoring. So, this proposed system incorporates IoT for remote monitoring which gives a better physician to patient ratio. The system employs a Node MCU ESP8266 microcontroller for monitoring the weight of IV bottle using load cell. A customized 3d printed pressure clamp using servo motor is designed for automatic valve closure. This system notifies its user and the caretaker when the fluid in the bottle goes below a pre-defined threshold value and the servo motor closes the valve when empty bottle condition is detected. The data are transmitted over the air using Wi-Fi module. Blink mobile app is used to display the parameters and also gives access to caregivers for controlling the system parameters in real time wirelessly. The system is tested with different case scenario and the accuracy is 99%. Thus, this system simplifies the process of IV fluid administration and reduce manpower to a great extent.

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ISBN: 9789393522160



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**Keywords—** *Smart infusion pump, Internet of Things (IoT), Load cell, Intravenous (IV), Gravity Infusion System, NodeMCU, Servo motor, Blynk.*

## **ANALYSIS OF MENTAL HEALTH USING LABVIEW SOFTWARE**

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### **ABSTRACT**

Health care is one of the avails that are most prominent. With advances in medical technology, physical health is well maintained. Moreover, mental health is one of the major concerns that are being addressed by most of the researcher. To judge the behaviour of mental state, devices to find certain parameters of brainwaves like alpha, beta and delta. The proposed system will approach various factors like attention, breathing index and stress can be analysed efficiently. The sole purpose of this system is to correctly detect and categorize the type of brainwaves and then feed the input to the application side. The proposed system has implemented using LabVIEW software. This proposal found a promising technique for reducing the complexities and to develop an overall e-health device.

**Keywords:** *Brainwaves, data acquisition, e-health, LabVIEW.*

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ISBN: 9789393522160



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## **AMINOTORS –PORTABLE AMINOTIC FLUID LEVEL MONITOR**

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### **ABSTRACT**

Aminotors is a movable amniotic fluid position examiner which can measure the position or volume of amniotic fluid inside the womb of a pregnant woman. The normal range in case of amniotic fluid indicator is 2 to 12 cms and in case of deepest fund system, the normal range is 2cms which is measured through ultrasound imaging. According to the check of WHO, over 12 of total motherly death happens due to Polyhydramnios i.e., high amniotic fluid position or Oligohydramnios i.e., low amniotic fluid position. This may lead to confinement, unseasonable or birth of foetus, umbilical cord squeezing during labor, slow growth and a high threat of caesarean. The main reason for high mortality rate is the attainability of a fluently accessible device. Unlike the conventional ultrasound, AMNIOTORS are movable, fluently accessible, no need for professed professionals, helps in periodic testing of amniotic fluid position and cost effective compared to the conventional styles. Hence our product will help to reduce the pitfalls due to low fluid situations.

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**ISBN: 9789393522160**



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## NEONATE INCUBATOR ENERGIZED WITH SOLAR FOR MEDICAL MANAGEMENT ORGANIZATION APPRAISAL

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### ABSTRACT

Preterm newborn child care is one of the main, agents and delicate regions in the Bio-clinical field. Some new-conceived are at a higher danger of mortality and are called high-hazard newborn children, on grounds that the gestational age and their introduction to the world weight put them at a higher danger of infection and demise. The preterm infant requires encompassing precisely comparable as in the belly to adapt to the outer climate. To some degree, the hatchery can fill in this climate. Keeps checking of the hatchery needs more consideration and a greater number of issues were occurred as of late like no legitimate oxygen flexibility and a few different issues. Likewise, the greater part of the insights regarding the child is not straightforwardly appeared to guardians which are another significant issue. Aside from this child burglary has gotten normal and no appropriate anticipation strategies for it. In our proposed work, a proficient technique for infant hatchery checking is planned which defeats the greater part of the issues we have referenced. PIC microcontroller is utilized to build up our framework which has more preferences and results in ideal execution. Likewise, for appropriate child well-being distinguishing proof weight, accelerometer, temperature, mugginess, heartbeat, and oxygen level sensors are utilized individually. In that event anything acting up in sensor esteem is distinguished it will be reflected and naturally signal will horn to caution the medical clinic staff.

**Keywords:** *jaundice, premature birth, raspberry pi3, safety, surveillance.*

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ISBN: 9789393522160



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## SEGREGATION OF BIO AND NON-BIODEGRADABLE WASTES FOR EFFECTIVE SOLID WASTE MANAGEMENT

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### ABSTRACT

With the growing population rate, the amount of waste being produced is also increasing at a very faster rate. It is also posing a very serious problem at the municipal level to manage the wastes being dumped everywhere as landfill waste. So, it is very crucial to have some system to manage waste automatically which is currently not there. This paper proposes a novel method where the provision is given to separate out wet and dry waste into respective bins by the sensing of different sensors incorporated along the conveyor belt is on which initially crushes the waste during moving. Pieces of glass, paper, metallic materials, and wet waste are separated out from proposed work. Using the segregated wet waste as the organic manure for the growth of plants and recycling of most of the dry components like paper, glass, plastic increases the economic value of the waste to its best. We are using OMRON Programmable Logic Controller.

***Index Terms: Solid waste management, Biodegradable, Non- biodegradable, Segregation.***

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ISBN: 9789393522160



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## **A POWER EFFICIENT AND QUATERNARY ADDER USING FINFET**

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### **ABSTRACT**

In VLSI, design and implementation of circuits with MOS devices and binary logic are quite usual. The Main Objective is to design a low power and minimum leakage Quaternary adder. The VLSI field consists of Multi-valued logic (MVL) such as ternary and Quaternary Logic (QTL). The Failures such as Short Channel Effects (SCE) Impact-ionization and surface scattering are in normalized aspects. The Quaternary radix on MVL (multi-valued logic) monitors and reduces the area. The Quaternary (four-valued) logic converts the quaternary signals and binary signals produced by the by the existing binary circuits. The Proposed is carried out with LTSPICE tool and CMOS technology.

***Keywords: Multi-valued logic (MVL), Quaternary Logic (QTL), FinFET.***

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**ISBN: 9789393522160**



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## **CARDIOVASCULAR DISEASE PREDICTION USING MACHINE LEARNING MODEL WITH GRAPHICAL USER INTERFACE (GUI)**

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### **ABSTRACT**

Cardiovascular disease is a term used to describe problems involving in restricted or obstructed blood vessels, which can result in a heart attack, chest pain (angina), or stroke. Coronary artery disease may not be discovered until after a heart attack, angina, stroke, or heart failure. In this project we will be working closely with heart disease prediction for that, we will be looking at the heart disease dataset. From that dataset, we will derive various insights that will help us know the weightage of each feature and how they are interrelated to one another, but our sole goal this time is to detect the probability of a person being affected by a saviour heart problem or not. The Cleveland, Hungary, Switzerland, and Long Beach V are 4 databases which are part of a 1988 data set. Although it has 76 properties, including the anticipated attribute, all published experiments only use 14 of them. The &quot;target&quot; field indicates whether the patient has cardiac disease. We plan to do data visualization and data analysis of the target variable, age features, and other data through this project, as well as univariate and bivariate analysis using machine learning algorithms through libraries such as NumPy, pandas, matplotlib, etc in Python and providing GUI using tinder framework for easy understanding for users.

**keywords:** *heart disease, tinder, python programming, machine learning.*

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ISBN: 9789393522160



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## A STATIC CONTENTION-FREE DIFFERENTIAL FLIP-FLOP IN 14NM CMOS -FINFET FOR LOW-VOLTAGE, LOW-POWER APPLICATIONS

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### ABSTRACT

The aim of the project is to design and implement a static Contention-Free Differential Flip-Flop in 28nm for Low-Voltage, Low-Power Applications. Near-threshold voltage (NTV) computing, where the supply voltage is approximately equal to the transistor threshold voltage, offers a promising approach to achieve high energy efficiency. Implementation will be done using Spice tools using VLSI Device models. A Static Contention-free Differential Flip-Flop (SCDFF) will be designed using FinFET for low voltage and low power applications. The SCDFF offers fully static and contention free operation without redundant internal clock toggling with footed differential latches, while keeping same area with conventional transmission-gate flip-flop (TGFF). The fully static and contention-free operation allows high variation tolerance at low supply voltage regime, achieving wide-range voltage scalability (1V to 0.3V). The CMOS and FinFET based Flip-flop will be implemented and will be compared.

**Keywords:** *Static Contention-Free Differential Flip-Flop (SCDFF), Fin-shaped field-effect transistor (FinFET), Transmission-gate flip-flop (TGFF), toggling, Near-threshold Voltage(NTV).*

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ISBN: 9789393522160



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## **BIOSENSORS: MODERN ANALYTICAL DEVICES FOR MONITORING OF HEALTH, FOOD AND ENVIRONMENT**

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### **ABSTRACT**

Biosensor devices are emerging as one of the foremost relevant tools in Health, food and environmental safety monitoring to ease for mass fabrication and field applicability. The safety of the food and environment is a serious concern for healthy living. In this connection a novel strategy which are fast in detection, reliable and highly sensitive are needed for the detection of toxicants and pollutants, which can overcome conventional analytical techniques with several limitations. Biosensors are modern analytical devices comprise of physical transducers and biological recognition elements responsible for their specificity from biological binding reaction derived from a range of interactions that include antigen/antibody, enzyme/substrate/cofactor, receptor/ligand, chemical interactions and nucleic hybridization in combination with a range of transducers. The market for the biosensors is US \$ 12 billion and it is growing rapidly extending its applications in precise monitoring of hazardous agents such as heavy metals, carcinogenic agents, pesticides, toxic residues, etc. Recent commercial biosensor devices like diabetic diagnostics devices, pregnancy test, covid-19 kits based on lateral flow assay (Ag-Ab) etc. have taken major market share designed based on simple principles of optical phenomenon such as surface Plasmon resonance, fluorescence, reflectance, chemiluminescence, bioluminescence, Electrochemical principle such as potentiometric, amperometry and conductometric, Quartz crystal microbalance, cantilever based systems, MEMS (micro-Electro-mechanical systems). Emerging, nano technology-based biosensor systems becoming popular for sensitive detection such as quantum dots, carbon nano-tubes, fullerenes, gold nanoparticles, silver nanoparticles etc. This review describes a succinct overview of current biosensor research and applications in the field of health, food and environment.

***Keywords: Carcinogens, Pesticides, Biosensor, Specific, Healthcare, Food, Environment.***

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ISBN: 9789393522160



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## HANDWRITTEN SIGNATURE VERIFICATION USING OPTIMIZED COYOTE ALGORITHM

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### ABSTRACT

Handwritten signature verification plays a major role in office document verification. The person's signature can be forged using many techniques. Intelligent forgery identified by optimized feature identification and well used deep learning techniques. Several deep learning algorithm implemented to improve the accuracy of the output. In this paper, optimized coyote algorithm implemented to equip the accuracy of the output. The output analyzed with two parameters are False Rejection Ratio and False Acceptance Ratio. 97% percent of accuracy achieved in this method.

**Keyword:** *Handwritten signature, feature extraction, coyote algorithm, deep learning algorithm.*

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ISBN: 9789393522160



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## **A MACHINE LEARNING BASED AIR QUALITY MONITORING AND ALARMING SYSTEM USING EMBEDDED AND IOT**

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### **ABSTRACT**

Air pollution has become a common phenomenon everywhere. Specially, in the urban areas, air pollution is a real-life problem. Air quality is measured to examine its quantity, compounds, and effects on the environment and human health, to compare this data periodically to notice trends over time. The measurements are taken in various ways depending on the source. In this project an efficient air quality monitoring device that can monitor the quality of air by measuring the presence of harmful substance in it and uploading it to cloud server for future reference is done. Using Deep learning methods, the data was analyzed to monitor and decide the environment condition in future. These analysis can be used for rain prediction also. Embedded System is used for data collection through sensor. Matlab is used for data prediction in machine learning approach. The proposed method makes use of Arduino uno microcontroller as its controller and the sensor unit consists of MQ135 air quality sensor and DHT11 temperature and humidity sensor.

***Keywords: IOT, gas sensor, embedded, pollution detection, air quality, cloud.***

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**ISBN: 9789393522160**



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## **VLSI IMPLEMENTATION OF THE LOW POWER NEUROMORPHIC SPIKING NEURAL NETWORK ALARMING SYSTEM USING EMBEDDED AND IOT**

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### **ABSTRACT:**

Biomedical system requires advanced computing methods and algorithms for the analysis of data. Most of the data is either one dimensional or two dimensional. For neuromorphic signals hardware and software designs are complex due to their signal features. For Biomedical application, analysis of data through modern computational methodologies is required. VLSI based architectures enhance the way diagnosis is performed. The Spiking Neural Networks (SNN) is faster, accurate and computationally powerful. The SNN models accurately the nervous system and other machine learning algorithm can be incorporated efficiently. The objective of the projects to design a Neuromorphic system using Nano electronics for the application based on Artificial Intelligence for feature extraction of medical data. The project is a combination of Nano electronics, computer technology, and biology. This project presents the analysis, design and implementation of neural networks based on human brain functionalities. The Spiking Neural Networks (SNN) architecture implementation in Very Large Scale Integration will reduce the power consumption and miniaturize the device. A detailed review on various spiking neural networks architectures and methods will be presented. In this project an effort will be made for the VLSI implementation of the spiking neural architecture. The implementation will be carried out using Quartus Tool and Spartan/Cyclone/Vertex Kits in 90nm and 65nm technology. Power, delay and area will be taken as the performance metrics.

***Keywords: Neuromorphic, accurately, functionalities***

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ISBN: 9789393522160



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## **DIAGNOSIS OF COVID-19 IN LUNG IMAGES USING DEEP LEARNING**

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### **ABSTRACT**

Artificial Intelligence (AI) provides a breakthrough for the diagnosis of COVID and other types of pneumonia. Pneumonia is diagnosed using some of the standard images such as Computed Tomography (CT) scan and Chest X-Ray (CXR). The latest research results show that CT has strong sensitivity in the diagnosis of COVID patients, and the positive rate in confirmed patients is greater than 90%. With the rapid development and rise of computer technology, the emergence of artificial intelligence technology combined with big data deep learning has provided a huge help for solving medical problems. Rapid spread of Coronavirus disease leads to severe pneumonia, and it is estimated to create a high impact on the healthcare system. An urgent need for early diagnosis is required for precise treatment, which in turn reduces the pressure in the health care system. Some of the standard image diagnosis available is Computed Tomography (CT) scan and Chest X-Ray (CXR). Aim of this project is to provide a solution for identifying pneumonia due to COVID and healthy lungs (normal person) using CT images. One of the remarkable methods used for extracting a high dimensional feature from medical images is the Deep learning method used in this work.

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**ISBN: 9789393522160**



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**LESS COMPUTATIONAL, LOW CURRENT LEAKAGE AND POWER EFFICIENT  
APPROXIMATE MULTIPLIERS FOR IMAGE  
PROCESSING APPLICATION USING FINFET**

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**ABSTRACT**

In exact (or approximate) computing is an attractive paradigm for digital processing at nano metric scales. Inexact computing is particularly interesting for computer arithmetic designs. This project deals with the analysis and design of two new approximate 4-2 compressors for utilization in a multiplier. These designs rely on different features of compression, such that imprecision in computation (as measured by the error rate and the so-called normalized error distance) can meet with respect to circuit-based figures of merit of a design (number of transistors, delay and power consumption). Four different schemes for utilizing the proposed approximate compressors are proposed and analyzed for a Dadda multiplier. Extensive simulation results are provided and an application of the approximate multipliers to image processing is presented. The results show that the proposed designs accomplish significant reductions in power dissipation, delay and transistor count compared to an exact design; moreover, two of the proposed multiplier designs provide excellent capabilities for image multiplication with respect to average normalized error distance and peak signal-to-noise ratio (more than 50dB for the considered image examples). In phase 2, 32nm technology will be utilized for the design. A new FinFET based Dadda multiplier will be proposed.

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ISBN: 9789393522160



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## **CALORIE BURN COUNTER**

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### **ABSTRACT**

Obesity is one of the crucial problem for every individual in this present world .This posture is mainly to Monitor the calorie burn count, when we do certain physical exercises. The one who are obese face many difficulties such as cardiac arrest (Myocardial infarction).This monitoring is so far advanced from smart watch technologies . A vital role of this device is that the accuracy percentage is maximum, when compared to similar technologies . It is a low cost device , it requires two small sensors in the thigh and the shank region, a portable microcontroller on the waist part and a battery to run ,it is also necessary to monitor their pulse rate which is also been included in this device .As they are light weighted it is easy enough to be integrated in different norms. The system prevails us how a human should maintain weight.

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**ISBN: 9789393522160**



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## **A SECURED DATA TRANSMISSION APPROACH USING LEACH PROTOCOL IN PRECISION-BASED AGRICULTURE**

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### **ABSTRACT**

Wireless Sensor Network (WSN) is a prominent network, where the latest applications and devices are being developed daily. To equip the current trends in the IT world, WSN is a predominant area that supports to the maximum to uplift the need of the end-user. The agricultural area is one of the areas that developed through the Internet of Things (IoT) in terms of yielding higher than usual, better water management, and so on. These features develop the Internet of Agriculture Things (IoAT) specifically to concentrate on agricultural-oriented developments. Therefore, this paper proposed a secured data transmission for IoAT using LEACH Protocol (S-LEACH). The paper presents a separate secured key to each node for data transmission in a highly secured environment. This protocol, Secured-LEACH (S-LEACH) outperforms existing protocols such as energy consumption, packet delivery, and packet loss.

*Keywords-WSN; IoT; IoAT; LEACH; Energy Consumption; S-LEACH*

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ISBN: 9789393522160



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