



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 5, May 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

Health Monitoring System using ESP32

Jerin Biju¹, Ruhith Rajesh², Rithik George Raji³, Jeffin Varghese Jolly⁴, Ashna k⁵,

Dr. Smitha C Thomas⁶

UG Student, Department of CSE, Mount Zion College of Engineering Kadammanitta, Pathanamthitta, India^{1 2 3 4}

Assistant Professor, Department of CSE, Mount Zion College of Engineering Kadammanitta, Pathanamthitta, India⁵

Professor, Department of CSE, Mount Zion College of Engineering Kadammanitta, Pathanamthitta, India⁶

ABSTRACT: As the population increases, there is also an increase in the number of chronic and heart diseases. The current hospital centric healthcare system is becoming inefficient to treat conditions that demand immediate treatment such as heart strokes. So, the focus is now tilting from hospital centric treatment to patient centric treatment. This project proposes a health monitoring system which monitors vital parameters of the patient such as temperature and heart rate using sensors as well as a fitbit which are connected to a raspberry pi board. The project involves alerting the doctor through SMS if any vital parameter of the patient deviates from the normal value. Apart from helping the doctor monitor the patient's basic health parameters this health monitoring system also ensures that the patient takes the prescribed medication at the right times. The raspberry pi acts as a personal server which logs the details of the patient's medication. The patient is sent reminders to take medicines through SMS according to his prescription.

KEY WORD: Measuring heart rate of the patient, measuring body temperature of the patient, O₂ level of the patient, Accurate values from the components, sending values to user emails about their checkup details

I. INTRODUCTION

The advancement in the new innovative technology and Internet of Things (IoT) has had a substantial influence on the healthcare system. Moreover, the fusion of novel advances in technology with healthcare systems provides us with a wide window for improvements in the areas of patient care and communications. But the fragmented nature of the healthcare system, which is further worsened by the lack of tools for communication between specialists stimulates the need of functional interoperability to ameliorate this coordination. Currently, information technology is considered a necessity rather than a supporting tool. A major aspect in the healthcare system is the monitoring of the patient's vital signs such as temperature and heart rate. Many monitoring devices that display the patient's vital signs are commonly present in the critical care units in operating rooms. But there could be instances where the doctor couldn't be alerted in time when there is an emergency, despite of 24 hours of monitoring. Also, the data couldn't be shared remotely with the other doctors who are specialists in that field and the family members. Technology that enables all these activities are available but aren't affordable by many people in developing nations. Our project aims to overcome this problem by developing a healthcare system that uses an esp32, an affordable credit card sized single board computer.

II. RELATED WORK

The survey explores different approaches for Health Monitoring system using Esp32

- A. The Internet of Things for Ambient Assisted Living Technological advancements lead to smart objects being capable of identifying, locating, sensing and connecting and thus leading to new forms of communication between people and things and things themselves
- B. The Design of Dual Radio ZigBee Homecare Gateway for Remote Patient Monitoring
- C. A Dual Radio ZigBee Homecare Gateway (DRZHG) has been proposed and implemented to support remote patient monitoring The Dual Radio ZigBee design furnished slow latency and highly accurate tele health service at home
- D. Things-aware smart pet-caring system with internet of things on web of object architecture
- E. Smart home services are increasing and converged systems are deployed with internet of things (iot) technology,

smart home service needs to consider both humanity and commune with nature

- F. The Esp32 single board computer will revolutionize computer science teaching
- G. The Raspberry Pi single- board computer will revolutionize computer science teaching this new single board device will revolutionize the way pupils learn about computing, programming and technology at school
- H. IOT Based Health Monitoring System Using Arduino UNO

The temperature sensor measures the body temperature, the heart beat sensors will measure the heart rate and oximeter measures the oxygen level when the patient is in contact with the sensors. The Arduino will process the code and display the data of the patient to LCD display

III. METHODOLOGY

A. EXISTING SYSTEM

Health monitoring systems typically involve a combination of hardware and software solutions to track and manage various aspects of an individual's health. Some common features and components include:

1. **Wearable Devices:** Many health monitoring systems leverage wearable devices such as smartwatches, fitness trackers, or specialized medical devices to collect data. These devices often include sensors for monitoring parameters like heart rate, activity levels, sleep patterns, and more.
2. **Mobile Applications:** Paired with wearable devices, mobile applications are often used to display and analyze health data. Users can track their progress, set goals, and receive alerts or insights based on the collected data. These apps may also provide a user interface for data input, such as food intake or mood tracking.
3. **Cloud Integration:** Health monitoring systems often utilize cloud platforms to store and process the vast amount of data generated by users. Cloud integration allows for seamless synchronization of data across multiple devices and provides a centralized location for analysis.
4. **Data Analytics and Machine Learning:** Advanced health monitoring systems may incorporate data analytics and machine learning algorithms to derive meaningful insights from the collected data. This could include trend analysis, anomaly detection, and personalized recommendations for improving health.
5. **Remote Monitoring:** Some systems are designed to facilitate remote monitoring, allowing healthcare professionals to track patients' health status in real-time. This is particularly useful for individuals with chronic conditions or those recovering from medical procedures

B. PROPOSED SYSTEM

Multi-Sensor Integration: Incorporate various sensors such as heart rate monitors, blood pressure monitors, temperature sensors, activity trackers, and more to collect diverse health data. **Data Aggregation and Analysis:** Gather data from different sensors and aggregate it in a centralized database. Utilize data analytics techniques, including machine learning algorithms, to analyze the collected data for patterns, anomalies, and trends. **Real- Time Monitoring:** Enable real-time monitoring of vital signs and health parameters. Provide alerts and notifications for any abnormal readings or critical health events. **User Interface:** Develop a user-friendly interface accessible via smartphones, tablets, or computers. Allow users to view their health data, set personalized health goals, and track their progress over time. **Communication and Connectivity:** Establish connectivity with healthcare providers and emergency services. Enable seamless communication between users, caregivers, and healthcare professionals for consultations, advice, and emergencies **Personalization:** Customize the system to suit individual preferences and health requirements. Allow users to tailor notifications, alerts, and recommendations based on their health goals and medical condition



IV. SYSTEM DESIGN

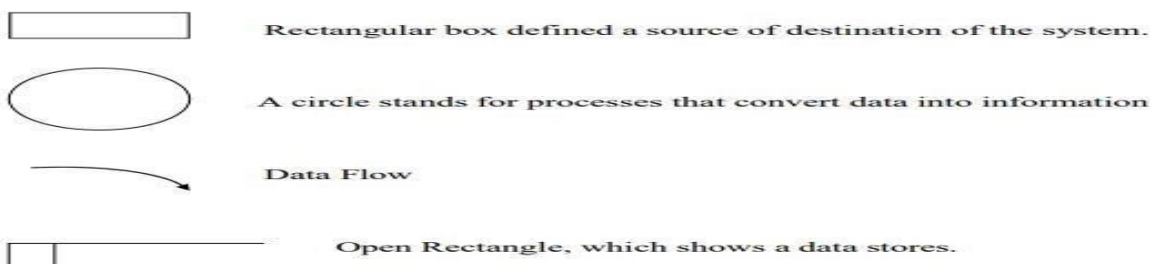


- CPU - I3 Processors
- Hard Disk Space - 250 Gb
- Display - 15l Color Monitor
- Main Memory - 8 Gb
- Keyboard - 104 Keys
- Clock-Speed - 2.6 Ghz
- Monitor - 15 " Svga Color

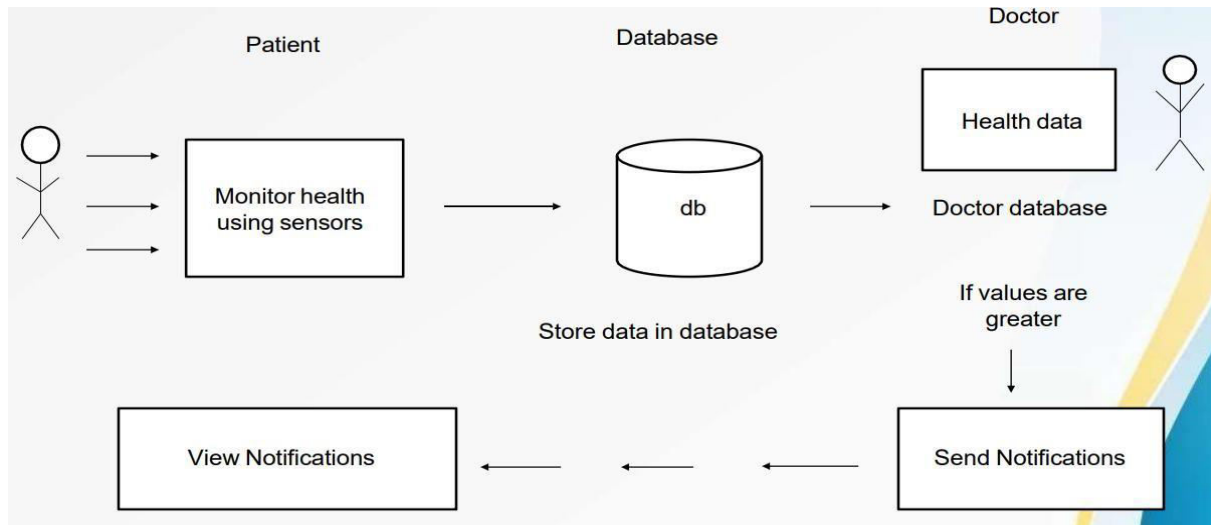
SOFTWARE REQUIREMENTS

- Operating System - Windows 10
- Backend - Python, PHP, MySQL
- Front End - HTML, CSS
- Server - Apache
- Software Used - Python Anaconda, XAMPP

DATA FLOW



ARCHITECTURE



V. SYSTEM DESIGN

The logical design describes structure and characteristics of features, like the outputs, inputs, databases and procedures. The physical construction which follows the logical design produces actual program software files and the working system. System design sits at the technical kernel of the software engineering and is applied regardless of the software process model that is used. Beginning once software requirements have been analyzed and specified software design is the first technical activity that is used to build and verify the software.

A. FUNCTIONAL REQUIREMENTS

Interface: The Graphical User Interface that communicates with the user with ease. Network Access: Provide accessibility to application through Wi-Fi or cellular network. Storage: MySQL, and Firebase that store the information to be displayed to the user. Easy integration: The application should be easy to integrate with the existing system

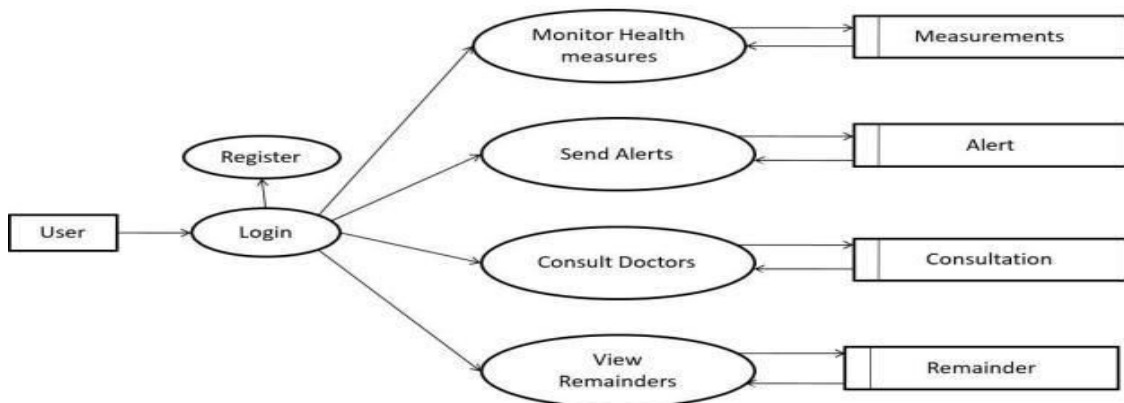
B. NON-FUNCTIONAL REQUIREMENTS

Performance: The application would be used by numerous customers throughout the country. So it was required that the system should take minimum time to produce output. The main concern was the time taken to query database system to extract the relevant names and calculate the similarity scores. This time depend upon the type of internet service used. Overall the response time for map loading and data retrieve from database has been improved to some extends

Accuracy: The application is purposed to be real time, so it is required that the high accuracy is maintained. This is maintained by the in-built Google API's and open source frameworks of Apache that supplies correct data and classes to give a precise coding option.

VI. DATA FLOW DIAGRAM

Data Flow Diagram (DFD) representing a system at any level of detail with a graphic network of symbols showing data flows, data stores, data processes, and data sources. The purpose of DFD is to provide a semantic bridge between users and system developers. The diagram is the basis of structured system analysis. A level 0 DFD, also called a fundamental system model or a context model represents the entire software elements as a single bubble with input and output indicated by incoming and outgoing arrows respectively. Additional process and information flow parts are represented in the next level i.e., Level 1 DFD. Each of the processes represented at Level 1 are sub functions of overall system depicted in the context model. Any processes, which are complex in Level 1, will be further represented into sub functions in the next level, i.e., in level 2. Data flow diagrams illustrate how data is processed by a system in terms of inputs, and outputs. Represent major components or functions with Circles. Actions for input by a user or a system go in Rectangular Boxes.



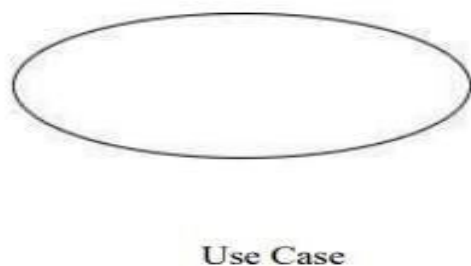
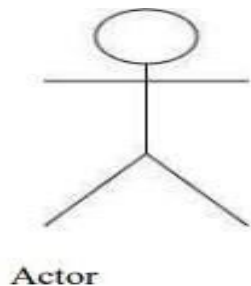
A. SYSTEM IMPLEMENTATION: The implementation is the final stage and it is an important phase. It involves the individual programming; system testing, user training and the operational running of developed proposed system that constitutes the application subsystems. One major task of preparing for implementation is education of users, which should really have been taken place much earlier in the project when they were being involved in the investigation and the design. The implementation phase of the software development is concerned with translating design specifications into source code. The user tests the developed system and changes are made according to their needs. Our system has been successfully implemented. Before implementation several tests have been conducted to ensure that no errors are encounter during the operation. The implementation phase ends with an evaluation of the system after placing it into operation for a period of time. Implementation is the third phase of the system process. In order to achieve the objectives and the expected performance the system has been developed in a highly interactive



FIG. Circuit diagram of ESP 32

B. USE CASE DIAGRAM

Use cases help to determine the functionality and features of the software from user’s perspective. A use case describes how a user interacts with the system by defining the steps required to accomplish a specific goal. Variations in the sequence of steps describe various scenarios. In the diagram the stick figure represents an actor that is associated with one category of user. In the use- 38 case diagram the use cases are displayed as ovals. A use case is a set of scenarios that describing an interaction between a user and a system. A use case diagram displays the relationship among actors and use cases. The two main components of a use case diagram are use cases





VII. SYSTEM TESTING

In any software development, testing is a process to show the correctness of the program and it meets the design specifications. Testing is needed to prove correctness, to show completeness, to improve the quality of the software and to provide the maintenance aid. Some testing standards are therefore necessary to ensure completeness of testing, improve the quality of the software, and reduce the testing costs and to reduce study needs and operation time. Testing software extends throughout the coding phase and it represents the ultimate review of configurations, design and coding. A series of test cases are created that are intended to demolish the software that has been built. Testing involves a series of operation of a system of application under controlled conditions and subsequently evaluating the result. The controlled condition should include both normal and abnormal conditions. It is planned and monitor for each testing level (e.g., unit, integration, system and acceptance)

A. WORKING

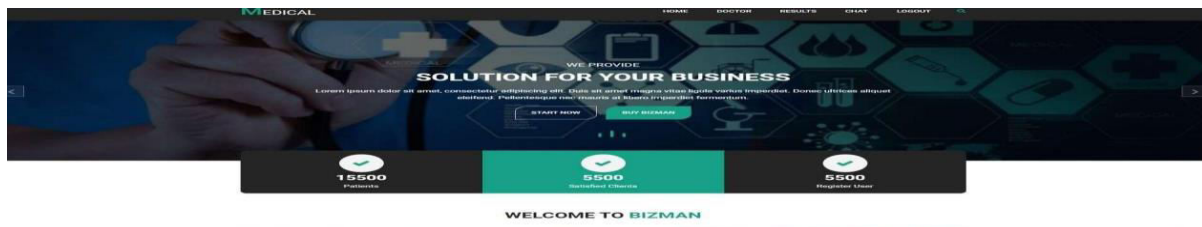
The implementation is the final stage and it is an important phase. It involves the individual programming; system testing, user training and the operational running of developed proposed system that constitutes the application subsystems. One major task of preparing for implementation is education of users, which should really have been taken place much earlier in the project when they were being involved in the investigation and the design. The implementation phase of the software development is concerned with translating design specifications into source code. The user tests the developed system and changes are made according to their needs. Our system has been successfully implemented. Before implementation several tests have been conducted to ensure that no errors are encountered during the operation. The implementation phase ends with an evaluation of the system after placing it into operation for a period of time. Implementation is the third phase of the system process. In order to achieve the objectives and the expected performance the system has been developed in a highly interactive and user-friendly manner.

B. APPENDIX OF WEBSITE

1.1 USER PANEL



1.2 DOCTOR PANNEL





1.3 ADMIN PANNEL

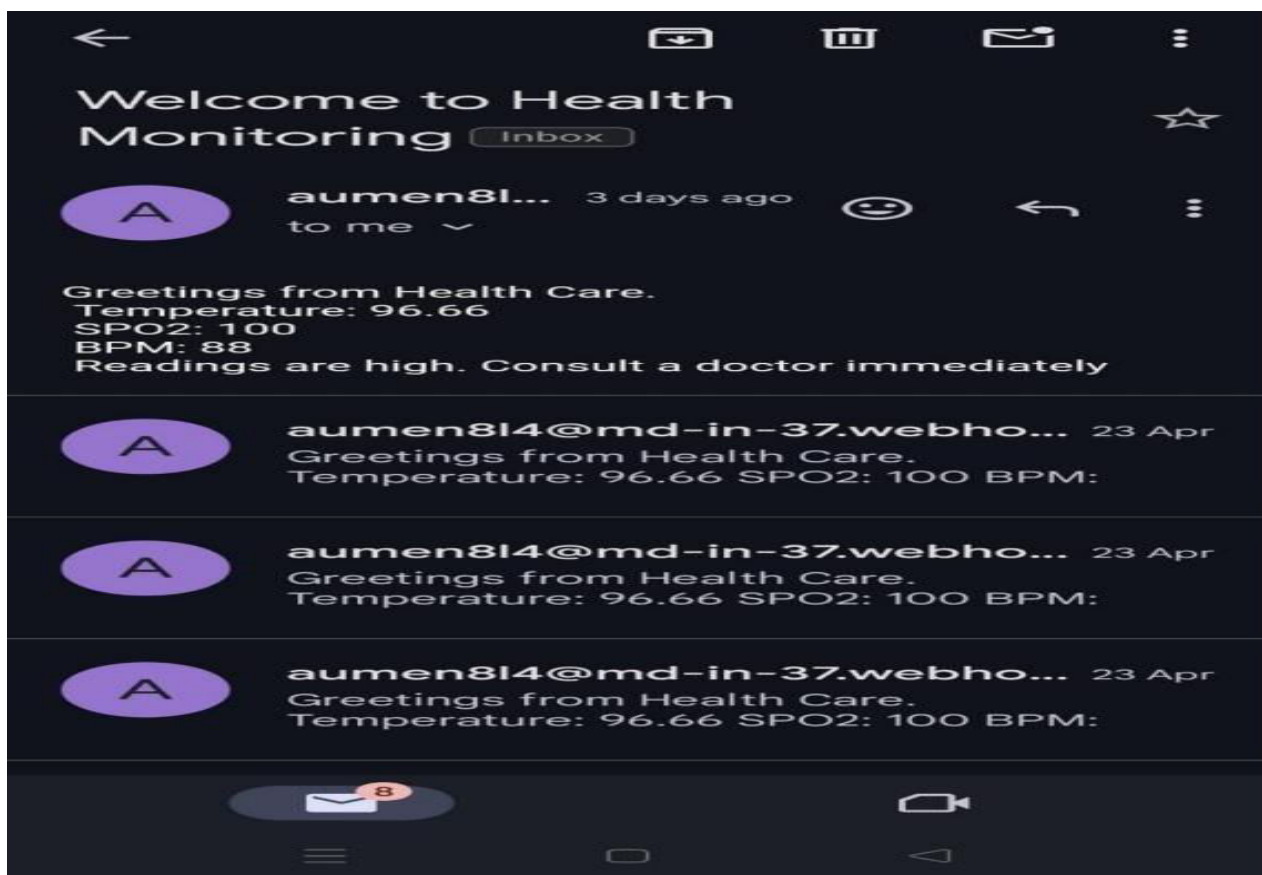


Fig . Alerting user through a gmail message

VIII. CONCLUSION AND FUTURE SCOPE

In conclusion, health monitoring systems play a pivotal role in empowering individuals to take proactive control of their well-being. By leveraging a combination of wearable devices, mobile applications, cloud integration, and advanced analytics, these systems provide users with real-time insights into crucial health metrics. The integration of remote monitoring capabilities and interoperability with healthcare infrastructure further enhances their utility, enabling healthcare professionals to monitor patients remotely and ensuring a comprehensive view of an individual's health history. However, as these systems evolve, it is essential to prioritize robust security measures to safeguard the privacy of sensitive health data. With continuous advancements in technology, the future holds the promise of even more sophisticated and personalized health monitoring solutions, contributing to a paradigm shift in healthcare towards preventive and individualized care.

REFERENCES

- [1] C. O'Brien and C. Heneghan, "A comparison of algorithms for estimation of a respiratory signal from the surface electrocardiogram. Computers in Biology and Medicine, vol.37, no. 3, pp.305-314, 2007.
- [2] R. E. Nappi, E. Martini, L. Cucinella et al. "Addressing vaginal atrophy (VVA)/genitourinary syndrome of menopause (GSM) for healthy aging in women, Frontiers in Endocrinology, vol. 10. P. 561, 2019.
- [3] Bansal, S. Kumar, A. Bajpai, et al., Remote health monitoring system for detecting cardiac disorders, IET Systems Biol. Vol. 9, no. 6, pp. 309-314, 2015
- [4] Khaled, Amgad SD, et al. "Evaluating the Role of Robotics, Machine Learning and Artificial Intelligence in the Field of Performance Management." Proceedings of Second International Conference in Mechanical and Energy Technology. Springer, Singapore, 2023.
- [5] K. Gatiss and G. J. Pappas, Wireless control for the IoT in Proceedings of the Second International Conference on Internet of Things Design Implementation, pp. 341-342, 2017 Apr 18.
- [6] Varshney L, Kumar K, Sharma S, Singh D. Real-Time IoT-Based Online Analysis to Improve Performance of PV Solar System for Medical Emergencies. In Machine Learning, Deep Learning, Big Data, and Internet of Things for Healthcare (pp. 77-92). Chapman and Hall/CRC.
- [7] Jasti, V., Zamani, A. S., Arumugam, K., Naved, M., Pallathadka, H., Sammy, F., ... & Kaliyaperumal, K. (2022). Computational technique based on machine learning and image processing for medical image analysis of breast cancer diagnosis. Security and Communication Networks, 2022.
- [8] Kumar K, Varshney L, Ambikapathy, Vrinda, Sachin, Prashant, Namya. Soft Computing and IoT based Solar Tracker. International Journal of Power Electronics and Drive System (IJPEDS). Vol 12, No 3: September 2021. Doi.org/10.11591/ijpeds.v12.i3.pp1880-1889.
- [9] G. Dhiman and A. Kaur, "A hybrid algorithm based on particle swarm and spotted hyena optimizer for global optimization," in In Soft computing for problem-solving, pp. 599–615, Springer, Singapore, 2019.
- [10] In Harmony search and nature-inspired optimization algorithms, A. Kaur and G. 56 Dhiman, "A review on search-based tools and techniques to identify bad code smell in object-oriented systems," in In Harmony search and nature-inspired optimization algorithms, pp. 909–921, Singapore, 2019.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details