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Smart Health Monitoring with Instant Emergency Response Based on IOT Technology Using Node MCU

Srinivasa Rao[1], N. Sowmya, N[2]. Esther Keerthana[3], K. Samyuktha, N[4]. Leela Sahithi[5]

Assistant Professor, Department of CSE, KKR & KSR Institute of Technology and Sciences, A.P, India. [1]

B.Tech Student, Department of CSE, KKR & KSR Institute of Technology and Sciences, A.P, India. [2,3,4,5]

ABSTRACT: Smart Health Care is a complete security solution for mid-level users that combines real-time healthcare with real-time environmental monitoring. The system is equipped with sensors that monitor vital parameters such as heart rate, oxygen level and temperature, allowing immediate emergency response. It activates GPS when you cry and sends timely health alerts to family members or the ambulance. It informs users of warning, quick understanding and emergency operation. Strong data security protects health information through encryption. The system is committed to continuous development and continuous improvement, using the latest technology as a solution for health management and emergency care. This new approach represents a significant advance in medical technology and is a first for the user's health and immediate operation.

KETWORDS: Node MCU, Internet of Things, MAX30100, GPS Module, Temperature sensor.

I. INTRODUCTION

Smart healthcare is at the forefront of a wave of change in healthcare, combining technology with the age of environmental analysis to create user safety. With this new method, advanced sensors go beyond traditional data collection and monitor important health parameters such as heart rate, oxygen level and temperature and protect personal health. This underground infrastructure is designed to be more than inherently weak. Auditors; Acts as a careful observer, especially at critical times. In an emergency, smart health systems activate and respond immediately, like GPS. This provides rapid assistance by ensuring critical medical information is quickly delivered to pre-defined recipients, whether for family issues or emergency medical services. But its strength lies not only in its talent but also in its commitment to the customer. Integration of intuitive notifications allows people to quickly understand the current problem, even when there is a lot of stress. This emphasis on transparency bridges the gap between technology and user experience, making smart health monitoring both practical and accessible in real situations. More importantly, the system uses highly secure information and is aware of the sensitivity of information in health-related information. It uses strong encryption to protect personal health information, giving users confidence that their information will be treated with the utmost confidentiality. This attention to security is combined with the overall goal of promoting a sense of security and confidence when using this advanced health screening. Continuous improvement is the guiding principle of smart healthcare. Regular updates not only improve hardware and software, but also incorporate new technology and improve emergency response procedures. This revolutionary system enables the body to move with the rapid development of medical technology and demonstrates its commitment to managing solutions in the healthcare department. In essence, smart healthcare transcends traditional applications to become a comprehensive and comprehensive solution that makes security a priority for consumers. Seamlessly blending advanced technology with a commitment to user experience, the system serves as a guide for health management and rapid assistance. Its ability to transform health and deliver personalized, timely care makes it a key player in the ongoing evolution of healthcare.

II. LITERATURE REVIEW

[1] Microcontroller based fingertip automatic heart rate counting system Mamun AL, Ahmed N, ALQahtani (JATIT) J ournal of Theory and Applied Technology ISSN 19928645: This work describes a microcontrollerbased heart rate coun ting system. The IR TX RX module collects signals from your heart rate monitor fingertip or ear. This signal is process ed by the microcontroller (ATmega8L) and displayed on the LCD. The results were compared with manual tests; It has demonstrated potential for medical, sports and social use, but further research is needed to develop it.

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[2] Heartbeat Detection and Heart Attack Detection Using Internet of Things: IoT Aboobacker Spideresque, Erith Kum ar, KSathish, (IJESCE) International Journal of Engineering Sciences and Computing, April 2007: This study demonstr ates the monitoring of heartbeat and Heart attack using Internet. The result is detection of the system tool. Sensors conn ected to the microcontroller send heart rate data over the network. Users can set the alarm system to complete the monit oring period and immediately alert doctors and users when the heart rate is abnorml[3] Heart rate and temperature meas urement for remote health monitoring using wireless body area networks Mohammad Wajih Alam, Tanin Sultana and Mohammad Sami Alam International Journal of Bioscience and Biotechnology Volume 8, Issue 1 (2016): This article A microcontrollerbased system for remote health monitoring Use a fingertip and thermometer to measure heart rate and body temperature in detail. It uses optical technology to detect blood flow and is more portable than traditional system s. A survey of rural patients regarding wireless body problems in regional networks is planned.Realtime measurement s hows heart rate measurement even during physical activity. The data is sent to a remote location via GSM to be viewed and analyzed on the mobile phone, proving its superiority over traditional methods.

[4] IoT Cardiovascular Monitoring Using Gray Wolf Optimization and Distributed Belief Network S Sandhiya, U Pala ni2022™researchsquare.com: This article presents IoT cardiac monitoring using deep learning tools and a novel featur e selection algorithm. It classifies diseases and their types according to IoT inputs and sends alerts/messages to patients accordingly. Experimental results show higher accuracy compared to existing methods.

[5]Heartbeat Monitoring Alerts at SMS 2009 IEEE Industrial Electronics and Applications Symposium 46 October 200 9, Kuala Lumpur, Malaysia. Warsuzarina Mat Jubadi, Department of Electrical Engineering, Siti Faridatul Aisyah Moh d Sahak University Tun Hussein Onn, Batu Pahat, Johor, Malaysia: This paper presents an alarm for continuous heart monitoring, which is important for people with heart disease. It uses photoplethysmograph (PPG) technology to detect heart rate, runs on PIC16F87 microcontroller and sends SMS alerts via Bluetooth. Heart rate variability is divided into l ow, normal and high, and there are commonalities. These readings are displayed on the Blynk mobile app for easy acce ss and interpretation.

[6]A study on monitoring cardiac arrest via cardiac monitoring in IoTC. Santhanakrishnan1,N. Gayathri Poojitha1 and L Jahnavi Reddy1 Reprinted with permission from IOP Publishing Ltd. Journal of Physics: Conference Series, Volume 1362, International Conference on Physics and Photonic Processes in Nanoscience, 2022 June 2019, India Eluru: In th e paper, IoT for monitoring heart rate through pulse and temperature sensors connected to microcontrollers for early de tection of heart disease. When the heart rate exceeds the threshold, an alert will be sent online to rural homes and hospit als for timely intervention.

[7] Heart attack detection and heart rate monitoring using IoT
N Patel, PK Patel, N Patel International Journal of Computer Innovations and Advances, 201[[[8] Researchgate.net: Th is project uses heart rate monitoring and stopping heart rate monitoring using IoT . Patient wearable hardware with sens ors and Android app. The system allows users to set heart rate high and low and send alerts if the reading falls above or below these thresholds indicating a heart attack

[9] Cardiac Arrest: Randomized Controlled Trials 2022:Citation: Penna, A.; Malioca, A.; Merigo, G.; Stilparro, G.; Sil vestri, I.; Fumagali, F.; Ristagno, G. Oneyear heart attack screening: randomized controlled trial in 2022. J. Kling. Pain killer. 2023, 12, 2235. https://doi.org/10.3390/jcm12062235. It uses photoplethysmography (PPG) to measure changes in blood volume in tissues. The signal is sent to the Arduino via serial communication and the heart rate measurement and counting is used by the software.

[10]Cardiac Arrest Review Vidya D. Bhujbal *1, Vaibhav V. Kakade Human Journal Review Article, February 2022, Volume 23, Issue 3, Vidya D. All rights reserved. Bhujbal et al: This review provides an overview of the mechanisms a nd consequences of cardiac arrest and highlights its unpredictability during various activities. He discusses the difficult ies of diagnosing coronary artery disease in young patients and emphasizes the importance of cardiopulmonary resuscit ation as the first option of treatment. Heart attacks are often associated with heart diseases and affect more than one mil lion people every year in India.

[11] A systematic review of the effectiveness of extracorporeal cardiopulmonary resuscitation and conventional cardiac resuscitation in adults with cardiac arrestCallum J Twohig1,2,3, Ben Singer2,3 ,4, Gareth Grier2,3,5 and Simon J Finn ey2, Journal of the Intensive Care Society 2019, Vol. 20(4) 347357: I. Intensive Care Society 2019 Article Reference: s agepub.com/journalspermissions DOI: 10.1177/1751143719832162journals.sagepub.com/home/homecjic) Comparison

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of ECPR with traditional cardiopulmonary resuscitation. ECPR shows better survival and neurological outcomes. Fact ors such as early shock and short duration are associated with increased survival in ECPR recipients. However, further research is needed to clarify the role of ECPR in rehabilitation.

[12] Research on Healthcare Using Internet of Things 1Sasippriya Saminathan, 2K.Geetha 1PG Student, 2Senior Assist ant Professor, Faculty of Communication, SASTRA University, Thanjavur613401. 1 sasippriya32@gmail.com: A surv ey exploring the role of IoT in healthcare and highlighting the benefits of telemedicine. Raspberry Pi collects patient da ta and sends it via a wireless sensor network for remote monitoring. Smart devices make healthcare more efficient by e nsuring information is accessible accurately and quickly. Challenges include material availability and data integrity. In ehealth use, IoT helps facilitate information sharing and improve patient care.

III. REVIEW FINDINGS

Microcontroller-based heart rate counting systems show potential for medical, sports, and social applications, but their development requires further research. Use of IoT for heart rate and cardiac arrest detection improves survival rate and neurological outcomes. Enable early detection and warning through sensors connected to microcontrollers. Provides remote health monitoring, real-time heart rate and body temperature measurement using wireless local area network. The system is portable and superior to traditional methods. IoT-supported cardiovascular monitoring is effective in classifying diseases with higher accuracy compared to existing methods and warning patients accordingly. Monitoring heart rate alerts via SMS provides continuous monitoring for heart patients and readings are displayed on the mobile phone for easy interpretation. IoT-based heart rate monitoring with pulse and temperature sensors enables early detection and timely intervention warning.

IV. PROPOSED WORK

Smart health monitoring provides security for the average user, which includes real-time health monitoring with real-time environmental monitoring. The system is equipped with heart rate, oxygen level and temperature measurement to start alerting immediately. In an emergency, it activates GPS and sends health alerts to family members or the ambulance. Focusing on user notification, data security and continuous improvement, Smart Health Monitoring is a solution for health management and emergency assistance. Smart healthcare is a transformative force in healthcare, seamlessly integrating wearable technology with real-time environmental analysis. Advanced sensors monitor key health indicators to ensure a healthy lifestyle. In the event of an emergency, the system activates GPS to send emergency health alerts to family members or service providers. Its strengths are its user-friendly design, technology and ease of use. The importance of data security through strong encryption increases user trust. Continuous development, including the use of advanced technology, is evident in regular updates. This approach is consistent with the changing healthcare landscape and demonstrates the system's commitment to quality healthcare management. Smart healthcare becomes a beacon of user safety by reforming healthcare through personalized and timely care.

A schematic block diagram is provided to show the various parts and connections of the system. Here is a brief description: Power Supply Unit: LM2596 DC-DC regulator provides constant +5V output voltage from the power supply. It ensures that the products receive the power they need to operate. MAX30100 Module: This module is responsible for measuring important health indicators such as heart rate and oxygen saturation level. It has many pins for communication and power supply, as well as connection to the microcontroller for data processing. Node MCU ESP8266: Node MCU operates in the middle of the system. It receives data from the MAX30100 module, processes it as a logic program, and interacts with other components such as the GPS module and the BLYNK IoT platform. GPS module: NEO-6M GPS module monitors satellite signals to determine the location of the device. It communicates with the MCU node to provide location information that can be used for emergency response and target tracking purposes. BLYNK IoT Platform: BLYNK is used for remote configuration and monitoring. It allows users to view health metrics, receive notifications, and trigger actions based on defined conditions. In general, this block diagram shows the integration of hardware components and their roles in realizing smart healthcare and services in emergency situations.

Block diagram of healthcare and notification. At its heart is the Max 30100 sensor, which is responsible for measuring heart rate and oxygen saturation levels, which are important indicators for health measurement. This information is processed and managed by the Node MCU microcontroller unit, which is the central processing unit. It also includes many peripherals to improve system performance. Temperature sensors monitor the temperature of the environment and provide important information for health monitoring. The built-in GPS module enables location tracking, providing

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information about the user's location or typing location. Button interfaces facilitate user interaction by allowing certain functions in the system to be entered or initiated. Additionally, the system is powered from a dedicated power supply to ensure continuous operation. Integration of the cloud makes data inconsistent, complete and accessible to remote parts of the system, thus increasing the performance and capacity of the system. The mobile alert feature further enhances the system by providing alerts and updates to users, ensuring timely response to critical health events. Together, these devices create powerful health monitoring and alerts that can be used in personal and clinical health.

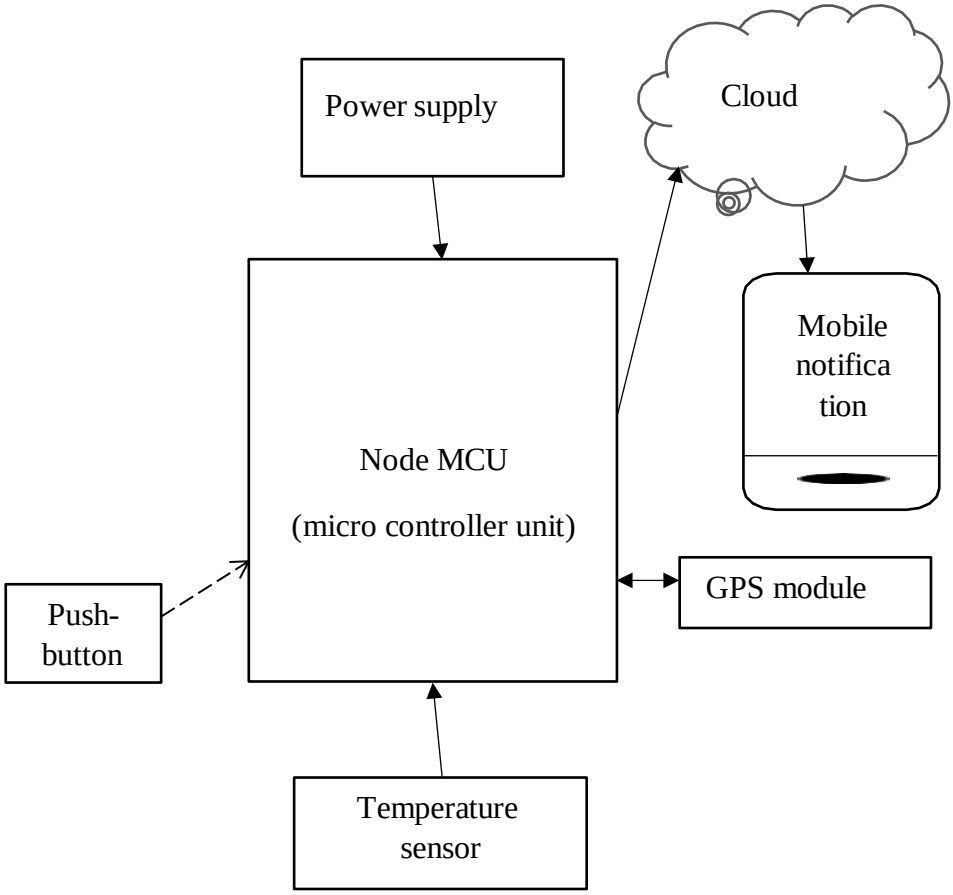

Fig1: Block diagram

V. RESULTS

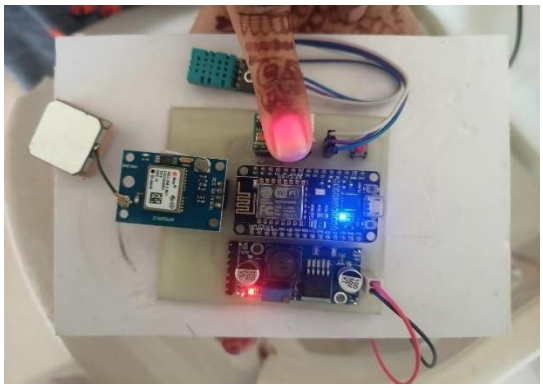

Fig-2.0

Fig-2.1

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In the diagrams above, the output after 10 seconds is shown in Figure 2.1. This represents the reading of a healthy person.

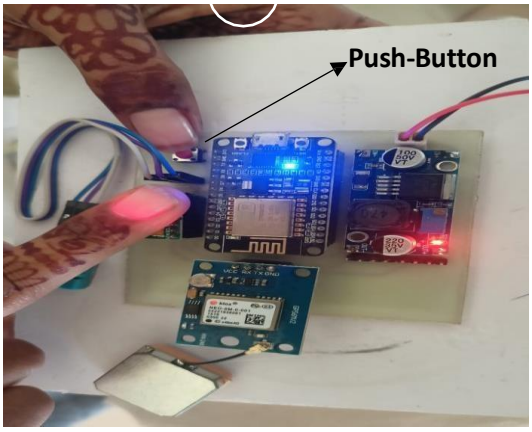


Fig-3.0

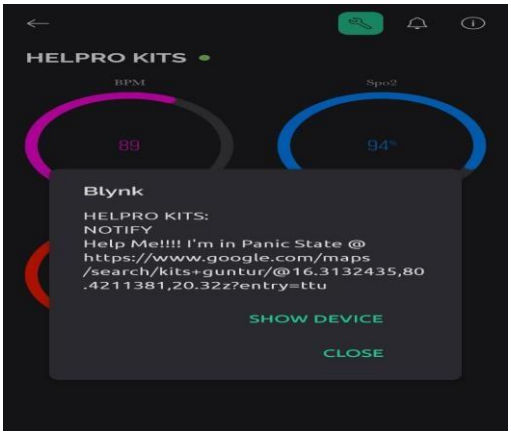
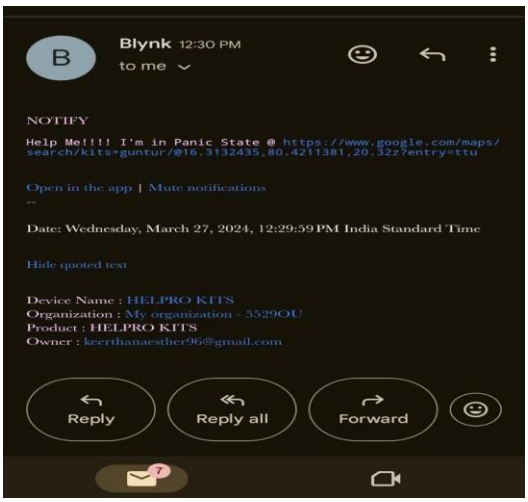


Fig-3.1

After pressing the button the health plan will fall and give an abnormal reading and then a notification will be given immediately and via email as shown in Figure 3.2 below.

Fig-3.2



VI. CONCLUSION

In summary, smart healthcare represents a major advance in medical technology and prioritizes the safety and health of users. Seamlessly integrating wearable health monitoring with real-time environmental analysis, the system provides an overview of tracking health information such as heart rate, oxygen level and temperature. In the event of an emergency, the system is capable of immediate response, including GPS activation and rapid transmission of critical medical information, enabling immediate assistance from family or emergency services. Alerts to the user help them quickly understand and take action when there is a problem, while the data, along with health data, is secured through encryption. Dedicated to developing and adapting the latest technological advances, smart healthcare is a solution for healthcare management and services, rapidly showing its role in the maintenance of the user's health and emergency treatment.

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[10] Cardiac Arrest Review Vidya D. Bhujbal *1, Vaibhav V. Kakade Journal of Humanity Review Article, February 2022, Volume 23, Issue 3, All rights reserved by Vidya D. Bhujbal et al.
[11] Evaluation of the effectiveness of extracorporeal cardiopulmonary resuscitation versus conventional cardiopulmonary resuscitation in adults with cardiac arrest Callum J Twohig1,2,3, Ben Singer2,3,4, Gareth Grier2,3 ,5 and Simon J Finney2, Journal of Intensive Care Medicine Association 2019, Vol. 20(4) 347-357: I. Critical Care Society 2019 Statement Reuse: sagepub.com/journals-permissions DOI: 10.1177/1751143719832162journals.sagepub.com/home/homecjic.
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