iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** V **Month of publication:** May 2024

DOI: https://doi.org/10.22214/ijraset.2024.61196

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue V May 2024- Available at www.ijraset.com

Battlefield Vitality: Soldier Health Monitoring and Position Tracking System Using BLYNK IoT Platform

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Abstract: ***Soldiers, pivotal in defending national security, often face injuries and disappearances during missions. To ensure their well-being and track their locations, the System for Tracking Soldier Position and Monitoring Health employs IoT technology and the Blynk platform. Integrating NodeMCU8266, PULSE oximeter, LM35 temperature sensor, NEO 6M GPS, and a push button, this system monitors vital health metrics and relays real-time GPS coordinates. Instant updates on soldiers' conditions and precise locations are transmitted, aiding swift interventions. The GPS module communicates coordinates and Google Maps links, facilitating seamless tracking. This system's efficiency lies in promptly relaying crucial health data, ensuring rapid responses and bolstering soldier safety.***

Keywords: Soldier health monitoring, Position tracking, IoT, Blynk platform, NodeMCU8266, PULSE oximeter sensor, LM35 temperature sensor, NEO 6M GPS module, Real-time tracking, Rapid response.

I. INTRODUCTION

Soldiers operating in diverse and often challenging environments face a multitude of risks, including physical injuries, physiological stress, and environmental hazards. The ability to continuously monitor their health and position is crucial for ensuring their safety and well-being. Traditional methods of soldier monitoring often rely on manual updates or limited range communication devices, which can lead to delays in identifying and responding to critical situations. The advent of the Internet of Things (IoT) has revolutionized data collection and communication, offering a promising solution for soldier health monitoring and position tracking. IoT devices embedded with various sensors can continuously collect real-time data on various health parameters and transmit it wirelessly to a central hub. This data can then be processed and analyzed to provide valuable insights into the soldier's state of health and location.

II. OVERVIEW OF THE SYSTEMS

1) *Proposed System:* We propose the System for Tracking Soldier Position and Monitoring Health using the BLYNK IoT platform. The system comprises three main components: a wearable device, a central hub, and the BLYNK IoT platform.
2) *Wearable Device:* The wearable device is attached to the soldier's body and equipped with sensors to collect real-time data on various health parameters. These sensors may include:
3) *Heart rate Sensor:* Measures the frequency of heartbeats
4) *Blood Pressure Sensor:* Measures systolic and diastolic blood pressure
5) *Temperature Sensor:* Measures body temperature
6) *Oxygen Saturation Sensor:* Measures the percentage of oxygen saturation in the blood
7) *Central Hub:* The central hub serves as the communication gateway between the wearable device and the BLYNK IoT platform. It receives sensor data from the wearable device via a low-power communication protocol such as Bluetooth or Zigbee. The central hub then aggregates and processes the data before transmitting it to the BLYNK IoT platform.
8) *BLYNK IoT Platform:* The BLYNK IoT platform provides a user-friendly interface for visualizing and analyzing the sensor data collected from the wearable device. Authorized personnel can access the platform to the development of the the System for Tracking Soldier Position and Monitoring Health using the BLYNK IoT platform can be divided into three main phases:
9) *Hardware Design:* This phase involves selecting and integrating the necessary hardware components, including the wearable device, central hub, and BLYNK IoT platform. The wearable device will incorporate various sensors to collect real-time data on vital health parameters, while the central hub will serve as the communication gateway between the wearable device and the BLYNK IoT platform. The BLYNK IoT platform will provide a user-friendly interface for visualizing and analyzing the sensor data.

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10) *Software Development:* This phase involves developing the software that will enable the wearable device to collect sensor data, the central hub to process and transmit data, and the BLYNK IoT platform to display and analyze data. The software will need to be designed to ensure real-time data transmission, secure data communication, and user-friendly data visualization.
11) *System Integration and Testing:* This phase involves integrating the hardware and software components and conducting thorough testing to ensure the system's functionality, accuracy, and reliability. The system will be tested under various conditions to simulate real-world scenarios and identify any potential issues.

A. Component Explanation

1) *PULSE oximeter Sensor MAX30100:* The MAX30100 is a sensor for pulse oximetry that measures the percentage of oxygen saturation (SpO2) in the blood. It is a highly accurate and reliable sensor that is commonly used in wearable devices.
2) *LM35 Temperature Sensor:* The LM35 is a temperature sensor that outputs a voltage proportional to the surrounding temperature. It is a simple and inexpensive sensor that is widely used in electronics applications.
3) *NEO 6M GPS Module:* A GPS module, the NEO 6M that provides accurate location information, including latitude, longitude, and altitude. It is a compact and easy-to-use module that is suitable for integration into wearable devices.
4) *Push Button:* The push button is a simple switch that can be used to trigger actions or events. In the context of the soldier health monitoring system, the push button could be used to send an emergency alert or initiate a data transmission.

These components will be integrated into the wearable device to collect real-time data on vital health parameters and soldier position. The collected data will then be transmitted wirelessly to the central hub for processing and visualization on the BLYNK IoT platform.

III. METHODOLOGY

The development of the the System for Tracking Soldier Position and Monitoring Health using the BLYNK IoT platform can be divided into three main phases:

1) *Hardware Design:* This phase involves selecting and integrating the necessary hardware components, including the wearable device, central hub, and BLYNK IoT platform. The wearable device will incorporate various sensors to collect real-time data on vital health parameters, while the central hub will serve as the communication gateway between the wearable device and the BLYNK IoT platform. The BLYNK IoT platform will provide a user-friendly interface for visualizing and analyzing the sensor data.
2) *Software Development:* This phase involves developing the software that will enable the wearable device to collect sensor data, the central hub to process and transmit data, and the BLYNK IoT platform to display and analyze data. The software will need to be designed to ensure real-time data transmission, secure data communication, and user-friendly data visualization.
3) *System Integration and Testing:* This phase involves integrating the hardware and software components and conducting thorough testing to ensure the system's functionality, accuracy, and reliability. The system will be tested under various conditions to simulate real-world scenarios and identify any potential issues.

IV. RESULTS

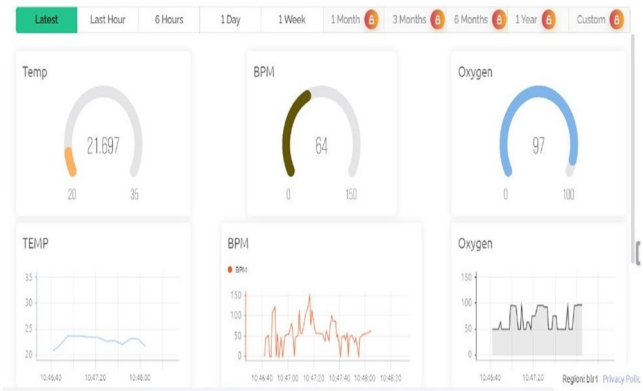


Fig 1 (Graphs)

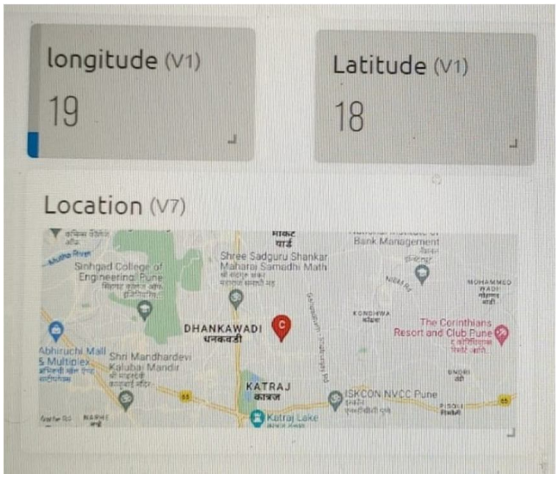
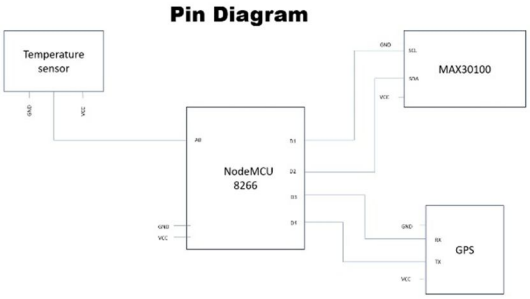
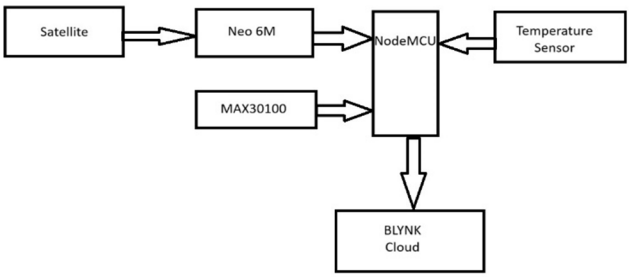


Fig 2(Location of Soldier)





Block Diagram

V. LITERATURE REVIEW

The study, "Soldier Tracking and Health Monitoring System," [2023], which was published in the Journal of Electronics, Computer Networking, and Applied Mathematics, presents a ground-breaking method intended to improve troops' effectiveness and safety during military operations. To give soldiers real-time situational awareness and vital sign monitoring, the system combines sophisticated tracking technologies, including GPS, with health monitoring features.

The paper, titled "Health Monitoring and Soldier Tracking System using IoT," [2020] introduces a soldier monitoring system using IoT and GPS to track soldiers' health parameters in real-time. Employing Arduino Uno and Node MCU, the system incorporates sensors for heartbeat, temperature, and gas levels. The setup facilitates low-cost, wearable health monitoring with the ability to alert the base station in emergencies. The integration of GPS enables location tracking. Results show successful monitoring, and future enhancements, like solar harvesting for power and remote-view cameras, are suggested. The system aims to enhance soldier safety during military operations.

The paper, titled “Developing a Secure Soldier Monitoring System using Internet of Things and Blockchain” [2019] presents a comprehensive Soldier Monitoring System using IoT and Blockchain technologies, addressing challenges in soldier healthcare and data security. The proposed system demonstrates promising results in monitoring vital signs and location with relatively low errors.

The paper, titled “Secure Health Monitoring of Soldiers with Tracking System using IoT: A Survey” [2019] reviews various existing systems, including those based on GPS, ZigBee, ARM processors, and cloud computing, pointing out their limitations. It identifies the need for a portable wireless real-time system based on IoT concepts, leading to the proposed solution.

The paper titled "Real Time Tracking and Health Monitoring of Soldiers Using GPS and GSM Module" [2021] published in the International Research Journal of Engineering and Technology (IRJET) discusses a system designed to track and monitor soldiers in real-time during warfare. The authors, Mrs. Anjana Devi and a team of UG Scholars from Adhiyamaan College of Engineering, present a comprehensive approach to enhance military operations and ensure the safety of soldiers. The key components of their proposed system include GPS for location tracking, GSM for wireless transmission, biosensors (temperature, heart rate, and pressure sensors) for health monitoring, and a metal detector for landmine detection.

VI. CONCLUSION

The real-time health monitoring capabilities of the system empower military commanders and medical personnel with invaluable insights into the physical condition of soldiers. Continuous monitoring of vital signs, environmental factors, and other relevant metrics makes it possible to identify possible health problems early and take prompt action and medical assistance. This proactive approach not only enhances the overall health and resilience of the force but also contributes to mission success by minimizing the impact of unforeseen health-related challenges.

VII. FUTURE SCOPE

Autonomous Medical Assistance: Integration with autonomous medical devices and drones could provide rapid medical assistance to soldiers in remote or dangerous areas. These devices could carry essential medical supplies, perform basic medical procedures, or relay critical information to healthcare professionals.

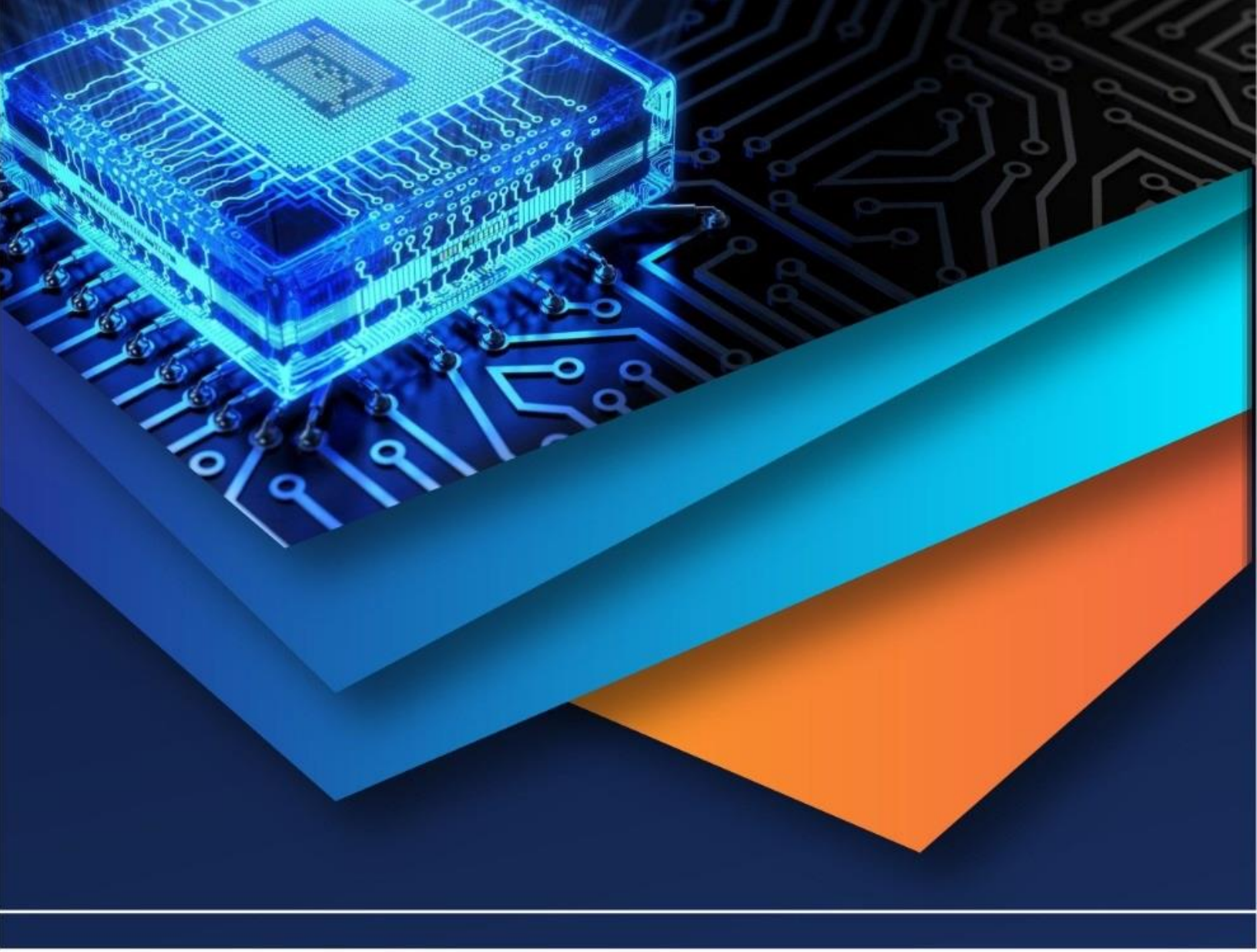
Integration of Artificial Intelligence (AI) and Machine Learning (ML): These systems prediction skills can be improved by integrating AI and ML algorithms. Predictive analytics can be employed to forecast potential health issues based on historical data, allowing for even more proactive and personalized healthcare interventions.

VIII. ACKNOWLEDGEMENT

We would like to use this opportunity to express our gratitude to Deepali Deshpande, our project guide, for her advice and assistance during the entire course. Her attempts to clarify our understanding and assist us in coding the complete algorithm were beneficial to the project's advancement. Her contribution enabled us to fulfil every deadline.

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