IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 2, May 2023

IoT Driven Healthcare System for Remote Monitoring of Soldiers

Prof. Aravinda Thejas Chandra[1], Ankusha J R[2], Deeksha B M[3], Dhruthi R[4], Kavya D[4]
Professor, Department of Information Science and Engineering[1]
Students, Department of Information Science and Engineering[2,3,4,5]
SJC Institute of Technology Chickballapur, India

Abstract: *The article describes a method for tracking and monitoring troops' health that is based on the Internet of Things (IoT). The proposed system can be installed on the soldier's body to use GPS to track their whereabouts and health status. Using IoT, these details will be sent to the control panel. Small wearable physiological devices, sensors, and transmission modules make up the proposed system. Thus, it is possible to adopt a low-cost system to defend priceless human life on the battlefield with the use of the proposed equipment.*

Keywords: GPS, IoT, Arduino board, remote health monitoring, and tracking

I. INTRODUCTION

With 1,230,255 active personnel and 998,960 reserve personnel, the Indian military is the third-largest standing army in the world. The army suffers greatly from the lack of information regarding injuries to its members, which could increase the number of fatalities and lasting disabilities. It has been noted that injuries rather than direct assaults on the battlefield are what lead to casualties [1, 2]. If the control room has access to real-time information on the soldier's condition and whereabouts, these numbers can be reduced.

The safety of soldiers is a complicated subject. The ability to know where soldiers are at any given time, the inability to maintain constant communication with the control room while conducting operations, the lack of access to immediate medical care, and conducting operations in various geographic locations are a few of the major safety concerns.

The most widely utilized technology for tracking soldiers' lives on the battlefield in recent decades has included cable-based systems, RF transceivers, walkie-talkies, ZigBee, and GSM-based tracking systems. All of these technologies, however, suffered from one or more issues, such as high installation costs, signal loss, excessive noise levels, and cumbersome design. So, a portable, wireless, low-cost tracking device with excellent dependability is Urgently needed to safeguard the soldiers' precious lives on the battlefield. To start immediate and successful rescue operations, the aforementioned system must also be real-time in nature. In this paper, a portable real-time tracking technique is suggested in response to these problems. The suggested solution is built on the IoT idea.

The real-time continuous monitoring of a soldier's position and health characteristics will be made easier by the suggested system. The block diagram of the suggested IoT-based system is shown in Fig. 1.

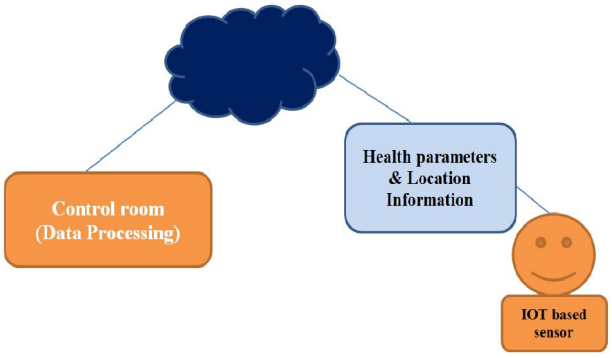

Fig 1. Block Diagram of Soldier Health Monitoring and Tracking System.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 2, May 2023

The suggested system allows for the monitoring of pulse rate, body temperature, Position, and GPS location tracking of the soldiers. IoT is used for the transfer of these parameters to the control room. GPS transmits the soldier's location and orientation to the control room. Moreover, GPS can be used to steer soldiers on the right path while they are engaged in operations.

The paper's second section discusses the available technology for location tracking and military health monitoring. The proposed system's operation is discussed in Section 3; the paper's conclusion and the direction of future study are discussed in Section 4.

II. THE LITERATURE REVIEW

Many efforts were reported by different academicians and researchers to track the location of the soldiers along with their health condition on the battle field.

J. Swetha Priyanka, and Aditi Deshpande, reported that To assure military safety, this article suggests a system that makes use of GPS and a GSM modem. The technology continuously monitors the whereabouts of the soldiers and, in the event of an emergency, notifies a central control station[1]. Abhi Zanzarukiya, and Rutu Parekh, [2] In this research, a wireless communication-based real-time embedded system for military security is presented. The system includes several many sensors to monitor the soldiers' health indicators and gives instant notifications in the event of unexpected readings. In [3] The LoRa module is proposed in this paper as a revolutionary wearable gadget for tracking and monitoring military health. The device uses LoRaWAN technology to relay data to a central monitoring station while tracking crucial health indicators for soldiers. Sujitha V,[4]This study describes an ESP32-based IoT-based health monitoring and tracking system for soldiers. For real-time monitoring and analysis, the system gathers health data from a variety of sensors and transfers it to a cloud-based server.

All of these systems, however, are hampered for one or more reasons, such as high implementation costs, slow response times, and bulky design. Hence, a portable wireless real-time system built on the Internet of Things is developed and suggested in this study as a viable alternative to the current technology for tracking soldiers' whereabouts and monitoring their health on the battlefield.

III. THE PROPOSED SYSTEM

The suggested system uses the Internet of Things to follow soldiers in addition to monitoring their health. The control room can obtain information via GPS about the soldier's location and orientation. Even if they become disoriented, it is their responsibility to steer the soldier in the right route using the GPS. Since the soldier's various tracking parameters are communicated via a Wi-Fi module, the base station may access the soldier's current state utilizing IOT. This data will be kept in the cloud and can be retrieved whenever needed on the PC in the control room. The authorities can take quick action based on this information by sending out a medical team, a rescue team, or any other backup force to assist. A soldier's health indicators and the state of the environment around them are both observed using various biological sensors. The soldier unit and the control room unit are the two components of the proposed system. Soldier health status is regularly monitored using an LM35 temperature sensor and pulse rate sensor. Position and orientation in real-time are determined via GPS. The Arduino (ATmega328P) processor is used to process and gather data from sensors and a GPS receiver. The particular processor was chosen because it is more affordable, more widely accessible, and has versatile interface capabilities than the other data possessors employed in the system at hand. A better processor than others is the ATmega328P.

3.1 Soldier Unit

The soldier's equipment is deployed along with the suggested system. The brain of the device will be the ATmega328P processor. The Soldier unit has a 16*2 LCD monitor, an Arduino, a panic button, a pulse rate sensor, a MEMS sensor a GPS receiver, and a Nodemcu ESP8266 Wi-Fi module (Nodemcu ESP8266). The threshold values of the desired parameter are preprogrammed and configured in the Aurdino depending on the surroundings and the test subject. We took into account body temperature for the suggested experiment's verification goals. The system alerts the user if the

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 2, May 2023

temperature deviates from the predetermined threshold value and transmits the information to the control room with a buzzer sound.

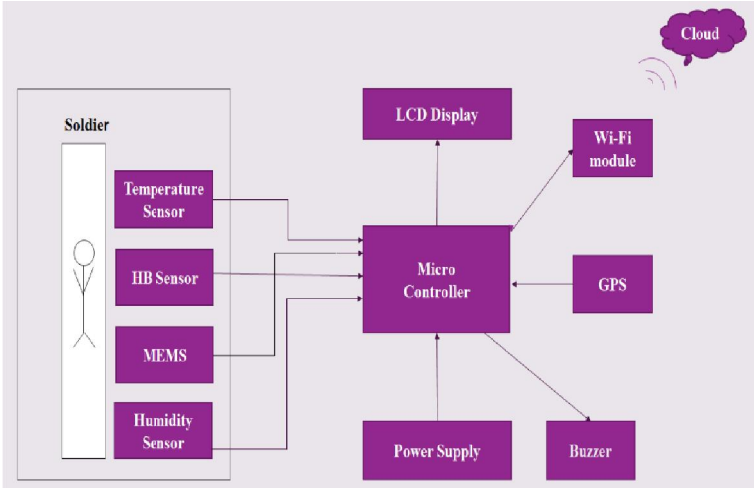

Fig. 2. Block Diagram of Soldier Health Monitoring and Tracking System Using Arduino (Soldier unit).

3.2 The Algorithm

1. Monitor a soldier's precise location using a GPS device and feed that information to the control room for display.
2. Using an LM35 temperature sensor, determine the soldier's body temperature. System alerts and notifies the control room when it exceeds the threshold level.
3. Calculate the soldier's pulse rate using a pulse rate sensor. System alerts and notifies the control room when it exceeds the threshold level. The LCD also displays the desired data.
4. Using a MEMS sensor, determine the soldier's position.
5. The soldiers will benefit from the Panic Button in any Emergency Situation.

3.3 Hardware Description

A. Heartbeat sensors

When a finger is placed on this sensor, it is intended to measure heartbeat. This sensor's digital output will be connected to an Arduino board, and it will be used to measure the rate of heartbeats in beats per minute (BPM). It operates on the idea that each pulse causes a change in the amount of light that is modulated. The individual's age and body size affect what is considered a normal heart rate. A normal resting heart rate for individuals 18 and older ranges from 60 to 100 beatsper minute (bpm), depending on age and physical condition. The measuring threshold is therefore set between 60 and 100 bpm. The technology will notify the control room whenever a soldier's heart rate deviates from the threshold value.

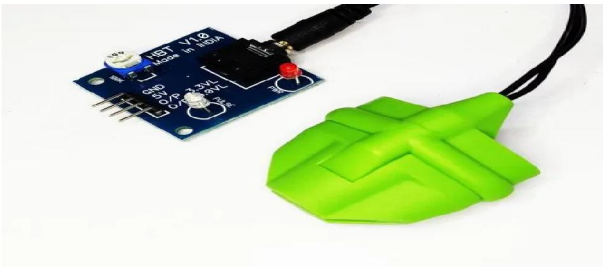

Fig 3. Heart Beat Sensor

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 2, May 2023

B. Temperature Sensor: LM35

The temperature sensor LM35 is frequently used to determine body temperature. About 370C is the average body temperature for people [5]. As a result, a threshold value between 300 and 400 C is taken into consideration.

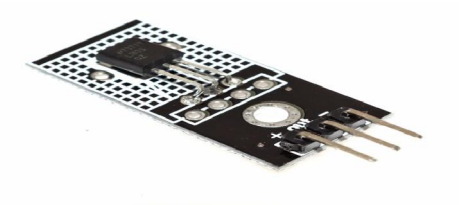

Fig 4. Temperature Sensor

C. MEMS Sensor

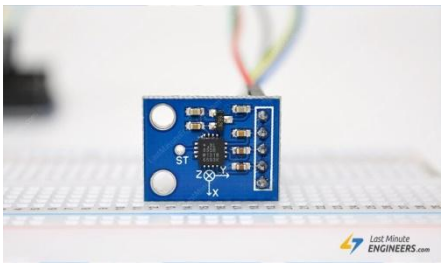

Fig 5. MEMS Sensor

D. GPS Receiver

For the base camp to be able to track their movements and get real-time information in any condition and from any location on the planet, a GPS device was put in the addressing system.

Fig 6.GPS Receiver

E. LCD Display

A 16x2 LCD can offer soldiers an easy-to-use interface that allows them to monitor their location and health in real-time and take the necessary action as needed.

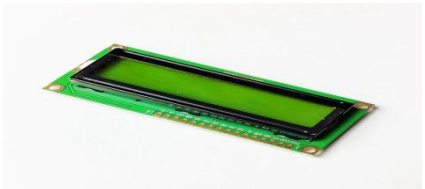

Fig 7. 16x2 LCD Display

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 2, May 2023

F. ESP8266 Wi-Fi Module

Fig 8. ESP8266

A minimum of 512Kb flash memory is provided by the NodeMCU EPS Wi-Fi 8266 module. It is a low-cost, user-friendly plug-and-play module that is simple to set up and configure. In IOT applications, it is frequently utilized to construct hardware platforms. The small Arduino is another name for this gadget. Every module has its IP address, which serves as a distinctive kind of soldier identification. Each soldier's connection to the control room is made possible by the IP address of the EPS8266 module.

3.4 Control Room Unit

The Arduino and Wi-Fi module are both connected to the measuring equipment. Wi-Fi Module's registered IP address is distinct. It is crucial for transmitting information in real-time monitoring and for building an online database. Using its specific IP address, the control room will collect the troops' actual information from the database of each soldier. The base station officer can access the soldier's current health status and location on a Google map.

IV. RESULTS

4.1 Body Temperature Sensor Result

The LM35 body temperature sensor continually measures body temperature. Here, the threshold level is set at 20 to 38 degrees. The system will notify and communicate the desired data to the control room whenever the body's temperature is below or beyond the threshold, depending on the situation.

4.2 Heartbeat Sensor Result

A soldier's heartbeat is detected by a heartbeat sensor. Here, the threshold level is set at 60 to 120 degrees. The system will notify and communicate the desired data to the control room whenever the body's heart rate is below or above the threshold, depending on the situation.

4.3 MEMS Sensor Result

This can assist in determining the soldier's location whether or not he is moving. If he is not moving, the cloud will send a warning message to the control room.

4.4 Humidity Sensor Result

The Humidity sensor continually measures water vapour in the air. Here, the threshold level is set at 40 to 80 degrees. The system will notify and communicate the desired data to the control room whenever the humidity is below or beyond the threshold, depending on the situation

V. CONCLUSION

The study describes an IOT-based system for tracking and monitoring soldiers' health. The main purpose is served by the use of an Arduino board, which is a cheap solution. Heartbeat, body temperature, and position data for each soldier are provided to the control room through biomedical sensors. This technology can help to solve the problem of soldiers going missing in action by pinpointing the exact position of a lost soldier who is in a critical state. Hence, it follows that

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 2, May 2023

this system will serve as a lifeguard for army soldiers around the world. A portable handheld sensor gadget with more sensing capabilities might be created in the future to help the warriors.

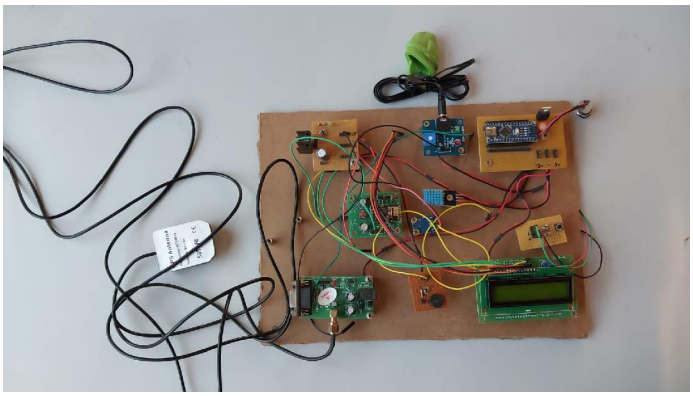

Fig.9: Soldier unit Model

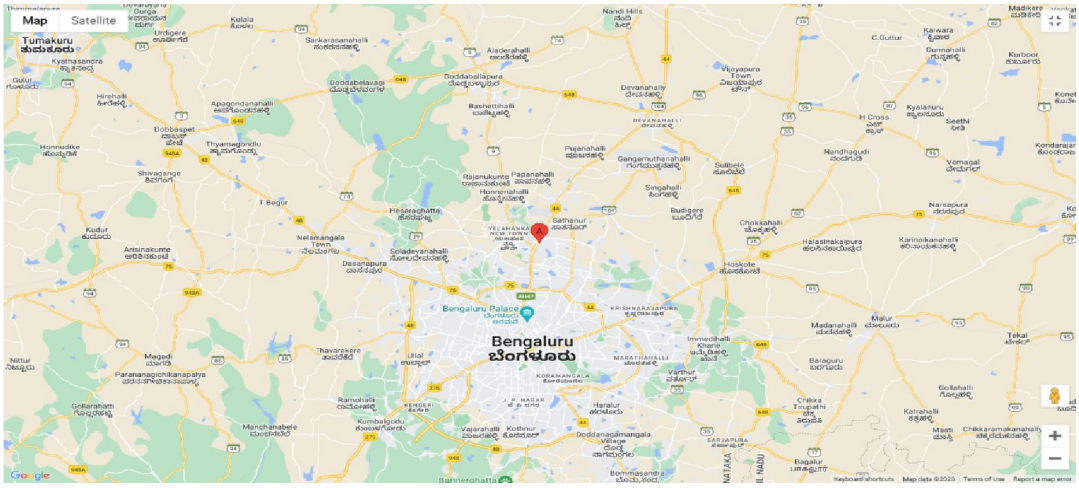

Fig.10: GPS Location verification on Google Map

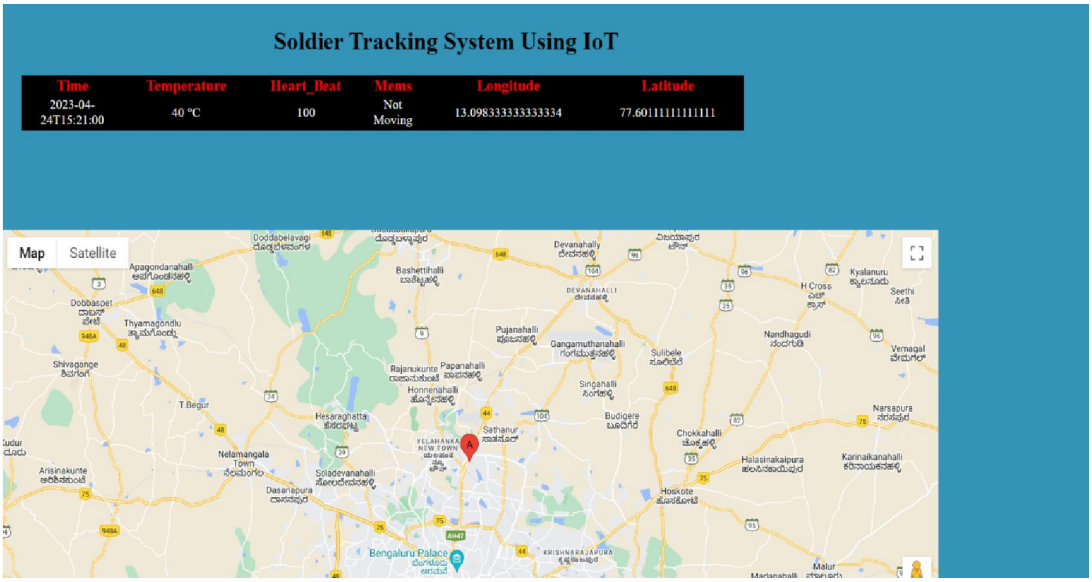

Fig.11: Health parameters and location

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.301
Volume 3, Issue 2, May 2023

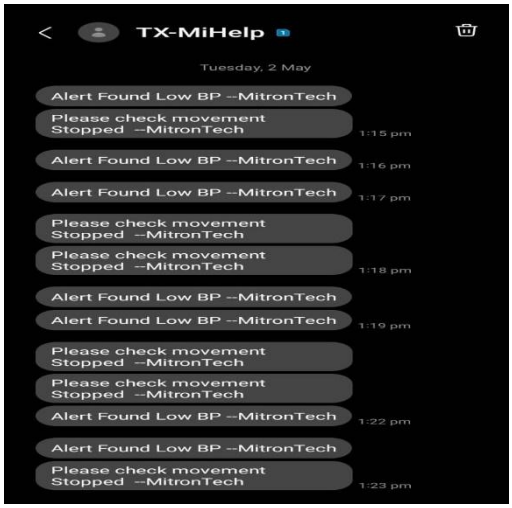

Fig.12: Alert Message sent to Control Room

REFERENCES

[1]. J. Shwetha Priyanka; Aditi Deshpande; G. Raja Mourya; Anil Kumar "Soldier Safety using GPS and GSM Modem"21160083, October 2021.

[2]. Bhargav Jethwa, Milit Panchasara, Abhi Zanzarukiya, Rutu Parekh"Realtime Wireless Embedded Electronics for Soldier Security" September 2020.

[3]. Y Jain, B Soni, A Goyal, "Novel Wearable Device For Health Monitoring And Tracking Of Soldiers Based On LoRa Module" Jan 2021.

[4]. Sujitha V, Sudarmani. R,AishwaryaB,Vishnu Sanjana V,P.Vigneswari"IoT based Healthcare Monitoring and Tracking System for Soldiers using ESP32" April 2022.

[5]. C J Lakshmi Prasanna,M. Ravi Kumar, Chella Santhosh, S V Aswin Kumar, P. Kasulu" IoT-based Soldier Health and Position Tracking System"April 2022.

[6]. T Dharsni, H Zakir, P Naik, "Soldier Security And Health Monitoring" 2018

[7]. D Singh, G Tripati, AM Alberti," Semantic Edge Computing And Iot Architecture For Military Health Services In Battlefield" 10.1109/CCNC.2017.7983103

[8]. A. Mdhaffar, T. Chaari, K. Larbi, M. Jmaiel and B. Freisleben "IoT-based Health Monitoring via LoRaWAN" IEEE EUROCON, 2017.

[9]. J. Pabla, V. Sharma and R. Krishnamurthi, "Developing a Secure Soldier Monitoring System using Internet of Things and Blockchain," 2019 International Conference on Signal Processing and Communication(ICSC), NOIDA, India, 2019, pp. 22-31.

[10]. A.V. Armarkar, D.J. Punekar, M.V. Kapse, S. Kumari, J.A. Shelke "Soldier Health and Position Tracking System" IJESC,2017.

[11]. Nodemcu.[Availableat]: www.esp8266.com/wiki/doku.php?id.