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# Soldier Health and Position Tracking System using IOT

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**ABSTRACT**

This paper reports an Internet of Thing (IoT) based health monitoring and tracking system for soldiers. In today's world, warfare is an important factor in any nation's security. One of the important and vital roles is played by the army soldiers. Concerning the safety of the soldiers, many instruments are mounted on them to view their health status as well as their real time location. Bio probes system contains different types of biosensors, transmission system and processing capabilities, and can thus facilitate low-cost wearable unobtrusive solutions for health monitoring. The proposed system uses GPS to track the direction of the soldier in the form of latitude and longitude values. So that direction can be found easily. These devices are being added to weapons and clothes. The data coming from sensors and GPS receiver will be transmitted to the control room through IoT. With the use of the proposed equipment, it is possible to implement a low cost mechanism to protect the valuable human life on the battlefield. Designing of this system using GPS and IOT gives a wireless system for tracking the location of the soldier and observing the heart beat rate, body temperature of the soldier and gases related parameters.

**Key words:** Soldier health, GPS, IoT, Biosensors

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## INTRODUCTION

Nowadays, the security system of the nation depending upon the enemy's war and so the security of the soldiers is considered as an important role in it. The nation's security is monitored and kept by army, navy and air-force. The important and vital role is of soldiers who sacrifice their life for their country. There are many concerns regarding the safety of the soldier. Soldiers entering the enemy lines often lose their lives due to lack of connectivity, it is very vital for the army base station to known the location as well as health status of all soldiers.

There is a necessity to develop a wearable technology which isn't bulky and dissipates very little power in the defense sector so that the location and vital health parameters of the soldiers can be tracked in real time when he is on the battlefield. Using this soldier navigation system the base station can guide the soldier to reach the desired destination. `Indian soldiers are mainly known for their courage, in spite of scarce ammunitions and safety measures; they have many triumphs to their credits. All must be really concerned about the safety of the soldiers, so we have decided to build a project which will efficiently keep a check on the health status of the soldier, and his precise location to equip him with

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necessary medical treatments as soon as possible. Soldier's tracking is done using GPS and IOT is used to provide wireless communication system.

The IoT makes the entire monitoring process fast, efficient and the decisions can be taken in less amount of time. This is a wearable technology which is the most important factor of this project.



**Fig. 1** Real –Time Wireless Health Monitoring of a Battalion in Combat

## PROBLEM STATEMENT

The objective of the system is to provide the real-time continuous monitoring of soldier's health parameters and location tracking using IOT and GPS module. In emergency situation it helps the solider by providing a panic button which sends and emergency message as well as he voice alert using which he can communicate with command officer and other soldiers. Depending on the message the control room takes the necessary action to save the life of the soldier.

## PROJECT OBJECTIVES

To overcome the above said problem and come up with a solution we are intending to develop low cost IoT based health monitoring and location tracking system for soldiers. The developed model must be able
1. To monitor the health condition of soldiers by taking real time information.
2. To track the accurate location of soldiers through GPS receiver and send it to the control room.

**Justification for implementing this project**

Extreme atmospheric conditions faced by soldiers leads to severe health problems or even death, whereas monitoring of their health conditions along with location could and taking necessary actions on time will save their lives. Here the role of our health monitoring and location tracking unit which solves this problem effectively through its special features listed below

- Measuring health parameters
- Location tracking and sharing
- Effective communication
- Customize
- Cost effective
- Easy to use

## LITERATURE SURVEY

**IOT and GPS Based Soldier Position Tracking and Health Monitoring System,** Monika V. Bhivarkar, Anuja G. Asole, P. B. Domkondwar, International Journal of Emerging Technologies in Engineering Research (IJETER) ISSN (Online): 2454-6410, Volume 6, Issue 1, January (2018) This System focused on tracking the location of soldier from GPS. The different types of biomedical sensors used in this system are the heartbeat sensor, temperature sensor and gas sensor. The main essence of this project is that it is an Internet of Things (IoT) based project. Using the IoT, their data

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can be transferred from one place to another over the network without the computer to computer and human to computer intervention.

**IoT Based Soldier Navigation and Health Monitoring System,** Krutika Patil, Omkar Kumbhar, Sakshi Basangar, PriyankaBagul, International Journal of Electrical, Electronics and Computer Systems (IJEECS) ISSN (Online): 2347-2820, Volume -5, Issue-1, 2017 This system uses GPS module and wireless body area sensor network to record all parameters in real time and send it to the base station. The different types of sensors used in this system are the humidity sensor, temperature sensor and pulse sensor which help in deciding the health status of that particular army official. This is a wearable technology which is the most important factor of this project.

**Soldier Health and Position Tracking System,** Akshita V. Armarkar, Deepika J. Punekar, Mrunali V. Kapse, Sweta Kumari, Jayshree A. Shelk, International Journal of Engineering Science and Computing, March 2017 Soldier's tracking is done using GPS and GSM is used to provide wireless communication system. For monitoring the health parameters of soldier we are using bio medical sensors such as temperature sensor and heart beat sensor. An oxygen level sensor is used to monitor atmospheric oxygen so if there are any climatic changes the soldiers will be equipped accordingly.

**Health Monitoring and Tracking System for Soldiers Using Internet of Things (IoT),** Niketpatii; Brijeshiyer, 2017 International Conference on Computing, Communication and Automation (ICCCA), IEEE. The paper reports an Internet of Thing (IoT) based health monitoring and tracking system for soldiers. The proposed system can be mounted on the soldier's body to track their health status and current location using GPS. This information will be transmitted to the control room through IoT. The proposed system comprises of tiny wearable physiological equipment's, sensors, transmission modules. Hence, with the use of the proposed equipment, it is possible to implement a low-cost mechanism to protect the valuable human life on the battlefield.

**Health Monitoring and Soldier Tracking System using IOT**, Puneeth Kumar D N, Archana Padikar A, Cinmayee C K, Chaithra E, Chethan, International Journal of Engineering Research & Technology (IJERT) ISSN (online) 2278-0181, Volume 8, Issue 14, This work deals with the keep track of the soldier parameters such as temperature, breathing and heart rate. Arduino Uno and Node MCU are used in designing the soldier monitoring system. Internet of Things (IoT) with Global Positioning System (GPS) is used for tracking the location of the soldier and monitoring of the health parameters like heartbeat, gas sensor and body temperature.

## PROPOSED SYSTEM

This project provides an IOT based health detection and location tracking of the soldier in a panic situation by using the hardware consisting of the sensor with IoT for communication purpose. The sensor components are mounted on the soldier body which reads the body parameters of the soldier such as heart rate, body temperature and gases parameters and reports to the control room and guardian/other soldier automatically using IoT communication when it is not normal. GPS is used for tracking the location. The proposed system is not only used to monitor and track the soldier only during the war time but also when the soldier is travelling from one place to other places and even in the places where extreme weather condition.

## SYSTEM STRUCTURE

The block diagram representation of the system components is as shown in figure 2.

The paper focuses on the health monitoring system of the soldiers. The block diagram of soldier's position tracking and health monitoring system using IoT includes heartbeat, temperature and gas sensors, power supply and GPS as input Arduino UNO as processing device.
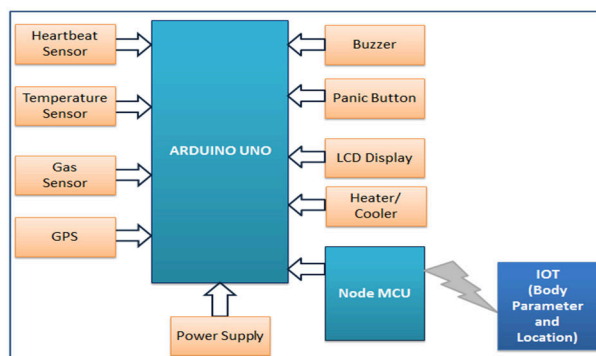
**Fig. 2** Block diagram of the proposed system

Node MCU for updating information to cloud. Buzzer, LCD display, heater/cooler as output devices.

This system increases safety in emergency response of military operation. Heartbeat sensor gives the heart rate by the sensor that measure the rate of flow of blood at the finger tip, by the amount of blood changes with time. Temperature sensor is the sensor that measure the amount of heat that it observes and gives the temperature in Degree Celsius. Gas sensor detects the concentration of gas in the atmosphere that detects the poisonous gas. GPS is used to find the exact location of the soldier. The direction of the soldier can be find with the use of GPS modem. GPS modem receives the signal from the satellite and calculates the longitude and latitude of the direction of soldiers and send to the controller from serial data.

Arduino UNO is an open source microcontroller board based on the microchip AT mega 328P microcontroller and developed by Arduino. Arduino UNO checks the status of heart rate, temperature and gas. If the heart rate is greater than or lesser than its threshold value, Arduino turns ON the buzzer, if the temperature differs from threshold value, it will turn ON the heater/cooler. The position information, heart rate, temperature and gas detection is sent to the Node MCU through serial communication. When Wi-Fi is available, it receives and read the serial data from Arduino and uploads data in IoT and compares the data, if there is any difference in threshold values, it will send SMS/E-mail to the army base station or authority.

The result is as shown in Table 1 and Fig.2. A message/email is send to the desired receiver confirming about GPS geography. When the normal body parameters differs from threshold values an alert message/email is send to base station along with the exact location of the soldier. Following results can be get from above execution. It is capable of collect and processes the vital body parameters and location information from the soldier's body. When temperature of surrounding rises above the threshold value greater or equal to 30 degree then cooler will turn ON. When the temperature falls below threshold value lesser or equal to 22 degree then heater will turn ON. When the pulse rate is higher or lower than the normal value the system will send E-mail/Message along with the location information of soldier to base station. When the gas value is above the threshold value greater or equal to 700, then system will send E-mail/Message along with the location information of soldier to base station.

**Table-1 Parameters of sensors with their result**

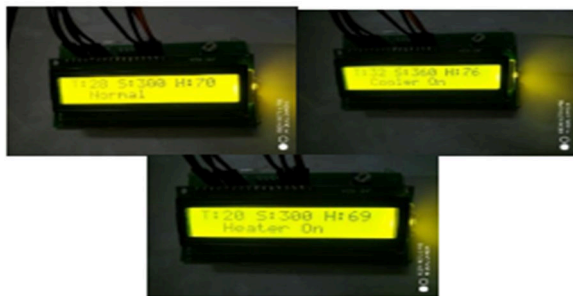| Parameters | Sensed Values |
|---|---|
| Heartbeat per minute | 69 BPM |
| Temperature | 29 ºC |
| Gas | 300 |

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**Fig. 3** Results of temperature, heart beat and gas
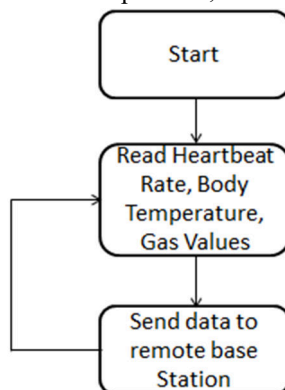


**Fig. 4** Flowchart of Soldier Unit



**Fig. 5** The output observed on the mobile or base station's computer

**Hardware Components**
Following are the major components used for developing the proposed system
1. Sensors
2. Arduino Uno
3. Node MCU
4. GPS

**CONCLUSION**

The paper reports an IoT based system for the health monitoring and tracking of the soldiers. Aurdiuno board is used which is a low cost solution for the possessing purpose. Biomedical sensors provide heartbeat, body temperature, and environmental parameters of every soldier to control room. This technology can be helpful to provide the accurate location of missing soldier in critical condition and overcome the drawback of soldiers missing in action. The addressing system is also helpful to improve the communication between soldier to soldier in emergency situation and provide proper navigation to control room. Thus we can conclude that this system will act as a lifeguard to the army personnel of

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all over the globe. In the future, we can include the Solar harvesting system to recharge the DC power source automatically when the user is exposed to the sun and we can also interface the camera which will help the doctors/concerned persons to view the patient activities remotely.

1. Establish a communication between soldiers and control room by using IoT.
2. This system helps to monitor health parameters of soldier, track their position and predict the warzone environment using various sensors.
3. This system provides security and safety to our soldiers.

## ACKNOWLEDGMENT

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