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Soldier Health and Position Tracking System

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Abstract

Soldiers play a crucial part in maintaining national security, which is why this issue is given significant weight. There are umpteen instruments to monitor soldier's health condition As a result, the system provides an efficient method for keeping track of a soldier's health, as well as their precise location in terms of latitude and longitude, and transmits this data to the control system. The national security mainly depends on army. The environment and battle situation in the combat zone is highly uncertain and fatal. A radio transceiver is used in the current system for remote soldier health monitoring by smart zigbee devices to communicate with one another. Though these systems provided real-time operation, it suffered from drawbacks such as limited bandwidth, signal degradation and requires knowledge of the system for the owner to operate Zigbee device. In proposed system, smart sensors are mounted on the soldiers body externally. It is used to detect the health condition based on temperature and heart beat using temperature and heart beat sensors and sends the alert message to Base station through GSM module and location of the soldier spot is sent through GPS module.

Keywords: Global Positioning System (GPS), Internet of Things (IoT), Global System for Mobile Communication (GSM), Zigbee.

Introduction

The security of a country is crucial in the contemporary global context, and that security depends on the army force. Protecting a country would be all but impossible without the soldier. In order to track a soldier's location and critical health metrics in real time while they are on the battlefield, wearable technology that is lightweight and consumes very little power is required. The base station can direct the soldier to their intended location using this soldier navigation system. Thus, this study focuses on using GPS to track the whereabouts of a soldier, which helps the control room station determine the soldier's precise location based on it, they will direct them. Moreover, high-speed, short-range wireless communication between soldiers is used to transmit data on situational awareness, including wireless communication and biological sensors used for GPS navigation. Temperature and heartbeat sensors make up the biosensor .This project's key selling point is that it is Internet of Things (IoT) based. Systems made out of other devices with distinct functionality are known as Internet of Things systems. Their data can be sent over a network using the IoT without human or computer intervention from one location to another.

The base station receives the soldier's combat location and health parameters in real time without the need for the soldier to provide any input, which is how IoT is applied in military navigation and health monitoring systems. The IoT streamlines and accelerates the monitoring process, allowing for quicker decision-making [1]. The Soldier must be combined with contemporary health monitoring, real-time GPS (Global Positioning System), and data links in order to send and receive information to and from the control unit. In order to connect not only with the control unit but also with military soldiers stationed next to them, the soldier may need wireless networks. In addition to the security of the country, the soldier must be protected by cutting-edge weapons, and the army control unit must keep track of the soldier's health. This project integrates biomedical sensors and monitoring equipment with the soldier's to achieve this goal. The combined components must be contained in a lightweight compact and deliver the intended outcome without consuming a lot of power. It is a common misconception in the military that soldiers cannot communicate with their control units [2]. Also, effective navigation between soldiers is necessary for correct planning and coordination among them. The suggested effort focuses on tracking the soldier's whereabouts because the control room station has to know their precise location in order to lead them. Using GPS, control unit locates the soldier. If a soldier gets lost on the battlefield, the base station must direct him in the right direction [3]. For the soldiers who participate in special operations or missions, this initiative would be helpful. The jackets worn by soldiers are fitted with sophisticated biomedical sensors, including temperature and heart rate monitoring. For full mobility, these are implanted with the soldier. This system will provide wireless communication to the base station's server. The soldier can be saved using the information gathered at the base station. This might make it easier for the control centre to understand what is happening on the mission field [4].

I. LITERATURE SURVEY

We can determine a person's heartbeat's health by using an Arduino board and a heartbeat sensor attached to their fingertip [5]. GPS tracking devices that transmit data to the base station keep track on soldiers' body temperatures and critical heart conditions. [6]. Threats from foes in recent days have mostly disrupted the security strategies of several states. So that the military's soldiers have a crucial and important function. These factors raise concerns about the soldiers' security. They are equipped with numerous devices and pieces of technology that track their health [7] .The country's defence department is primarily responsible for the nation's security. This system will be helpful to the soldiers on any mission in a variety of ways. With the Global Positioning System, we may use this technology to determine the soldier's whereabouts. M-health can assist in making it possible. M-Health refers to the use of mobile computers, medical sensors, and communication technologies in the healthcare industry [8].Zigbee-enabled wireless technology makes it possible to keep track of a patient's health status and notify a doctor right away if there are any problems so that the doctor may offer quick assistance [9]. We employ the Body Sensor Network, which may be positioned near or inside a body and is made up of numerous physiological and biomedical nodes, for the real-time health monitoring system. The primary subjects of discussion in this essay are the interconnected BSNs that operate as a system and contribute significantly to the real-time health monitoring of the soldiers [10].

II. Proposed Methodology

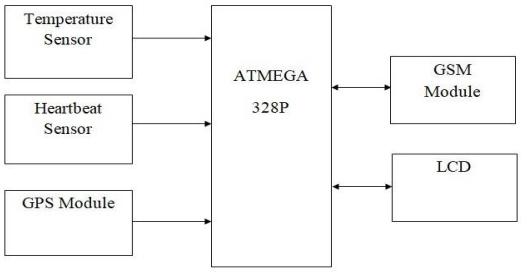


Fig: 1 Block Diagram

Proposed System:

The proposed system uses 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. The GPS must send the soldier in the right route even if they lose track of their location .The hardware used in this project consists of a sensor with a GSM module for communication, which enables the location tracking and health detection of the soldier using GSM and GPS in an emergency. The soldier's body is fitted with sensor components that can measure things like body temperature and heart rate. Here, a sensor was utilized to measure the soldier's heart rate and display the results on an LCD screen .DS18B20 temperature, pulse, and oxygen level detector sensors are used to continuously monitor a soldier's health. Real-time location and orientation determination using GPS is possible [11].The Arduino (ATmega328P) CPU processes and gathers data from sensors and a GPS receiver. The particular processor was picked because, compared to the other data possessors used in the system at hand, it is more accessible, more inexpensive, and has a wider range of interface capabilities. A better processor than others is the ATmega328P [12].When the body temperature is abnormal; a temperature sensor will automatically report it to the control centre and the guardian/other soldier utilizing GSM connection. By pressing the emergency button on this application, a soldier can request assistance from the control room in an emergency, and the control centre can use the GPS module to track the soldier's present location and take appropriate action.

The position of the soldier and his or her health metrics will be transmitted to the base station. The Temperature Sensor and Pulse Rate Sensor will both identify the soldier's health parameters. With the aid of a GPS module attached to it, this system communicates the soldier's current location to the base station. The Blynk App assists in transmitting the soldier's location and health parameters to the base station.

System Architecture:

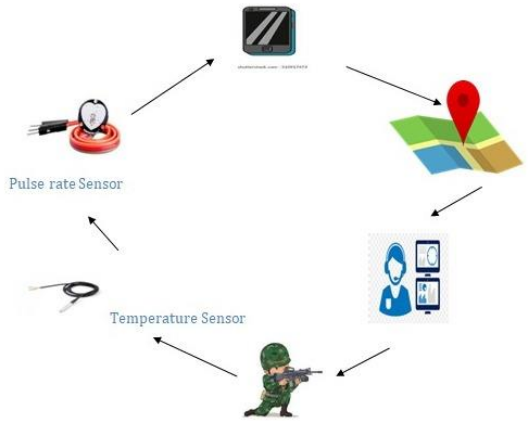


Fig: 2 System Architecture

Working:

The suggested system uses 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. The GPS must send the soldier in the right route even if they lose track of their location. Since the soldier's various tracking metrics are communicated via a Wi-Fi module, the base station can access the soldier's current state utilising 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 prompt action based on this information by assembling a medical team,

rescue squad, or other backup force to assist them. A soldier's health indicators and the state of its immediate environment are monitored using a variety of sensors. The two units that make up the proposed system are the control room unit and the soldier unit. Soldier health status is continuously monitored using the temperature sensor, pulse rate sensor. GPS provides real-time position and orientation determination. Processing and collecting data from sensors and a GPS receiver is done using the Arduino (ATmega328P) CPU. 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 [13].

Modules

The modules include:
Detection
Alert

Detection:

Temperature Sensor: used to gauge the body temperature of the soldier.
GPS (Global Positioning System): Used to determine the latitude and longitude of the specific position of the Soldier.
Heart Beat Sensor: Used to monitor the Soldier's heart rate.

Alert:

GSM (Global System for Mobile): Used to SMS base station with coordinates.

Temperature Sensor:

The direct-to-digital temperature sensor is the DS18B20's primary feature.

Fig: 3 DS18B20 Temperature Sensor

Heart Beat Sensor:

When a finger is placed on heartbeat sensors, a digital output of the heartbeat is produced.

Fig: 4 Heart Beat Sensor

NEO-6M GPS-

It has a maximum tracking sensitivity of -161 dB and can monitor up to 22 satellites across 50 channels while using only 45 mA of current. It can update its location five times in a second with a 2.5m horizontal position precision, which is faster than conventional GPS units.

Fig: 5 NEO-6M GPS

III. Results:

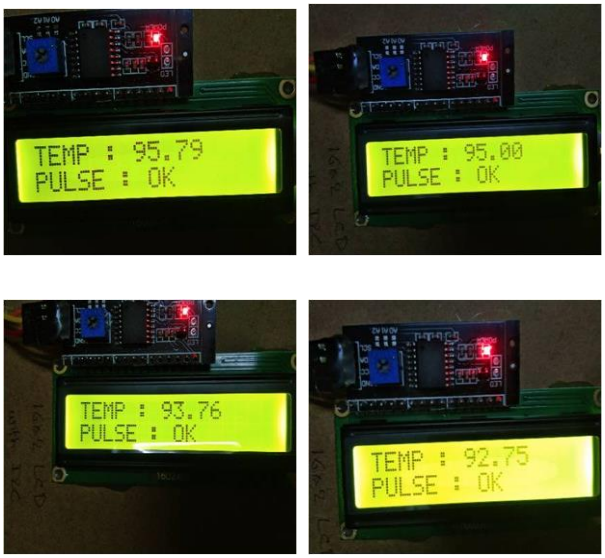
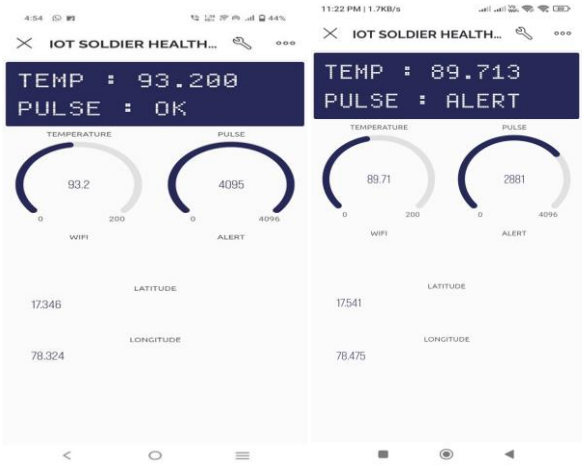


Fig: 6 Results for varying Temperature and Pulse rate.

Soldier's temperature and pulse rate are displayed on the Screen. Until the soldier reaches the precise

health criteria, the soldier's temperature and pulse rate values will fluctuate continuously. Some of the fluctuating temperature and pulse rate readings are shown in the fig.



The graphic up top demonstrates how the Soldier Health Parameters are regularly supplied by mail to the base station. So, they can always keep an eye on the soldier's health.

V. Conclusion:

This project describes an IoT-based system for tracking and monitoring the soldiers' health. A cheap option for the identical purpose is the Arduino board. Every soldier's heartbeat, body temperature, and ambient characteristics are sent to the control room using 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. The addressing system aids in providing accurate navigation to the control room and enhancing communication between soldiers when there is an emergency. We can therefore draw the conclusion that this system will serve as a lifeguard for army soldiers around the world. A portable handheld sensor with more sensing choices will be available in the future.

VI.Future Scope:

If the soldier's position coordinates or health metrics cross a certain threshold, we can add an emergency dial capability as part of this project's extension.

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