

Health Monitoring for Military Using Wearable Sensors

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Abstract— The nation depends on the enemies' warfare and so the safety of the soldiers is considered as vital role in it. Many times the soldiers become lost or injured. This project gives the ability to track the current location and gives the current health status of the soldier also concerning the soldiers safety there are many instruments to view their health. In soldiers health monitoring, bio-sensors systems such as temperature sensor and heart rate sensor gives the result of abnormal condition when the level goes low or high. The GPS sensor gives the latitude and longitude to find the direction becomes easier. GSM module can be used for effective range of high-speed transmission, short-range and soldier-to-soldier wireless communications that will be required to relay information on critical situation awareness. So that the rescue operation become easier. Both GPS and GSM devices are being added to weapons and firearms, and some militaries such as the Israeli Army which are exploring the possibility of embedding the devices into soldiers vests and uniforms. Through this project, we continuously monitor the health status (body temperature and heart rate) of the soldier and transfer the data wirelessly to the website using mobile as a server through IOT. So by using these equipment's we are trying to implement the basic lifeguarding system for soldier in low cost and high reliability.

Keywords— Arduino, Tracking, GPS, GSM, Temperature sensors, Heart Beat sensors, IOT, Website.

I. INTRODUCTION

The infantry soldier of tomorrow promises to be one of the most technologically advanced modern warfare has ever seen. Around the world, various research programs. So this paper focus on tracking the location of soldier from GPS, with High-speed, also detect the health and monitor abnormal condition using Bio sensors. The Bio Sensor Consist of the Temperature sensor & Heart Rate Sensor. In brief to explain, Soldier is always facing death. He never shirks responsibility. He fights in most difficult terrains, on hills and mountain, in plains and forest. The defence of the country is his primary mission. [1]The role of soldier in safeguarding the frontiers of his modest land is unique. He lives and dies for the NATION. It is our responsibility to help our soldier. That's why we are introducing this project which will be very useful for providing health status of the soldiers and provide medical help to them at critical situation in battlefield. In our system we are basically focusing on Soldier's health in terms of his heartbeats and his body temperature. If soldier gets injured and becomes unconscious by gunshot or due to any other reason, then his heart beats start increasing or decreasing gradually. In this type of situation where the information about

current heart rate becomes the indispensable part of soldier, this project emerges out as best to acknowledge the doctors at server site with the correct and fast information. If heart beat either increases above critical level or decreases below the critical level, a message is automatically sent to server with the help of GSM modem. GPS tracker will give the current location of the soldier which will be useful for locating soldier's location and providing medical help as early as possible. The goal of this project is to develop a low cost, low power, reliable, non-intrusive and non-invasive signs of health status. To track the location of the soldier i.e. longitudes and latitudes. The methodology adopted for this project is to use non-invasive sensors to measure heart rate and body temperature. Signal conditioning circuits are designed to filter and amplify signals to provide desired output. All the components used in the circuit are low powered and cheap. The acquired data is real time and is sent through IOT and into Micro controller.

II. METHODOLOGY IMPLEMENTED

A. System Architecture

The below basic block diagram of Soldier Unit with Bio-sensors which sense the soldiers health also GPS track the location of soldiers. This block diagram consists of some essential blocks.

1. Arduino Uno
2. GPS Module
3. MAX232
4. GSM Modem
5. IOT
6. LCD
7. Temperature Sensor
8. Heart Beat Sensor

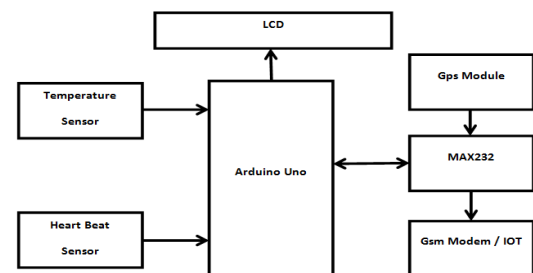


Fig 1: Soldier Unit

III. FLOWCHART

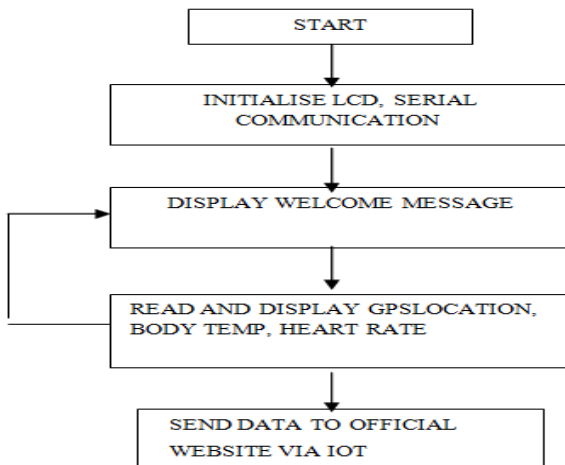


Fig 2: Flowchart of Soldier Unit

IV. IMPLEMENTATION

4.1 Database Processing

[2]Database processing is a process that get and store all the datas. In our project we use four columns contains - Unique ID, Temperature, Heart Beat, Location. The data received are stored in above four columns and also store live update in the Cloud and retrieve the data via Website view. Also we design a module to store the location data (i.e. latitude and longitude) known as **GSM with IOT module**. We also developed a mobile app to enable a internet connection for server to store all the data's and also we going to use a mobile for temporary server. For example – data's of 25 members, one of its member only can access all other 24 member data's. We use WAMP server or SQL for database.

4.2 Health Detection

To monitor the health of military soldiers we used temperature sensor and heart beat sensor. **LM35** is a precision IC **temperature sensor**. With **LM35**, temperature can be measured more accurately than with a thermistor. We set room temperature in our project which the temperature of the soldiers are analyzed by sec to sec. If the temperature reached abnormal condition then the data gets highlighted. Heart beats are sensed by pulse rate using heart beat sensor. We know that heart beat is normal i.e. 72 beats per min (or 60-100 per min). [3]If he run or gets scared as well as get tempered then the heart beat raised will be raised and its known to be abnormal but if it gets normal within 20 sec then it assumed as normal. But it attains for long time then the abnormal condition will get detected. Here we also used push button. By pressing that then the heart beat will get doubled (i.e. if the heart beat is 2 then it attains as 4) or notified through message per 5sec. The above said process is for/to analyze abnormal condition.

4.3 Location Detection

To detect location we use GPS. Using GPS we detect the longitude and latitude and consider longitude as X and

latitude as Y. Through location detection we can detect location (longitude and latitude), ground height, current time, current date, air speed. But here we take location to store that where the soldier is.

4.4 Transmission Medium

[4] We use IOT for Data Transmission in our project. Using transmission medium we can transfer temperature, heart beat and GPS by collecting all its information via microcontroller. Then the data of temperature, heart beat and GPS/location are displayed in LCD and also send back through IOT to website. For IOT we using PHP program.

4.5 Indication System

[5]After the process of soldier location tracking and health detection the message of soldiers abnormal conditions are send to the 3 predefined mobile number (neighboring). In real time, the data are send to the cloud storage(IOT) about the latitude and longitude as well as the abnormal condition are indicated to the neighboring soldiers ID.

V. ALGORITHM

A Track algorithm is to track the soldiers location. Tracking algorithms provide the ability to predict position of multiple individual soldiers being reported by sensor systems. It is used to predict position for threat estimation.

VI. RESULT

This project developed and implemented on Arduino Uno using Embedded C according to mentioned algorithm has been compiled and loaded to the microcontroller board successfully. The Bio-sensors can successfully detect the heart beat and temperature. Also the location (longitude and latitude) of the soldier using GPS can successfully detected.

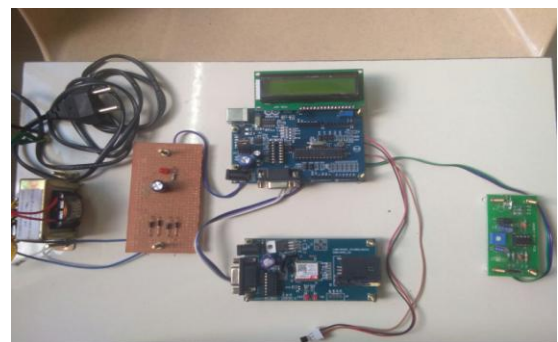


Fig3 : Result

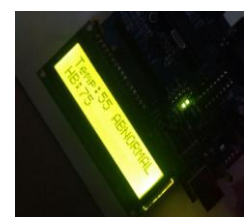


Fig 4: Normal Condition Fig 5 : Abnormal Condition

VII. CONCLUSION

Continuous Communication is Possible: Soldiers can communicate anywhere which can help soldier to communicate among their squad members whenever in need. Less complex circuit and power consumption. Use of Arduino Uno and low power requiring peripherals reduce overall power usage of system. Modules used are smaller in size and also lightweight so that they can be carried around. Security and safety for soldiers: GPS tracks position of soldier anywhere on globe and also health system monitors soldier's vital health parameters which provides security and safety for soldiers.

VIII. FUTURE SCOPE

This system can provide more safety to soldiers by adding heart rate sensors, temperature sensors and GSM and GPS modules for the purpose of communication and location of soldiers. By using this sensors base station can monitor physical status of soldier. And they can be given medical instruction to overcome the problems. We can add display section to this project. This will help to display digital map,

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