

IOT and GPS Based Soldier Position Tracking and Health Monitoring System

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Abstract – In today's world the security of the nation depends upon the enemies' warfare and so the safety of the soldiers is considered as a vital role in it. The security of any nation depends on military, army, air-force & navy of country and the backbone of all these forces are our soldiers. One of the fundamental challenges in military operations lies in that soldiers are not able to communicate with the control room station. In this project the exact location and health status parameter of a soldier can be sent to the base station in real time so that the appropriate action can be taken in case of crisis. GPS is used to log the longitude and latitude so that direction can be known easily. Here to find the health status of the soldier we are using the body temperature sensor to measure the temperature of the body as well as heart rate to measure heart rate of soldier. The IoT makes the entire monitoring process fast, efficient and the decisions can be taken in less amount of time. So by using these equipments we are trying to implement the basic life guarding system for soldier in low cost and high reliability. So by using these equipments we are trying to implement the basic life guarding system for soldier in low cost and high reliability.

Index Terms – Internet of things, GSM, GPS, Longitude, Latitude.

1. INTRODUCTION

In current world scenario, the security of a nation is the utmost important factor and the security of nation depends on the army force. Without the soldier it would be nearly impossible to protect a nation. 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.

So this paper focuses on tracking the location of soldier from GPS, which is useful for control room station to know the exact location of soldier and accordingly they will guide them.

Also high speed, short range soldier to soldier wireless communication to relay information on situational awareness

such as biomedical sensors GPS navigation, wireless communication. The biosensor consists of temperature sensor and heart rate sensor. The main essence of this project is that it is an Internet of Things (IoT) based project. IoT systems are systems that consist of interrelated machines (mechanical or digital), computing devices, animals, people and other objects which have unique functionalities. Using the IoT, their data can be transferred from one place to another over the network without the computer to computer and human to computer intervention. The relevance of IoT in Soldier Navigation and Health Monitoring system is that the real time location and health parameters of the soldier on the battlefield are instantaneously sent to the base station without the soldier having to input anything. The IoT makes the entire monitoring process fast, efficient and the decisions can be taken in less amount of time.



2. RELATED WORK

This paper has an idea of tracking the soldier and navigation between soldier-to-soldier such as knowing their speed,

distance, and height as well as health status of them during the war, which enables the army personnel to plan the war strategies. This system enables GPS (Global positioning systems) tracking of these soldiers. It is possible by M-Health. The M-health can be defined as mobile computing, medical sensors and communication technologies for health care. This device will improve, not only for the host, but also for placed together/correctly arranged military personnel who will exchange information using wireless networks. One of the basic challenges in military operations lays that the soldiers are not able to Communicate with control room station.

2.1 Block Diagram of Proposed system

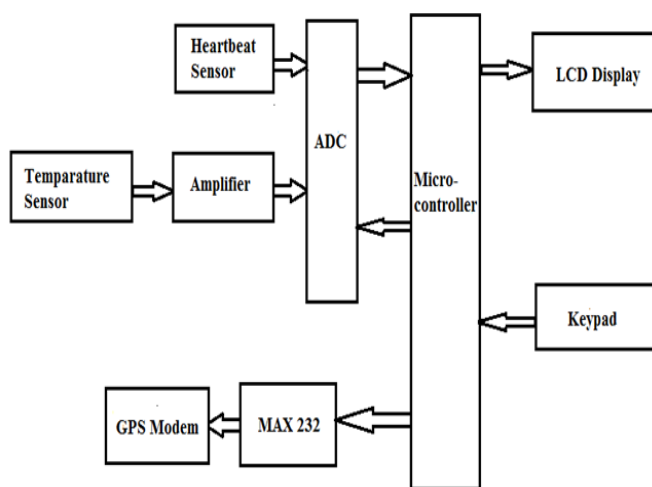


Fig. Schematic Block Diagram of Soldier Position Tracking and Health Monitoring system

The block diagram of soldier position tracking and health monitoring system with environmental analysis is shown in above fig. It consists of two units soldier unit and base station unit. As it requires high speed communication it is intended to use Atmega 328 processor. Biosensors such as body temperature and heart beat sensor is integrated to processor to monitor the health status. The GPS receiver is used to log the location (longitude and latitude) of soldier, which is stored in microcontroller memory.

GPS Receiver receives and compares the signal from orbiting GPS satellite to determine geographic position. Using keypad we can send messages to other unit. RF Transceiver gets the latitude and longitude of other soldier unit and calculates distance, speed and height between them. It also sends the information to the army base station containing the health parameter and the location of soldier. At Army Base Station unit it gets the details of soldier unit through GPS receiver, the soldier location and health status displayed on system at base station using software. This is a wearable technology which is the most important factor of this project.

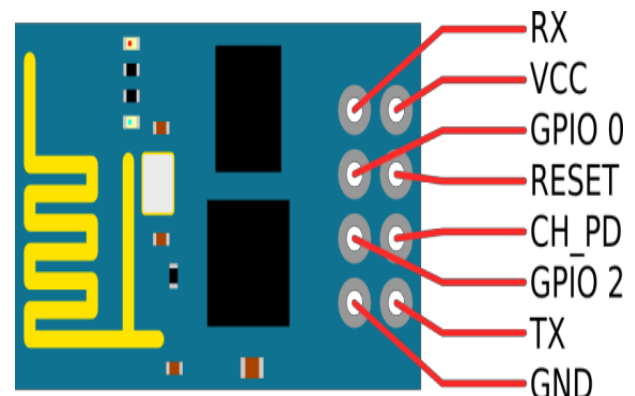
2.2 Block description of soldier Position Tracking and Health Monitoring system

2.2.1. Arduino-Uno board:



The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

2.2.2. Wi-Fi Module-ESP8266:



The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and MCU (microcontroller unit) capability. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. The ESP8285 is an ESP8266 with 1 MB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi. The successor to these microcontroller chips is the ESP32.

2.2.3. Global Positioning Systems (GPS):

The Global Positioning Systems Transmit signals to equipment on the ground. .GPS make it possible for people with ground receivers to pinpoint their geographic location. The location accuracy is anywhere from 100 to 10 meters for most equipment. Main function of Global Positioning System

modem is to provide longitude and latitude of the soldier's exact and current position. The GPS modem receives data from satellite. And then it gives this bunch of data to Microcontroller through serial communication.



2.2.4. GSM:



GSM, which stands for Global System for Mobile communications, reigns as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area. It is a specialized type of modem which accepts a SIM card and operates over a subscription to a mobile operator. A GSM module looks just like a mobile phone. A GSM modem can be a dedicated modem device with a serial or USB connection. Most of the GSM cellular modems come with an integrated SIM card holder. AT or attention commands are used to interface GSM modem with microcontroller.

3. PORPOSED MODELLING

An efficient system is being proposed which has an application of tracking the soldier's location and health parameters during the war, which also invokes the military or army officers to plan the war strategies. Base station gets location of soldier from GPS and communication takes place through the GSM modules. An important service of the base station is to guide the soldier on correct path if he is lost in the battlefield. The base station can access the current status of the soldier which is displayed on the PC and this system uses the IOT. Therefore an immediate action is taken by sending rescue and help for the soldier or sending backup for threat predicted ahead. Using

various biomedical sensor health sensor module (HRM2511E) both which are Arduino compatible.

The GPS module is interfaced with the Arduino uno board and it provides us with the exact location of soldier in the form of latitude and longitude. The Arduino uno board is also interfaced with a 16x2 LCD which works on 4-bit mode which is used for saving the connecting pins. The 16x2 LCD can be interfaced in 8-bit mode for increasing the speed of the process. The LCD display is used to display sensor reading. All the outputs from the sensors, wifi module, GPS and GSM system is given as the input to the microcontroller. This output is displayed on the LCD. Final important component interfaced with the Arduino uno board is the GSM module which is used for sending values to other Arduino uno board. parameters of soldier's are observed, the position and orientation of soldier is trapped using GPS. The Arduino uno board is connected to the sensors, particularly temperature sensor (LM35) and heart beat.

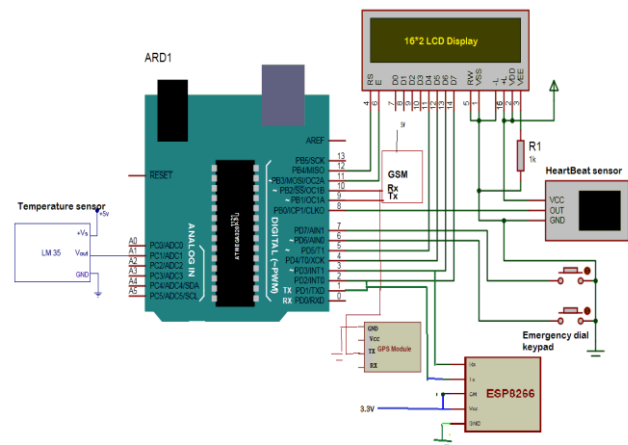
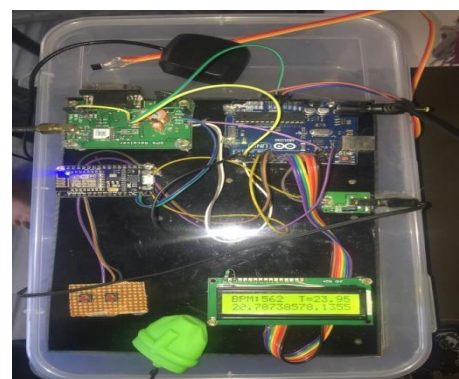


Fig. Circuit diagram of Soldier Position Tracking and Health Monitoring system

4. RESULTS AND DISCUSSIONS

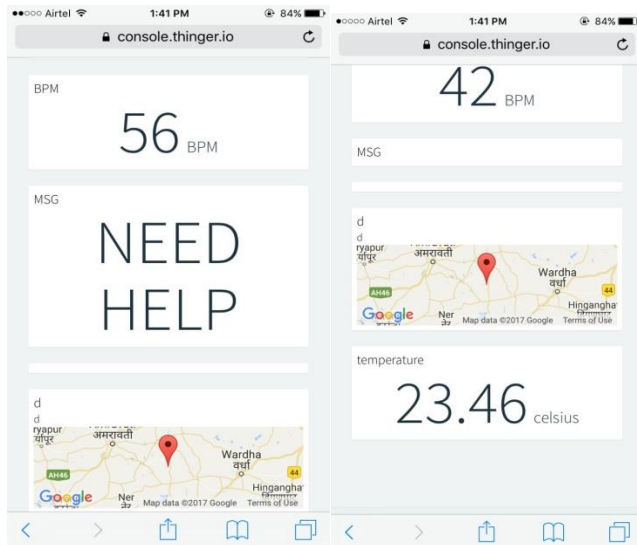
The output of the project showing the readings of temperature, BPM, longitude and latitude.



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



When any of the switch is pressed by the soldier accordingly the message is display like this



5. CONCLUSION

Soldiers can continuously communicate anywhere with the base station using RF, DS-SS, FH-SS which can help soldier to communicate among their squad members whenever in need.

Use of 328 controller 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 easily. 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. So in this way concept of tracking and navigation system is very useful for soldiers when they are on military field during war. And also for base station so that they can get real-time view of soldier's on field displayed on PC.

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