

A simple and Cost-Effective Real-time Soldier Health and Position Tracking System

Prof. (Dr.) Vijay Mane¹, Shivangi Shardul², Sahil Shah³, Chaitanya Sawant⁴

¹Associate Professor¹, Department of Electronics & Telecommunication Engineering, VIT, Pune, India

²⁻⁴UG Students, Department of Electronics & Telecommunication Engineering, VIT, Pune, India

Abstract - In today's world, a nation's security is dependent on its adversaries' combat, thus the troops' safety is a critical factor. The military, army, air force, and navy of any country are responsible for its security, and our soldiers form the backbone of all of these forces. The inability of a soldier to connect with the control room station is one of the most serious offence in military operations. We can directly get the real-time position of the soldiers using this project. We can get the soldier's exact position using GPS. Using IoT the entire process becomes fast. So, by utilizing this technology, we have developed a rudimentary life-guarding system for soldiers that is both low-cost and reliable.

Key Words: GSM, GPS, Sensors, Arduino, LDR

1. INTRODUCTION

In today's world, a country's security is the most crucial aspect, and a country's security is dependent on its armed forces. It is practically impossible to locate every soldier physically so there is need to develop a system which can track the movement of the soldiers and also the health related records. The base stations or strategic war rooms can directly locate the soldiers using thus soldier health tracking system[1].

Also in the countries where the defence budget is low as compared to the developed nations it is necessary that the costing of this system should be as low as the defence ministry could bear[2].

Adding the sensors like temperature sensor and the heart beat sensor makes this system strategically to analysis the informations at the warheads and also to get the actually view of the warhead and also the data processing and transmitting should be very fast so we have used gsm SIM800A module for data transmitting to the base station. data may be moved from one location to another via the network using the Internet of Things, without the need for computer-to-computer or human-to-computer communication [3].

Study of the information's that we get from this system will help in the future planning of the war heads and also the evacuation of the injured army personals from the war head as the position of the soldiers is also known. Also it will be helpful in planning the medical facilities as the

health related information is available[4].

1.1 Literature Review

An Internet of Things (IoT)-based health monitoring and tracking system, which monitors soldiers' health and tracks their position. Since Arduino is connection oriented, i.e. it comes with a USB connector, they haven't defined how communication between the client and server sides is achieved [5,6].

Soldier Health and Position Tracking System in this Soldiers are tracked using GPS, and GSM Communications permits everyone to communicate wirelessly. To measure troop health metrics, they employ biomedical sensors such as a temperature sensor and a cardiogram sensor. By using a respiration rate sensor to measure environmental blood pressure, soldiers can be better prepared in the case of climatic shifts [7].

GPS Based Soldier Tracking And Health Indication System, focused on tracking a soldier's position, which allows the command centre to be aware of the soldiers' actual location and lead them accordingly [8].

Rajeswari and R. Kalaiselvi are used a sensors like LM35 temperature sensor, a pulse rate sensor, and an oxygen level detecting sensor to continually monitor a soldier's health in their study. To determine real-time position and directions, the Global Positioning System (GPS) is used. Arduino (ATmega328P), a wrist multi sensor device with biomedical sensors for heart rate, 1-lead ECG, blood pressure, oxygen blood saturation, and skin temperature measurement, gathers data from sensors and a GPS receiver [9].

2. Proposed System

This study is all about tracking soldiers and connection between them it also includes their speed, distance, height, etc, as well as their health state throughout the conflict, allowing army professionals to prepare war plans. This method uses GPS for tracking and using M-Health it is very easy to track soldiers health as it use mobile computers, medical sensors, and communication technology in health care. This equipment will benefit not only the host, but also the military people who will be grouped together/correctly arranged and share information across

wireless networks. The soldiers' inability to communicate with the control room station is one of the most basic obstacles in military operations.

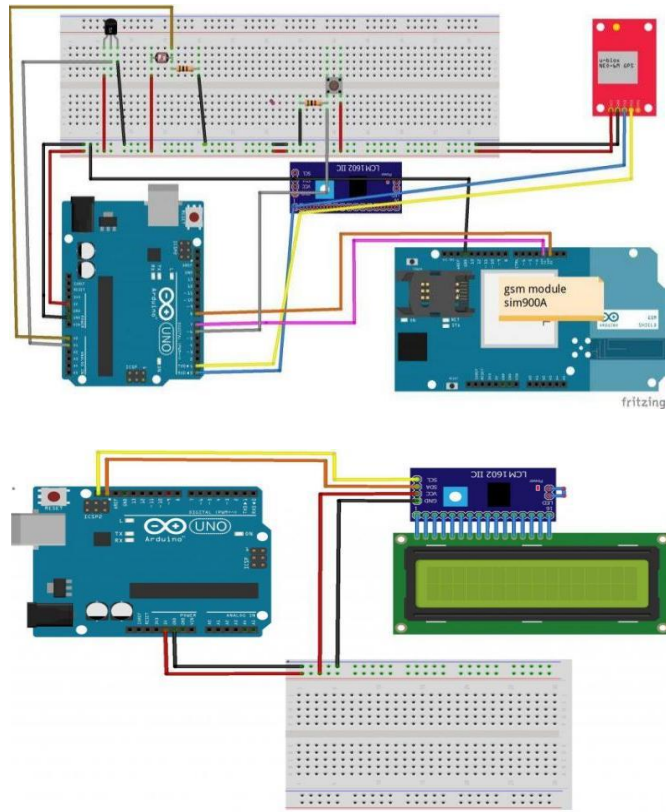


Fig: Blog diagram of proposed system

There are two units in it: a soldier unit and a base station unit. It is planned to employ an arduino atmega processor since it requires high-speed connectivity. Temperature and heartbeat sensors are among the sensors provided to keep track of the soldiers' health. The soldiers' position was recorded using the NEO 6M gps module and for location a GPS receiver receives and compares signals from rotating GPS satellites. The latitude and longitude of other soldier units are obtained by the RF Transceiver, which then calculates distance, speed, and height between them and also for sending information to the army main base about soldiers health and location. The information of the soldier unit are obtained by a GPS receiver at the Army Base Station unit, and the soldier's location and health condition are displayed on a system at the base station using software.

2.1 Components

- GSM Module SIM800A.
- Arduino UNO
- 16×2 LCD Display with I2C Module.

- NEO-6M GPS Module
- 1x Push button.
- 1kohm & 10kohm resistance.
- LM35 Temperature sensor.
- LDR for Demonstration of heartbeat.

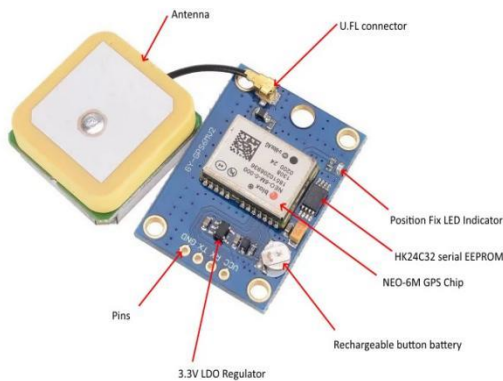
1. Arduino Uno board:

The Arduino Uno is the very famous and many people are using this board. The name "Uno" was chosen to mark the release of Arduino Software (IDE) 1.0, which has since evolved into succeeding versions. Arduino UNO is a low-cost, versatile, and easy-to-use open-source programmable micro-controller board that may be used in a wide range of electrical applications. This board can operate relays, LED's, servos, and motors as an output and can be interfaced with other Arduino boards, Arduino shields, and Raspberry Pi boards. Arduino is a material platform and open-source technology with millions of active users all over the world..

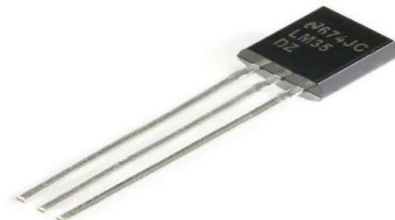


2. Global Positioning Systems (GPS):

GPS send signals to ground base station. People with ground receivers can use GPS to locate their geographical position. For most equipment, the location precision ranges from 100 to 10 metres. The main purpose of the Global Positioning System modem is to deliver the accurate and current longitude and latitude of the soldier. Satellite data is received by the GPS modem. then sent to the Microcontroller using serial communication.



builders, and students because of its low cost (about \$0.95) and higher precision. Many low-cost items make use of the LM35 because of its low cost and high precision. Although the sensor has been around for over 15 years, it is still in use and may be found in a variety of devices.



3. GSM:

GSM is very famous and many people are using it as cell phone technology. Mobile phones use the GSM network of a cell phone service provider to locate nearby cell phone towers. It's a customised modem that accepts a SIM card and works with a mobile operator's subscription. A GSM module resembles a mobile phone in appearance. As a GSM modem, a specialised modem device with a serial or USB connection can be utilised. The majority of GSM cellular modems include a built-in SIM card holder. AT instructions, also known as attention commands, are used to connect a GSM modem to a microcontroller.

GSM SIM800A module :



4. LM35 Temperature Sensor:

The LM35 is a temperature sensor show us the actual temperature. In this conversion of output voltage to temperature is very simple The benefit of the lm35 over the thermistor is that it does not need to be calibrated externally. It's also protected against self-heating thanks to the covering. It is popular among enthusiasts, DIY circuit

2.2 Methodology

An ideal system is being developed that includes an application for tracking soldiers' whereabouts and health indicators during wartime, as well as including military or army leaders in the planning of war operations. The location of the soldier is determined by GPS, and communication is carried out using GSM modules. If a soldier becomes disoriented on the battlefield, the base station can help him find his way back. The base station has access to the soldier's current state, which is shown on the PC, and this system makes use of the Internet of Things. As a result, prompt action is taken by dispatching rescue and assistance to the soldier, as well as dispatching backup in the event of impending threats. Using two Arduino compatible biomedical sensor health sensor modules.

The GPS module is connected to the Arduino Uno board to the rx and tx pins and gives us the actual position of the soldier in latitude and longitude. The Arduino uno board also has a 16x2 LCD with I2C interface that operates in 4-bit mode, which is utilised to save connection pins. To increase the speed of the process, the 16x2 LCD can be interfaced in 8-bit mode. Sensor readings are shown on the LCD display. The microcontroller receives all of the outputs from the sensors, wifi module, GPS, and GSM system. On the LCD, this output is presented. The GSM module, which is used to transfer values to other Arduino uno boards, is the final key component interfaced with the Arduino uno board. Soldiers' characteristics are monitored, and their position and orientation are recorded using GPS. Sensors are connected to Arduino uno board.

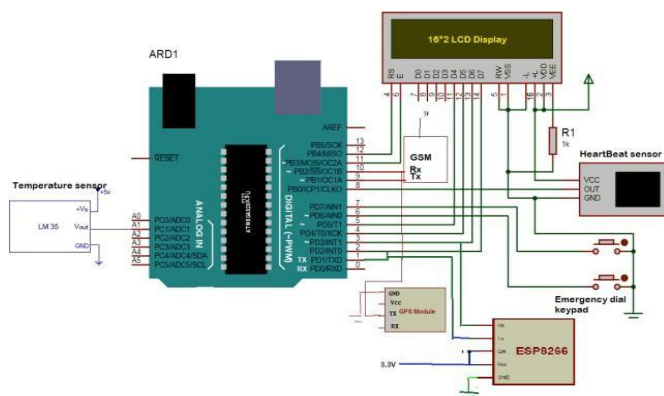


Fig. Soldier Health Tracking System's Circuit Diagram

3. CONCLUSION

Soldiers can connect with the base station at all times utilizing RF, DS - SS, and FH - SS, allowing them to speak with their squad members anytime they need to. The system's overall power consumption is reduced because to the use of 328 controllers and low-power peripherals. The modules utilized are tiny in size and light in weight, making them easy to transport. Soldiers' whereabouts are tracked by GPS anywhere on the world, and the health system checks crucial health indicators, ensuring their protection and safety. As a result, the notion of a tracking and navigation system is extremely valuable for soldiers on the battlefield during a fight. Also, base stations will be able to acquire a real-time view of soldiers on the field via a PC.

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