Soldier Health Monitoring and Position Tracking

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Abstract: In today’s the national security mainly depends on army (ground), navy (sea), air-force (air). The important role is played by the soldiers. There are many concerns regarding the safety of these soldiers. This system will be useful for soldiers, who involve in war. This system enables GPS (Global positioning systems) tracking of these soldiers through longitude & latitude. It is possible by various biological sensors which are Temperature sensor, Heart beat sensor, Pulse Rate sensor. This biological sensor major the current health condition of the soldiers & also track the location of soldiers using GPS & GSM. In this system, smart sensors are attached to the body of soldiers. This is implemented with a personal server for complete mobility. This personal server will provide the connectivity to the server at the military base station using a wireless connection. Each soldier also has a GSM (Global system for Mobile communication) module which enables the communication with the base station in case of any injuries. As soon as any other soldier enters the enemy lines it is very difficult for the army base station to know about the location as well as the health status of all soldiers. In our project we have come up with an idea of tracking soldier as well as to give status of the soldier during the war.

INTRODUCTION

The security of the nation is depends up on the enemies’ warfare and so the safety of the soldiers is considered as vital role in it. Concerning the soldiers safety there are many instruments to view their health status as well as ammunitions on the soldiers. In soldiers security, bio-sensors systems gives different types of small physiological sensors, Biomedical sensor, transmission modules and processing capabilities, and can thus facilitate low-cost wearable unobtrusive solutions for health monitoring.

GPS used to log the longitude and latitude so that direction can be known easily. These devices are being added to weapons and firearms, and some militaries such as the Israeli Army which are exploring the possibility of embedding GPS devices into soldiers vests and uniforms so that field commanders can track their soldier’s movements in real time.

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 situational awareness, tactical instructions, and covert surveillance related data during special operations reconnaissance and other missions. So by using these equipment’s we are trying to implement the basic lifeguarding system for soldier in low cost and high reliability

I. OVERALL DESCRIPTION

A. Project Scope

In today’s world enemy warfare is an important factor in any nation’s security. The national security mainly depends on army (ground), navy (sea), air-force (air). The important and vital role is played by the army soldier’s. There are many concerns regarding the safety of these soldiers. As soon as any soldier enters the enemy lines it is very vital for the army base station to know the location as well as the health status of all soldiers.

B. User Classes and Characteristics

The user is expected to be familiar with mobile phone touch as well as perform basic navigational, input operations on the device. The Web Users are expected to be Internet literate, understand how to navigate location and perform conceptual tasks such as send message, temperature range, heart beat, pulse rate and inputting data into specified and authenticate location

C. Operating Environment

- Arduino MEGA 2560
- Heartbeat Sensor
- Temperature Sensor and Humidity Sensor (DHT11)
- GPS Module (NEO-6M)
- Pulse sensor
- LCD display.
D. Design and Implementation Constraints

Arduino UNO is a micro-controller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM output), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the micro-controller, simple connect it to a computer with a USB cable or Power it with a AC To DC adopter or battery to get started

- Temperature Sensor

The most widely measured physical parameter is body temperature; it can be calculated by putting the sensor in contact with human body. The sensor used in this project is an LM35 temperature sensor. LM35 is a precision IC temperature sensor with its output proportional to the temperature (in °C). The LM35 sensor has more features that attracted us to choose it, such as Calibrated directly in Celsius (Centigrade), Linear + 10-mV/C scale factor; it measures temperatures from -55°C to +150°C range, the accuracy 0.5°C

![Temperature sensor](image1.png)

Figure 1: Temperature sensor.

- Heartbeat Sensor

The sensor used in this project is pulse sensor-SEN-11574. Heart rate data can be really useful for determining the health status of a person. The pulse sensor amped is a plug and play heart rate sensor for arduino. It essentially combines a simple optical heart rate sensor with amplification and noise cancellation circuitry making it fast and easy to get reliable pulse readings. It sips power with just 4 mA current draw at 5V. To use it simply clip the pulse sensor to earlobe or fingertip.

![Heartbeat sensor](image2.png)

Figure 2: Heartbeat sensor

- Pulse rate sensor

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![Pulse rate sensor](image3.png)

Figure 3: Pulse rate sensor

- GPS & GSM model:

Neo 6 M GPS is a USRT 6 M module. It will be used to track the position of the soldier. It gets connected to at-most 32 satellite and will give the exact longitude and latitude readings. In this way it will track the exact position. While originally a military project, GPS is considered a dual-use technology, meaning it has significant military and civilian applications. It operates in the range -40 degree Celsius to 85 degree Celsius and at 2.7V-5V. Also it has a tracking and navigation sensitivity of -161 dBm. The GPS (Global Positioning System) is a “constellation” of 24 well-spaced satellites that orbit the earth and 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. Accuracy can be pinpointed to within 1 meter with special military approved equipment. GPS equipment is widely used in science and has now become sufficiently low-cost so that almost anyone can own a GPS receiver.

![GPS](image)

**Figure 4: GPS**

- **ThingSpeak Server**

  ThingSpeak™ is an IoT analytics platform service that allows you to aggregate, visualize and analyze live data streams in the cloud. ThingSpeak provides instant visualizations of data posted by your devices to ThingSpeak. With the ability to execute MATLAB® code in ThingSpeak you can perform online analysis and processing of the data as it comes in. ThingSpeak is often used for prototyping and proof of concept IoT systems that require analytics.

II. **External Interface Requirements**

A. **User Interfaces**

For GUI purpose we are using IoT Gecko platform for displaying information on web and taking inputs from android Smartphone.

B. **Hardware Interfaces**

We are using Arduino Uno Micro-controller which works as a central controller in our system.

C. **Software Interfaces**

We are using open-source Arduino IDE for development purpose.

D. **Communication Interfaces**

The communication between the different parts of the system is important since they depend on each other. We usually use Bluetooth for communication between the IoT with Arduino.

HTTP Protocol: Using post method HTTP protocol transfer data from one to other location.

I2C: I2C (inter integrated circuit) protocol intended to allow multiple “slave” digital integrated circuit to communicate with one or more “master” chips

III. **SYSTEM DESIGN AND MODELLING**

A. **System Architecture**

IOT health monitoring has sensors. First one is a temperature sensor, second is Heartbeat sensor, third one is pulse rate sensor and fourth one is GSM & GPS for location tracking. This project is very useful for the soldiers and base station can monitor health parameters of soldier using biomedical sensors. So now the base station of soldiers or family members can monitor or track the soldiers health as well as location of soldiers through the wireless connection.
B. Prototype Model:

Actual implementation and execution of the model

IV. NONFUNCTIONAL REQUIREMENTS

A. Web support

The user can track the device and health parameter using the web-browser.

B. Software Quality Attributes

• Reliability
• Availability
• Maintainability
• Portability

CONCLUSIONS

Continuous Communication is Possible: Soldiers can communicate anywhere using RF, DS-SS, FH-SS which can help soldier to communicate among their squad members whenever in need. Less complex circuit and power consumption: Use of ARM processor 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.

REFERENCES


