

ADVANCED VERSION OF SOLDIER MONITORING SYSTEM

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ABSTRACT

With so much advancement coming in the field of electronics we should think about helping our soldiers by making gadgets which can be helpful to them during war times. Sometimes during war proper communication between the soldier and the base station becomes the main issue because soldier can get help from the base only when the base has the information about the exact location of the soldier. And the base station can also keep the track record of the condition of the soldier's health. This project will be helpful in tracking the location of the soldier as well as checking the health status of the soldier during the war, which enables the army personnel to plan the war strategies. This project will also help the soldier in finding the correct path if he lost in the battlefield.

KEYWORDS: *GPS module, GSM module, Temperature Sensor, Heart Beat Sensor, Humidity Sensor, Flex Sensor, Metal Detector.*

I. INTRODUCTION

Soldier monitoring system consist of electronic devices like Microcontroller, Keypad, LCD, GPS and GSM module, and sensors like flex sensor, humidity sensor, temperature sensor, heart beat sensor and a metal detector. There are many concerns regarding the safety of our soldiers. As soon as any soldier cross the enemy lines it becomes very vital for the army base station to know the location as well as the health status of the soldier. The main motive of this project is to track the location of the soldier and to tell the health status of the soldier and send this useful information to the base station with the help of GSM module.

This project is going to be helpful for the soldiers, who involve in special missions. The idea behind this project is to help the soldiers in every ways possible, soldiers dedicate their whole life to their country, to their nation's security, in saving innocent people's life, in stopping terrorism which is increasing day by day. That's why to help them in succeeding their mission advanced technology plays an important role as well.

This system has two units first one is soldier unit which consist of biomedical sensors which are used to tell the health status of the soldier by using body temperature sensor and heart beat sensor, these sensors will measure the body temperature and pulse rate of the soldier, GPS Receiver which is used to log the longitude and latitude of the soldier which is stored in microcontroller memory, GSM modem sends the message to the army base camp containing the health parameters and location of the soldier. And the second unit is the base unit, where the message will be received. Now with the help of the given information in the message the officer can track the location of the soldier and also get to know about the health status of the soldier.

The following paper is further divided into the literature review and proposed model. Section III will describe about the previous work done on Soldiers health and position tracking system and section IV is about the proposed model.

III. LITERATURE REVIEW

Pangavhane S.M., Choudhary Sohanlal and Pathak Bhavik^[1] proposed a model in which they are attaching the device in the soldier's pocket, this device will be tracking the location of the soldier and giving the health status of the soldier which includes pulse rate and body temperature of the soldier. They are using ARM LPC2148 microprocessor which is of 32 bit having 64 pins. The main reason behind using this IC is because it supports multiple pipelining which multiple instructions can be executed in a single cycle by which speed of operation increases. They are using SR87 GPS module and attaching its antenna to the soldier's jacket which provide the latitude and longitude value above the sea level. GSM will act as the messenger between the soldier and the base station. LM35 temperature sensor and heart beat sensor for the health status of the soldier. The main motive of device is to do the effective tracking of the soldier, to monitor and provide the health status of the soldier continuously and to maintain low cost, high reliability and compact size so that it can easily fit into soldier.

Shruti Nikam, Supriya Patil, Prajka Powar and V.S. Bendre^[2] using the concept of various wearable sensors for the monitoring of human physiological parameters. They are calculating two simple parameters of the soldier which are body temperature and pulse rate because no large and complex circuits are required in measuring them. They are using LM35 low cost temperature sensor because it does not require signal conditioning and pulse rate sensor for pulse rate measurement. For tracking soldier's location there is a GPS (SR87). They are using graphical LCD for displaying customized characters. RF transceiver (CC2500) is also been used in this project. GSM module for messaging purpose. And ARM LPC2138 microprocessor has been used for this project. Their main motive is to provide security and safety for soldiers by maintaining continuous communication between the soldier and control room station. They are using ARM processor and low power requiring peripherals to reduce overall power usage of the system.

P.S. Kurhe, S.S. Agarwal^[3] their paper is concerned with real time tracking and health monitoring system of remote soldier using ARM 7. Their main aim is to develop a real-time wireless monitoring system which can medically monitor the soldier and can also provide the location of the soldier using GPS and providing continuous information about the health status of the soldier to the control room station with the help of the GSM module. Their soldier unit consist of two types of sensors which are temperature sensor and heart beat sensor, these sensors measures the parameters and convert those parameters into the digital form.

The ARM7 LPC2148 plays an important role as well in controlling all the devices and it has inbuilt analog to digital convertor. Their device will provide high level safety to human life and it suitable for Indian conditions as well and it is of low cost and has less complex circuitry. But sometimes the accuracy of the device may get affected by some factors such as weather and the environment around the mobile soldier unit.

Ingawale Kajal, Shinde Pooja, Pawar Poonam and Prof. Miss. Kadam M.M.^[4] they are focusing on the idea of GPS based Soldier Tracking and Health Indication System. For navigation they are using GPS module and GSM will act as the messenger between the soldier unit and base unit. They are using oxygen sensor, pulse rate sensor, body temperature sensor for health indication system. This system is designed for soldier's security and safety. In future instead of battery they can even upgrade their system by using solar cell battery. They are using oxygen sensor for environmental analysis. This sensor will measure the oxygen level in the environment and compare it with the threshold level. If the oxygen is increases or decreases from this level then message is send to the control room station automatically.

IV. PROPOSED MODEL

The proposed model is Soldier Monitoring System, which consist of two units first one is soldier unit which consist of ATmega16 microcontroller, sensors like body temperature sensor LM 35, heart beat sensor, humidity sensor and flex sensor, then there is a metal detector, GPS module, GSM module, LCD, Keypad, MAX 232 IC. And the second unit is a base unit which consist of a mobile phone which will receive a message send to it by the soldier unit this message will contain all the information about the location of the soldier and health status of the soldier which is measured by heat

beat sensor and body temperature sensor. They will give the parameters in the analog form which is converted into the digital form by the ATmega16 microcontroller and send them to the control room station. This model is specially designed for our soldiers for the purpose of their safety and security. If the soldier is lost in the battlefield then he contact to the control room station immediately and make them aware of his situation so that they can guide him to the right path. In the emergency period if he is not feeling well or he is not in the condition to fight and return to base he can send the signal and can get help from the base as well.

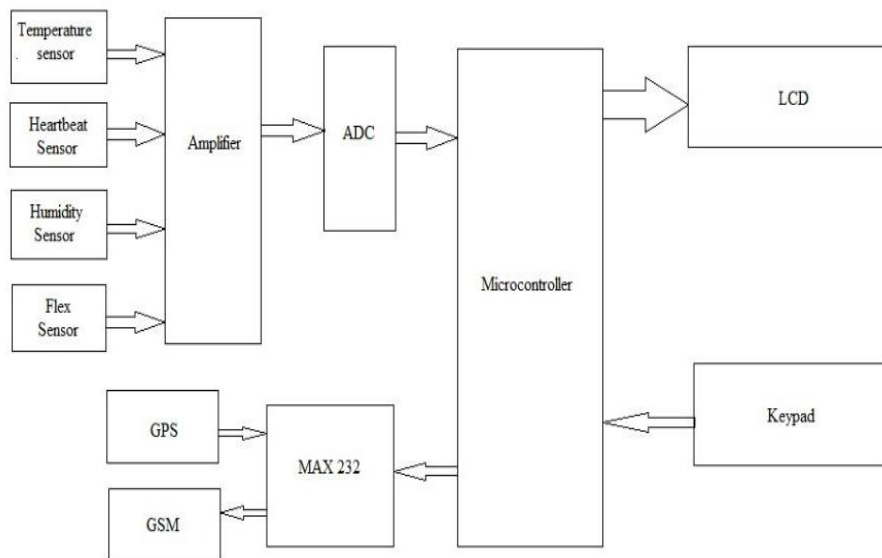


Fig 1: Block Diagram of Soldier Monitoring System

ATmega16 Microcontroller: It is an 8-bit high performance microcontroller with low power consumption. It has inbuilt peripherals like USART, Analog Comparator etc. It can operate on 16 MHz frequency. It is a 40 pin IC. It is of low cost having 16 KB flash memory, static RAM of 1 KB and EEPROM of 512 Bytes.

GPS module: GPS stands for Global Positioning System. It will provide the location of the soldier in terms of latitude and longitude parameters. GPS module does not require any external components except power supply decoupling capacitors. The module also have the option of connecting external active antenna if necessary. It is connected to ATmega16 via MAX 232 IC.

GSM: GSM stands for Global System for Mobile Communication. It comes with an integrated SIM card holder. This device is used for the communication between the soldier and the control room station. It is connected to the microcontroller via MAX 232 IC. It comes with a serial or USB connection.

Keypad Unit: It consists of number of buttons which are needed to interact soldier unit with base unit. In case of emergency soldier can press the specified button for alert signal which will alert the base station or some alarm will start.

Body Temperature Sensor: To calculate the body temperature of the soldier here we use LM 35 temperature sensor. If the body temperature of the soldier increases 40 °C then Hyperthermia a life threatening disease can happen to soldier and if the temperature falls down to 35 °C then there is a chance of Hypothermia so the treatment is required in both the cases.

Heart Beat Sensor: The ideal heart beat rate of a person is 72 beats per second, if the heart beat rate increases or decreases from this threshold value then the message regarding this information will be send to the base station.

Flex Sensor: They are passive resistive devices that can be used to detect bending or flexing. Flex Sensor decreases its resistance in proportion to the amount it is bent in either direction. We can implement it in the gloves of the soldier and set a specified value for the specific gesture by the soldier. If the soldier make that gesture again then the base station will receive a signal.

Humidity Sensor: It senses, measures and reports the relative humidity in the air. It therefore measures both moisture and air temperature. Relative humidity is the ratio of actual moisture in the air to the highest amount of moisture that can be held at that air temperature.

Metal Detector: An electronic device that gives an audible or other signal when it is close to metal, used for example to search for buried objects. When the soldier enters the battlefield or cross the enemy lines they can check for mines buried under the ground.

V. CONCLUSION

From the above proposed model, we have come to the conclusion that we can transmit the data sensed from the soldier unit to army control room using GSM. Above system is integrated with various sensors telling about the health condition of the soldier. This system is capable of tracking the location of the soldier in terms of latitude and longitude. Overall the aim of Soldier Monitoring System is to provide safety and security to the soldier. With the help of this system soldier can get help from the base station in panic situations. This system is of great help in emergency conditions, it will keep the track of the soldier's heart beat rate, body temperature of the soldier, location of the soldier, temperature of the surroundings. We are implementing a special sensor called flex sensor which will give the alert signal to the base station by the special gesture made by the soldier in the emergency times.

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