

Real Time Soldier Tracking System

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Abstract : Army's welfare is one of the most important aspects of any country. It is our duty to equip soldier with better advanced technology. This paper helps to track the soldier at any given moment using GPS. In this paper, soldier's health parameters such as heart rate and body temperature are continuously measured and transmitted wirelessly to the control room using GSM. In case of death of the soldier, the processor detects the change in pulse rate and location of the dead soldier; tracked by the GPS module is then communicated to the military base station by the use of GSM. This information can be used to devise war strategies as to how many more soldiers (and where) should be deployed to replace the martyrs. In case of emergency, soldier can communicate directly to the base station using a panic switch.

Keywords - Tracking, GPS, GSM, ARM, Biosensors.

1. INTRODUCTION

Nowadays soldier security and safety have become a concern. Presently in India, all section of the defence system i.e. army, navy and air force are facing a problem of tracking the soldier and his status. At present, to know the status and location of each soldier, soldiers are communicated over the radio line. But it has been proved that these methods are not efficient methods for tracking. During the time of war, we always hear the problem of missing of soldiers in the newspaper. On focusing this problem, we have decided to develop a system that will automatically trace the location of each and every soldier. Also the health parameters regarding soldiers will be noted continuously such as heart rate and body temperature of the soldier.

2. PROPOSED SYSTEM

In this project we will attach the device in the soldier's pocket. This device will contain the heartbeat sensor which continuously gives the reading of heartbeat of soldier to the base station. The temperature sensor will give the data of body temperature. The system also composed of GPS and GSM. Through GPS the location of the soldier is traced and through GSM the soldier is able to communicate directly with the base unit.

The other part of this system is base unit which act as receiver where the complete data of each and every soldier is recorded. The system work on two way communication. Firstly there can be query from the receiver side to know the status of the soldier. Secondly there can be the automatic response from the system side to know when the heartbeat of the soldier stops that is when the soldier is died.

2.1 BLOCK DIAGRAM

Our system compose of two units that is soldier unit that is fixed to the soldier jacket and the base unit that is used to continuously monitored the soldiers parameters such as heartbeat rate and body temperature.

2.1.1 Soldier Unit

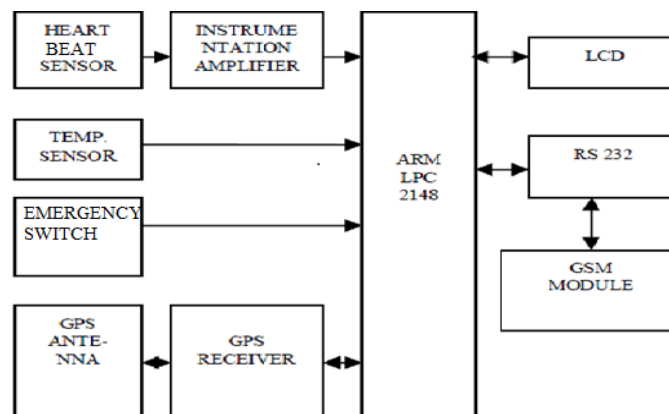


Fig.1 Block Diagram of Soldier System

2.1.2 Base station unit



Fig.2 Block Diagram of Base Unit

2.2 BLOCK DESCRIPTION

2.2.1 Soldier unit description

2.2.1.1 ARM LPC2148

In this project we have used ARM LPC2148 microprocessor. It is 32 bit, 64 pin IC. It supports multiple pipelining which means multiple instructions can be executed in a single cycle. It increases the speed of operation. ARM LPC2148 supports two 10bit ADC and single 10 bit DAC. ARM LPC2148 supports multiple UART which is used for interfacing the GPS and GSM module. Its operating temperature range is from -40 to 80 °c .

2.2.1.2 GPS (GLOBAL POSITIONING SYSTEM)

In this project we are using SR87 GPS module. We are using the GPS module to find out self location of soldier. The GPS antenna is attached to the soldier's jacket which provide the latitude and longitude value above the sea level. GPS is used to provide the accurate value of the location and time in all climatic condition. This module is directly interfaced to the microprocessor. SR 87 support high performance receiver task up to 20 satellites. It has built in lithium battery which enables fast positioning of the soldier.



Fig.3 GPS Module

2.2.1.3 GSM (GLOBAL SYSTEM FOR MOBILE)

This unit acts as the messenger between the soldier and the base station. Soldier can directly contact to the base unit using this module. We can use SIM 300 or SIM 900 in this module. SIM 900 support multiple frequencies such as 850 MHZ, 900 MHZ, 1800 MHZ. It is easy to use as plug in GSM modem and compact in size. SIM 900 is used for both voice and data transfer. It also have internal TCP/IP stack which is used to connect the modem with the internet.

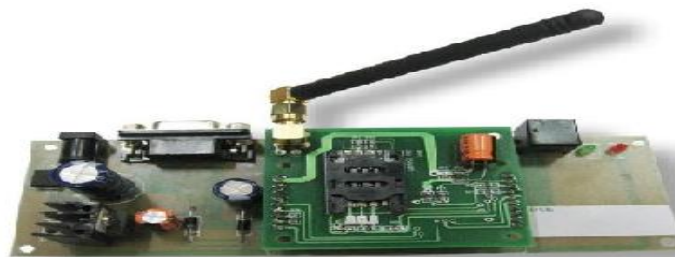


Fig.4 GSM Module

2.2.1.4 Heartbeat Sensor

Heart beat sensor consists of LED-LDR pair. LED emits the light which passes through the finger. On the other side of the finger LDR receives the light. As the heart pumps, the volume of the blood through finger changes and so the light intensity received varies. The change in the received light intensity is very small and so instrumentation amplifier is used.



Fig.5 Heartbeat Sensor

2.2.1.5 Temperature sensor

Temperature sensor is used to continuously monitor the body temperature of the soldiers. For these we use the temperature sensor LM35. The LM35 does not require any external calibration to provide typical accuracies of $\pm 1/4^{\circ}\text{C}$ at room temperature and $\pm 3/4^{\circ}\text{C}$ over a full -55 to $+150^{\circ}\text{C}$ temperature range. We are using LM35 as it is a low cost temperature sensor. LM 35 temperature sensor output voltage is linearly proportional to temperature.



Fig.6 Temperature sensor(LM35)

2.3 Base unit Description

2.3.1 GSM unit

This unit is the messenger between the soldier and the base station. This unit includes transmitter & receiver. This unit is used to send instructions from the base station to soldier and also to receive the soldier status from the soldier unit.

2.3.2 PC

This unit is present to the controller room. This unit is used to read the information provided by the GSM unit.

3. FEATURES AND ADVANTAGES

3.1 Features

1. This system provides the accurate data of longitude, latitude of the soldier.
2. It can be easily fitted in pocket due to its compact size.
3. We can track soldier anywhere in the world.

3.2 Advantages

1. Effective tracking of Solider can be done.
2. Used to monitor and provide health status of the soldier continuously.
3. Low cost, high reliable.
4. Very compact device, so we can easily fit into solider.

5. System is less complex so installation is easy.
6. Low power consumption.

4. RESULT

This result shows the soldier's body parameters such as heartbeat and temperature values as well as longitude and latitude positions are received on the mobile via SMS. We can directly detect the position of the soldier by inserting those values on PC using Google maps software.

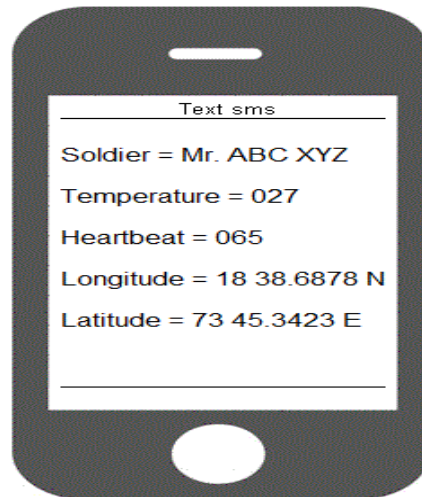


Fig. 7: Expected result on Mobile

5. CONCLUSION

From the above implementation we came to the following conclusion:

- Security and safety for soldiers: Using GPS we can track position of soldier anywhere on globe and also the health parameters which provide security and safety for soldiers.
- Effective 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 and emergency.
- Less complex circuit and less power consumption. Since ARM processor requires less power to operate
- So power consumption is less. Also the modules used are small in size, so complexity is also reduced.

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