SOLDIER HEALTH AND LOCATION MONITORING SYSTEM

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Abstract: In our project we have developed a system which tracks and monitors location and health parameters of a soldier via a GSM module. The proposed System will constantly track the temperature, pulse and location of an individual. It is developed using Arduino Uno.

The Objectives of this work are:

1) Building smart embedded system product with automatic and manual distress call function for the safety of the soldier.

2) To find exact location of a soldier in remote areas using GPS based embedded system. Measurement of soldiers body temperature and pulse rate and share data with military base remotely.

System Consists of different parts: The Control Unit i.e., the Arduino Uno, GSM module for communication, GPS module for location tracking, Temperature and Heartbeat sensor for tracking the health and a power supply.

Index Terms – **Base Station, Heartbeat sensor, GSM Module**

I. INTRODUCTION

Soldiers sacrifice their lives to provide a safe life to a people around the world. Hence to reduce their hardship they must be equipped with latest technology. The proposed system will protect them from risk like communication loss with base, getting doomed etc. amongst others. Soldiers go untraceable for many years is one of the problems. There are many concerns and threats regarding the safety of the soldiers. Soldiers entering the enemy lines mostly lose their lives due to absence of connectivity and reinforcement. It is necessary to know the location and health status of all the soldiers to the army base station so as to provide support and plan the strategies with the remaining troop. So many soldiers lost their lives during wars on the battlefields as there was no proper health backup and communication between the soldiers on the battlefields and the officials at the army base stations. Hence Soldier Health Monitoring and Location Tracing system is developed.

II. LITERATURE SURVEY

The author describes a variety of wearable, portable, lightweighted sensors to keep a watch on psychological data of humans. The body sensors are made up of variety of biometry and psychological sensors including blood pressure. In the system author has focused their main agenda as their safety of their troops and his soldiers by tracking their health conditions during the time of the war and thereby using the device the control room knows the exact location of soldiers and their health and plan their strategies as per their convenience. In case of isolation of the soldiers from their respective battalions, the control room can guide the soldiers with proper directions to the base camps. the soldier's information is transmitted to the control system and keeps the track of the injured soldiers and takes necessary actions to save their lives. The system works on RF module which can be used for strong communication between one soldier to another soldier so that the information can be passed on how the current situation is there and as per the data conveyed by the soldier according to the current situation and make changes in the operations plan. So by installing this system for guarding the soldiers life with low cost and high reliability. From this journal we had a brief study about GPS module and its interface with Arduino module.

III. EXISTING SYSTEM

Currently soldier's health is detected by the equipment attached to its body which keeps a track of its heartbeat only. These devices used to provide information regarding the speed, distance height as well as during the peer wars. These systems aren't integrated with high tech software, which provide real time updates of the soldiers. Extension of these systems is that the device attached to the body (generally on the shoulders) comes with some specific sensors which alert the soldier during the emergencies.

IV. PROPOSED SYSTEM

The soldier monitoring and location tracing system allows military to follow a soldier's current GPS position as well as check on his/her status, such as movement and heartbeats. Soldiers' unit and control unit are the two sections of the proposed system. Sensor networks for health and environmental monitoring, GPS module for tracking location. The global positioning system modem provides the precis location or accurate co-ordinates of the soldiers together with the link pattern, allowing the military to follow soldier's present location. The technology is extremely useful for gathering information about a soldier's condition and offering immediate assistance. Not only does the planned technology monitor soldier's health, but also keeps track of them. The control room can obtain information about the soldier's position and direction and guide them as per their planning.

V. ARCHITECTURE
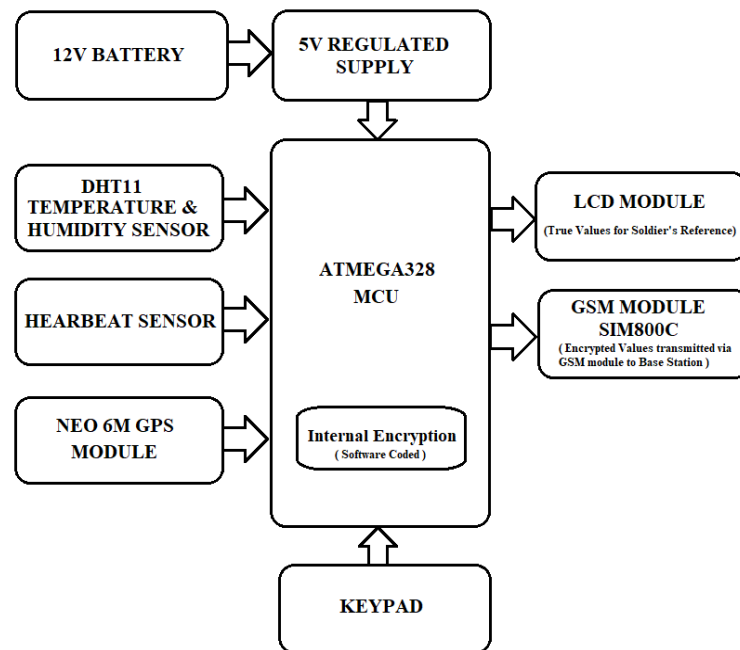
☐Arduino UNO MCU

The Arduino Uno has ample amount of digital IO ports which makes it suitable for designing of required embedded system.

☐ **Heartbeat Sensor**

☐ The project has the Heart Rate Monitor System, which is controlled or operated by Arduino, which include the Heartbeat Sensor.

☐ This project can be used as an inexpensive alternative to Smart Watches and other expensive Heart Rate Monitors.

☐ **Global System for Mobile (GSM)(SIM900A)**

☐ Global System Mobile is used by soldier to initiate the voice call as per their need or vice – versa to receive the call and has the additional feature of sending or receiving SMS messages. This system helps to send data to Base Station.

☐ **LCD 16*2**

☐ Data Collected by the sensors is Displayed on the LCD through Arduino. This display board is used for acknowledgement purpose.

☐ **DTH 11 Sensor**

☐ In our project DTH 11 acts as a temperature and humidity sensor. The sensor has the highly negative temperature co-efficient to measure the temperature and microcontroller is used to display the measured value of temperature and humidity sensor by the DTH 11 sensor and the output is given in the form of serial data.

☐ **Global Positioning System (GPS) (Neo 6M GPS module)**

☐Global positioning system provide the precise location of the soldier in the form of longitude and latitude via wireless communication, helping base camp with positional awareness of the soldier.

VI. CIRCUIT DESIGN
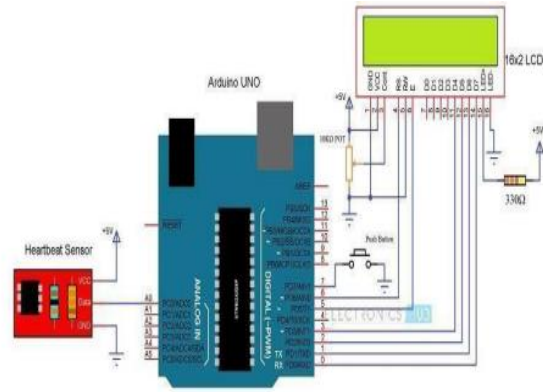
Heartbeat sensors include sensors and control circuit and the sensor in heartbeat sensor has IR led. Photo diode place in a clip. Op-amp IC is used for interconnecting the signal to a micro controller. Circuit shows the fingerprint heartbeat sensor, which work by detecting pluses. Blood in the finger is check by using heartbeat sensor and the light from IR led passing through the finger. The photo diode output is given to the non-inverting input of the first op amp using a capacitor, it will block the DC components of the system and the first op-amp acts as non-inverting amplifier and the output of first op-amp is given as one of the input to the second op-amp and the signal is given to microcontroller. We use DTH 11 temperature and humidity sensor. Thus, led is connected to transmitter it will blink when the pulse is detected.

The communication between the proposed system and the base station is encrypted. It is a basic level of encryption that transmits jumbled values over the GSM network. Base Station deciphers the received message with a preset Keyword. The actual values such as Temperature, Humidity, Heart Rate are displayed on the LCD module for the Soldier's Reference. Within the code, functions like magic numbers and Keyword Ciphering is used for encryption purposes. Although the GSM network offers its level of own encryption on their transmissions, an additional ciphering ensures that even if a third party were to encounter the message, it would be more difficult for them to decipher it without the keyword.

VII. RESULT AND CONCLUSION

The LCD shows the actual values of the Soldier, i.e., his/her Pulse rate, temperature and humidity. But the SMS received by the information would have ciphered values and not the original one. These values are reverse engineered with the same key used for the encryption.

VIII. CONCLUSION

In our project we have used real time smart monitoring system as it is very handy and easy to carry which is also light weighted system, the system also allows the base station to keep the constant tracking of the soldier and identify them. The system helps to locate soldier's position and soldiers blood pressure and heart rate condition continuously. The base station continuously collects each soldier's health condition data and analyzes that information and provide necessary support to plan the strategies. The received information is encrypted and therefore even if it is intercepted by a third party, it cannot be decrypted without a key.

IX. FUTURE SCOPE

This project is a proof of concept. With further Research and Development this system can be improved in many ways from top to bottom. Better microprocessors, state of the art technology can be implemented in making a reliable, military grade equipment. Similarly, the proposed system can also be implemented in civilian applications such as a tracking system for trekkers and hikers. Furthermore, additional sensors as blood toxicity level sensor, oximeter can be implemented as well for a better monitoring of the individual's health.

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