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Solider Health And Position Tracking System

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ABSTRACT: Soldiers are the main reasons for the country's safety. They play major role in protecting the country. So, we wanted to create a project which is useful to the soldiers and military operations which will play major role in defending soldier's life in tough situations in the battlefields. This project will track the soldier's health status such as Heartbeat and it will also track the soldier's Live location so that the military base station will always monitor the places that the soldier is present. If the soldier is not responding to military base station then the military base station will know where the soldier is and what his health situation is.

KEYWORDS: Sensors, LCD, GSM, GPS, ARDUINO.

1.INTRODUCTION

This project is about the tracking the soldiers real time health status and real time location. This project includes the hardware components such as Arduino UNO board, GSM module, GPS module, Panic button, Temperature sensor and Heartbeat sensor. We are going to integrate all these Components with Arduino UNO. These components are of their latest versions and more efficient than their previous versions. The GSM module we used in this project is SIM900A which supports 4G SIM as we know that the previous version of GSM module (SIM800L) only supports 2G SIM. And the Arduino UNO Rev3 version is used.

A. System development

The Project will contain two units

1. Soldier unit
2. Base unit

1.1. Soldier unit: The soldier unit is fixed or attached to soldier's body. This soldier's unit is less than 1KG.The soldier's unit contains LCD display, Temperature sensor, Heart beat sensor, Panic Button, GSM module, GPS module.

2.1 Base Unit: The military base contains the base unit which contains the Base unit. The base unit contains a mobile phone or PC which will show the soldiers live health status and live location. The base unit can use a command called "LOCAL" to get the location and health status of the soldier without the soldier's permission.

NOTE: The soldier's unit will only receive the commands from a mobile number which is programmed in the Arduino Programing Software.

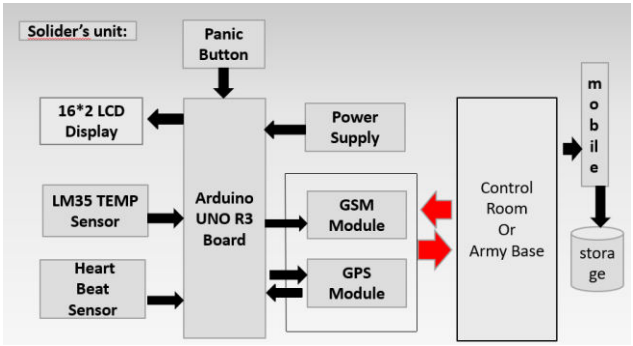

Fig. 1. Block Diagram

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B. LCD Display(16*2)

The LCD display is used to display the output from the hardware components. LCD display contains 16 pins VSS, VCC, VEE, RS, R/W, E, DBO, DB1 – DB7. For Example we used this LCD display for our project to show the output of Health status and Live location and also this LCD are used for so many previous projects.

C. Temperature Sensor(LM35)

The temperature sensor is mostly used to detect the temperature of body. It contains three pins GND, VCC, DATA. Generally, temperature sensor will detect from the range of -55 degrees to 150 degrees. We use LM35 version of temperature Sensor for this project which is efficient.

D. Heart Beat Sensor

Heartbeat sensor is used to track the pulse per minute. we used this Heartbeat sensor in order to monitor the soldier real time heartbeat so that the base station will provide the necessary medical help to the soldier location.

E. Panic Button

Panic Button is used to operate multiple options at one time. In this project If the soldier presses the panic button then automatically the health status and live location at that time of pressing the panic button will be sent to the Base station.

F. Arduino Uno R3 Board

The Arduino UNO R3 board mainly works upon the ATmega328p Microcontroller and also it has 328 kb of Flash memory. It also has 2kb of SRAM which is used to store the data. The EEPROM is used to store the nonvolatile data.

We can connect the power supply of Arduino UNO board by two types Either with USB interfacing or Either with External power supply The input voltage must be in the range between 7-12 DC Voltage.

It also have 14 digital input and output pins. They are numbered from 0-13. All of these pins can provide up to 5V DC output voltage and also can give or lost up to 40mA of current.

Features:

1. Microcontroller: ATmega328.
2. Operating Voltage: 5V.
3. Input Voltage (recommended): 7-12V.
4. Input Voltage (limits): 6-20V.
5. Digital I/O Pins: 14 (of which 6 provide PWM output)
6. Analog Input Pins: 6.
7. DC Current per I/O Pin: 40 mA.
8. DC Current for 3.3V Pin: 50 mA.

G. Power Supply

Power supply units (PSUs) are essential components that convert alternating high voltage current (AC) from the mains power grid into direct current (DC) suitable for powering electronic devices, including modern computing components. In addition to converting AC to DC, PSUs also regulate the output voltage to precise tolerances required for reliable operation of sensitive electronic components.

H. GPS Module(NEO-6M).

Global Positioning System (GPS) is used to track the current live location of the user or it is also used to navigate the destinations. It provides information in the format of Longitudes and Latitudes. The NEO 6M Module is used in this project because it is cost and work efficient.

I. GSM MODULE(SIM 900A).

SIM900A GSM Module is the smallest and cheapest module for GPRS/GSM communication. It is common with Arduino and microcontroller in most of embedded application. The module offers GPRS/GSM technology for communication with the uses of a mobile sim. It uses a 900 and 1800MHz frequency band and allows users to receive/send mobile calls and SMS. The keypad and display interface allow the developers to make the customize application with it. Furthermore, it also has modes, command mode and data mode. In every country the GPRS/GSM

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and different protocols/frequencies to operate. Command mode helps the developers to change the default setting according to their requirements.

J Operation of System.

The central hub of this circuit is the Arduino UNO Board, which serves as the brain that controls and coordinates the various components. Working in harmony with the LM35 temperature sensor, GSM module, GPS module, LCD display, and other discrete components, the Arduino UNO Board plays a crucial role in ensuring seamless communication and efficient operation of the circuit. By leveraging the power of the Arduino UNO Board, this circuit is able to perform a wide range of tasks and functions, making it a versatile and powerful solution for diverse applications.

Pins Of Arduino UNO R3:

Vin: This is the input voltage pin of the Arduino UNO R3 board Which is used to provide input supply mainly from an external power source or USB interfacing.
5V: This 5V pin is used to provide the power supply to the board and all the components.
3.3V: This is used to provide a supply of 3.3V and it is is generated from a voltage regulator on the board.
GND: This is a ground pin.
Reset: This pin is used to reset the microcontroller which is Arduini UNO R3 board.
Analog Pins: The pins from A0 to A5 are used in the form of analog input and it is between the range of 0-5V.
Digital Pins: The pins from 0 to 13 are used as a digital input or digital output for the sake of Arduino board.
Serial Pins: These pins are known as a UART pins. These pins are used for communication between the Arduino board and a computer or Arduino board and other devices.
External Interrupt Pins: This pin of the Arduino board is used to produce the External interrupt and it is done by pin numbers 2 and 3.
PWM Pins: This pin of the board is used to convert the digital signal into an analog by varying the width of the Pulse. The pin numbers 3,5,6,9,10 and 11 are used as a PWM pin.
SPI Pins: This is the Serial Peripheral Interface pin; it is used to maintain SPI communication with the help of the SPI library. SPI pins include:

1. SS: Pin number 10 is used as a Slave Select
2. MOSI: Pin number 11 is used as a Master Out Slave In
3. MISO: Pin number 12 is used as a Master In Slave Out
4. SCK: Pin number 13 is used as a Serial Clock

LED Pin: The board has an inbuilt LED using digital pin-13. The LED glows only when the digital pin becomes high.
AREF Pin: This is an analog reference pin of the Arduino board. It is used to provide a reference voltage from an external power supply.

Arduino UNO works according to the program written on to it. The program is written in the form of Embedded C language. The main working principle of the Arduino UNO in our project is to collect all the required information from body temperature sensor LM35, GPS module, and to send all this data to the base station using GSM module (SIM900L). The LM35 is a well-known efficient temperature sensor that senses the body temperature and converts it into typical voltage. This voltage is given to an analog to digital converter (ADC) of the microcontroller which converts the analog value in its input to a digital value ranging from 0 to 255.

Temperature sensor measure the Body temperature. This helps to know the temperature variation. And this information is transmitted to Arduino UNO and then to base station with using GSM. 37 Heart beat sensor used in this project is Easy Pulse v1.1. In transmission mode brightness is radiated towards the skin and sensor is sited on the other side of the skin to compute the light fallen on light sensor. InfraRed LED and a light detector are mapped on two opposite sides and are in front of one another. When a tip of a finger is placed into the sensor, it is lightened by the Infrared light emitted from the LED. The light sensor diode accepts the light passed through the skin on other side. Intensity of transmitted light depends on the amount of blood volume in the tissue. A graph for this change against time is mentioned to be a **photoplethysmography** or PPG signal.

The PPG signal recognized to overall blood volume of the inspected skin, and AC component is identical to heart beat. The AC component of the signal, which carries important information and has a much smaller amplitude compared to the DC component, is boosted in strength and filtered. The resulting AC signal is then transformed into a robust pulse

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train. This pulse train is transmitted to the microcontroller via the second pin, where it can be processed further. Where microcontroller calculates heartbeat display in on the Mobile Phone at the **BASE STATION**.

Fig 2. Text SMS Format

K.Software Used.

Arduino UNO Programming code in Embedded C Language.

L. Conclusion.

The design was way more effective than we originally thought off at the start of our project. We tried following ethics in designing and implementation of the project. We won't claim that our circuit had 100% efficiency, as it did show some variance that we minimized to some extent. The good thing, we noted that there is a lot of possibility to make enhancements in this project. Our system is for one soldier. The communication between soldiers to soldier can be established. This system gives strength to the defense system of our country. So, we can accomplish that these types of strategies are very supportive for certifying security of the soldiers.

M. Future Scope.

The good thing, we noted that there is a lot of possibility to make enhancements in this project. Our system is for one soldier. The communication between soldier to soldier can be established. The betterment of base station unit can also be done by making proper GUI at base station PC and officials at base station can also send feedback or any order to soldiers via base unit.

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