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REAL-TIME WIRELESS EMBEDDED ELECTRONICS FOR SOLDIER SECURITY

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ABSTRACT

Any nation's security system cannot function without its soldiers. Many soldiers are lost while others are injured during military actions. Because troops are our nation's saviors, defending us against terrorist attacks, enemy attacks, and other dubious acts that could endanger both our nation and ourselves, their health is of utmost importance. This initiative makes it possible to locate and keep an eye on the health of soldiers who get hurt or lost on the battlefield. The military's time, search, and rescue operations are reduced as a result. With the use of GPS modules and wireless body area sensor networks (WBASNs), which include sensors for temperature, heartbeat, and other parameters, this technology allows the army base station to follow the whereabouts and health of soldiers. A GSM module is used to transmit the data that sensors and GPS receivers receive. Additionally, a soldier within wireless transmission and receiving range can interact with another soldier and request assistance from the control room.

Keywords: Global Positioning System (GPS), Wireless Body Area Sensor Network (WBASN), Temperature Sensor,HeartbeatSensor,GlobalSystemForMobileCommunication(GSM),Transmission&Reception.

I. INTRODUCTION

A portable, wireless low-cost tracking system with high reliability is the need of the hour for the protection of the valuable life of the soldiers on the battlefields. The army suffers a lot due to the unavailability ofinformation on injuries to its personnel which may increase the death/ permanent disability toll. The armed forces, when deployed on the battlefield, need to be monitored for the utilization of soldiers. It is observed that the causalities are caused due to injuries rather than direct assaults on the battlefield. These numbers can be minimized if real-timeinformation is available inthecontrol roomabout thehealth andlocation ofthesoldiers. The transmission of these parameters to the control room is carried out by using GPS. In the last decades, technologies such as cable-based systems RF transceivers, walkie-talkies, ZigBee, and GSM-based tracking systems were the most dominantly used methodologies for the tracking of soldier's life on the battlefield. Pulse rate and body temperature in an environment can be monitored along with the location tracking of the

soldiers using GPS can be monitored using the proposed system. However, all these technologies suffered from one or more reasons like high installation cost, loss of signal, high noise as well as bulky nature. Knowledge of the current location of soldiers, the inability to continuous communication with the control room during the operations,lackofimmediatemedicalattention,and operationsunderdifferentgeographicalconditionsarethe few prominent safety issues. Indian armed forces are the third largest standing army in the world with 1,200,255 active troops and 990,960 reserve troops. Rather than reporting on the status of their health and current location which may sometimes be wrong due to human error, a device attached with sensors can be used to get precise results.

The goal is to develop low-cost, low-power, reliable, non-intrusive, and non-invasive signs of health status. To track the location of the soldier i.e., longitudes and latitudes. The methodology adopted for this project is to use non-invasive sensors to measure heart rate and body temperature. Signal conditioning circuits are designed to filter and amplify signals to provide thedesired output. All thecomponents used inthecircuit are low-powered and cheap. The acquired data is real-time and is sent through ADC and into the Microcontroller.

II. LITERATURE SURVEY

- JL Prasanna et al., (2022). In this paper, with the help of the Internet of Things (IoT) and GPS, tracking and monitoring the health conditions of soldiers can be done by using live track applications. The proposed device, which makes use of GPS for tracking the fitness of squaddies and their cutting-edge position, may be located at the soldier's body. This data will be sent to the control room based on the live track program. The proposed system is made up of small physiological devices, sensors, and transmitting modules that can be worn on the body.
- A Sharma et al., (2022). In this paper, the authors used various wearable bio-sensors, control units comprising distributed communicationsystems, and human-friendly user interfaces. TheGPS module performs searches and rescues soldiers in minimum real-time expansion. In case of an emergency, the system will produce an alarm so that necessary actions can be taken.
- S Usharani et al., (2022). This research implies a computational intelligence system that can understand both individual events and the modifications amongst awesome accomplishments of brief duration and the squat quantity for clinical applications. In this research, an autoencoder for accumulating attributes for categories acquired through detectors. The LTSM system is then used to collect further substantial extended- period relationships among datasets to enhance data analysis accuracy further.
- L Thakre et al., (2022). In this paper, they used biosensors to monitor health, and a GPS is used to track a soldier's location, adding a GSM modem which makes the system compatible with wireless.
- K Teja et al., (2021). In this paper, a wireless body area network (WBAN) is created by treating each soldier asanodeandeachnodeiscomposedofvarioussensorstrackingthecircumstanceof that specificsoldierwhich can be incorporated inner a uniform or a bulletproof jacket. The attributes tracked by the system are motion and physiological health of the soldier and the

environment. After gaining knowledge of these attributes, the control room can take decisions accordingly and create an effective battle strategy.

III. PROPOSEDSYSTEM

In This Proposed System, the soldier Health and Position Tracking System allows the military to track the current GPS position of a soldier and also checks the health status including body temperature and heartbeatsof the soldier.

The System also consists of extra features with the help that a soldier can ask for help manually or send a distress signal to the military if he is in need. The GPS modem sends the latitude and longitude position with a link pattern with the help that the military can track the current position of the soldier.

The system is very helpful for getting the health status information of soldiers and providing them instant help here we are using an Arduino UNO microcontroller and GSM module for Sending messages on Healthconditions and the location of the Soldier to the military.

BLOCKDIAGRAM

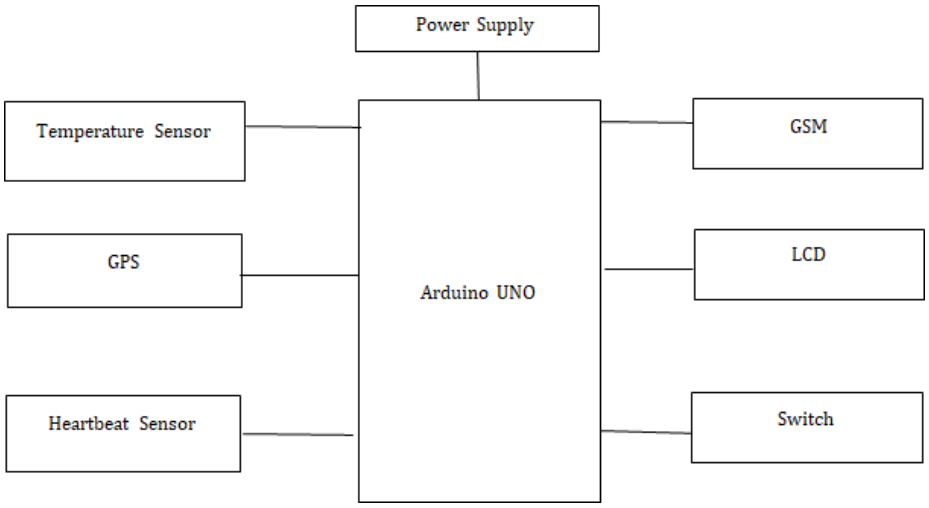

Figure1: BlockDiagramofProposedSystem

IV. HARDWAREREQUIREMENTS

1. ARDUINOUNO

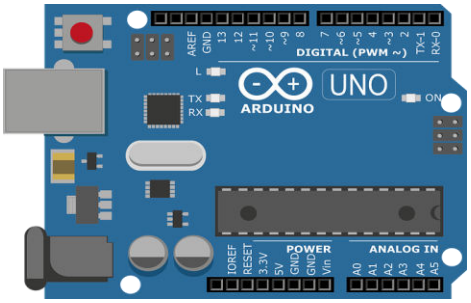

Figure2: Arduino UNO

The Arduino microcontroller is an easy-to-use but effective single-board laptop that has received extensive traction withinside the interest and expert market. The Arduino is open-source, which means the hardware is reasonably priced and the development software is free. The Arduino programming language is a simplified version of C/C++.

2. GSM

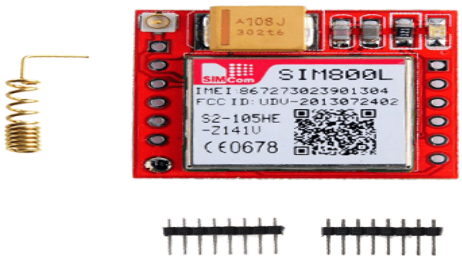

Figure3:GSMModule

GSM is a mobile communication modem; it stands for global system for mobile communication (GSM). GSM system was developed as a digital system using the time division multiple access (TDMA) techniques for communication purposes. A GSM digitizes and decreases the data, then sends it down via a channel with particular streams of consumer data, every in its particular time slot.

3. GPS(GlobalPositioningSystem)

Figure4:GPSModule

Global Positioning System (GPS) is a satellite-based system that uses satellites and ground stations to measure and compute its position on Earth. GPS is also known as Navigation System with Time and Ranging (NAVSTAR) GPS. The GPS receiver needs to receive data from at least 4 satellites for accuracy purposes. GPS receiver does now no longer transmit any records to the satellites.

4. BUZZER(SWITCH)

A Push Button switch is a type of switch that consists of a simple electric mechanism or air switch mechanismto turn something on or off. The button itself is usually constructed of a strong durable material such as metalor plastic. Push Button Switches come in a range of shapes and sizes.

5. POWERSUPPLY(BATTERY)

A power supply is a component that provides at least one electrical charge with power. It normally convertsone kind of electric energy to another however, it could also convert a distinct Energy shape into electricenergy, which includes solar, mechanical, or chemical.

6. TEMPERATURESENSOR(DS18B20)

Figure5: TemperatureSensor

The DS18B20 is oneform of temperaturesensorand it resources 9-bitto 12-bit readings oftemperature.These values display the temperature of a specific device. The conversation of this sensor may be executed via a one- cord bus protocol which makes use of one statistics line to speak with an internal microprocessor.

7. HEARTBEATSENSOR

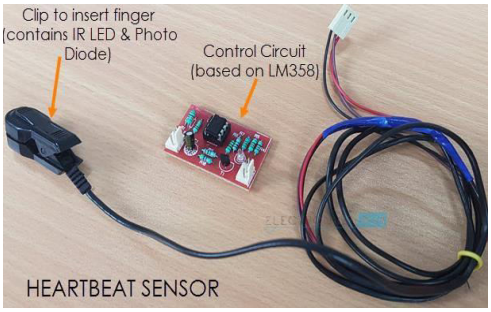

Figure6: HeartbeatSensor

Heartbeat Sensor is an electronic device that is used to measure the heart rate i.e., the speed of the heartbeat. The heartbeat is measured in beats per minute or bpm, which indicates the number of times the heart is contracting or expanding in a minute.

8. LCD(LIQUIDCRYSTALDISPLAY)

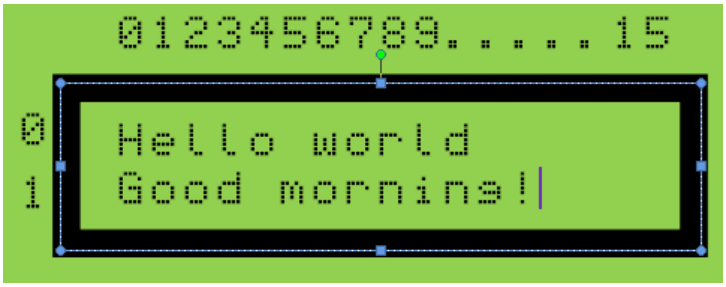

Figure7:LCD

LCD (Liquid Crystal Display) display screen is a digital show module and discovers a huge variety ofapplications A 16x2 LCD is an essential Module normally utilized in numerous gadgets and circuits. These modules aredesired oversevensegmentsand different multi-section LEDs.A16x2 LCDmeans itcandisplay16 characters per line and there are two Such lines.

V. SOFTWAREREQUIREMENTS

ArduinoIDE

Arduino IDE which IDE stands for Integrated Development Environment – Is a reputable software program delivered via way of means of Arduino. Cc is mainly used for writing, compiling, and uploading the code in the Arduino Device.

- Arduino IDE is an open-supply software program this is especially used for writing and compiling code into the Arduino Module.
- It is a reliable Arduino software, making code compilation too smooth that even a common person with no prior technical knowledge can get their feet wet with the learning process.
- It is easily available for operating systems like MAC, Windows, and Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role in debugging, editing, and compiling the code in the environment.
- A variety of Arduino modules to be had together with Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro, and plenty more.
- Each of them contains a microcontroller on the board that is programmed and accepts the information inthe form of code.
- The foremost code, additionally referred to as a sketch, created at the IDE platform will in the long run generate a Hex File which is then transferred and uploaded to the controller on the board.

- The IDE environment mainly contains two basic parts: Editor and Compiler where the former is used for writing the specified code and later is used for compiling and importing the code into the given Arduino. These surroundings help both C and C++ languages.

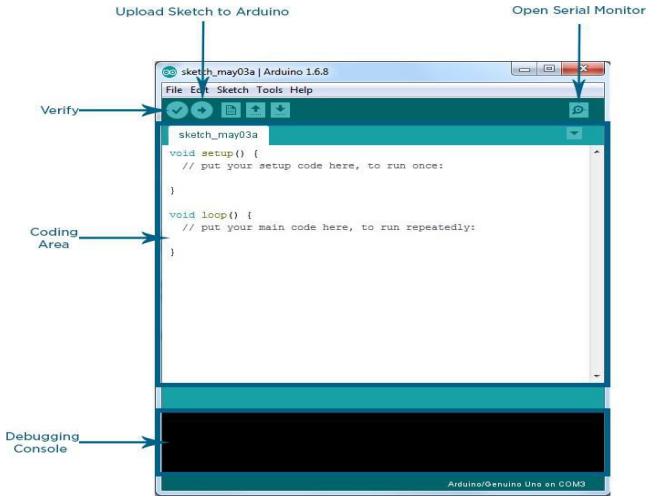

Figure8: ArduinoIDE Software

VI. RESULTS

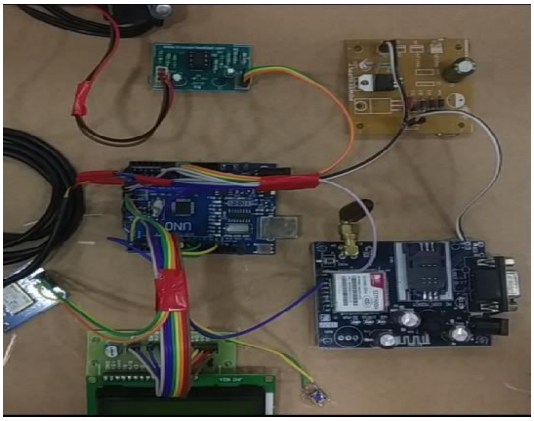

Fig9

The system is completely integrated and can track the location of soldiers from anywhere on the earth using a GPS receiver. This system helps to monitor the health parameters like the heartbeat, and body temperature of soldiers using a heartbeat sensor and a temperature sensor. This system helps the soldier to get help from the army base station and/or from another fellow soldier in a panic situation. It also helps to locate the soldier's position with a GPS module and transfer the location to a base station using a GSM module. It also provides a push button which helps to transfer the location of the soldier.

VII. CONCLUSION

From the above-proposed system, we will finish that we will ship statistics this is sensed from far off infantrymen to the navy manage room the use of GSM. The system is completely integrated and can track the location of soldiers at any time from anywhere on the earth using a GPS receiver. This system helps to monitor the health parameters of soldiers using a heartbeat sensor to measure heartbeats and a temperature sensor to measure the body temperature of soldiers. This system helps the soldier to get help from the army

base station and/or from another fellow soldier in a panic situation. This system presents the place facts and fitness parameters of squaddies in real-time to the military manipulation room. This system is very useful to military forces during the war as it can be used on the battlefield without any network restrictions. Thus, this system provides security and safety to our soldiers.

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