International Journal of Applied Engineering Research

Real Time Soldier Security by WirelessEmbedded Electronics

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ABSTRACT

In the modern day, any state's security policy must take enemy threat into consideration. Soldiers in the military play a significant and essential part in this perspective. There are various factors to take into account when it comes to those troops' security. Therefore, a variety of tools or devices are attached to troops for security reasons in order to monitor their health and ammunition. In order to provide low-cost wearable solutions for health monitoring, health-related sensors such as pulse rate sensors, body temperature measuring sensors, transmission and processing capabilities, can be used GPS essentially uses latitude and longitude to pinpoint a soldier's precise location. In order to communicate information regarding situational awareness, tactical orders, and covert surveillance-related data during special operations reconnaissance and other missions, a GSM module may be employed. Consequently, we are attempting to develop a fundamental lifeguard system for soldiers that is low-cost and highly reliable by applying these tools.

Key Words: Arduino UNO, GPS Modem, GSM SIM900A, LCD Display, MAX30102 Sensor, Adapter.

I. INTRODUCTION

Death is a soldier's constant adversary. He never shies away from responsibility. He engages in combat in the most dangerous environments, such as forests, plains, and mountains. The protection of the country is his first duty. In protecting the frontiers of his tiny nation, the soldier has a specific responsibility. He gives all up for the country. We must support our armed forces. In order to reveal the soldiers' health status and provide them with emergency medical care on the battlefield, we are launching this effort, which will be very helpful.

In our approach, we mainly monitor the soldier's heart rate and body temperature to assess his condition. If a soldier is wounded and unconscious due to a bullet or for any other reason

The GPS tracker will indicate the soldier's present location, which will help in finding the soldier and getting medical treatment to him or her as soon as feasible. The GSM modem built into the device will send an SMS to the base station or neighboring hospitals if a soldier needs medical attention. The goal of this project is to develop accurate, non-intrusive, non-invasive, low cost, and low power health condition indicators. To ascertain the location of the soldier, including longitude and latitude.

II. LITERATURE SURVEY

Numerous academicians and researchers have reported making numerous attempts to trace the whereabouts of the soldiers on the battlefield as well as their state of health. An analysis of wearable sensor-based health monitoring and the system known as Prognosis was created and designed using wearable biosensors for health monitoring. These systems enable low-cost wearable inconspicuous solutions for continuous all-day and anywhere health and activity status monitoring by being able to incorporate several kinds of tiny physiological sensors, transmission modules, and processing capabilities. To track the patient's body temperature, respiration,

Movements, and heartbeat, a Raspberry Pi-based method was suggested. The IoT was then used to add the obtained data to the cloud-based websites.

A system created by Niket Patil and Brijesh Iyer uses the Internet of Things to track soldiers' positions and keep tabs on their health. The communication between the client side and server side has not been specified because Arduino is connection-oriented, i.e., it comes with a USB port. R. Shaikh et al. have suggested a real-time, ARM processor based method for monitoring and gathering patient temperature, heartbeat, and ECG data. ZigBee and GSM wireless technology were used to give clinicians up-to-date information on patients so they could act immediately. Wireless body area sensor networks (WBASNs) powered by ZigBee are used to continuously monitor people's whereabouts and health.

III EXISTING METHOD

A biosensor data acquisition unit, a tracking module, a user interface module, and a wireless module for data transmission and reception make up the existing system's several subsystems on the soldier's end. Two subsystems make up the command centre: a wireless module and a Lab VIEW-based GUI interface forinterfacing with soldiers. It is made up of two units: the "Server unit" and the "Solider unit". Our project uses wireless technology (Zigbee) for communication.

To control the operations, we are utilising a programmable IC (PIC16F877A) with 368 bytes of RAM memory and 8 kilobytes of ROM that is of the Flash kind. The Solider Unit (moving unit) is connected to GPS, and it transmits the server unit's location on the battlefield through a Zigbee transmitter. The server unit's receiver picks up the signal and determines the location. To determine if a soldier is alive or dead, a heartbeat sensor and a temperature sensor are attached to the soldier unit. The server unit then receives the information. Soldiers can request assistance from the server in an emergency by using the unit's keypad interface. to avoid body parts becoming inactive owing to severe snowfall, such as the finger, heart, leg, and hand. The status is displayed on the LCD. Lab VIEW is used to monitor the server unit (PC). The system's status is displayed on the LCD screen.

DISADVANTAGES OF EXISTING SYSTEM

- The owner must understand the system in order to use devices that are ZigBee compliant.
- It is not as secure as a system based on WiFi.
- When a fault arises in a home appliance that complies with ZigBee, replacement costs will be considerable.
- The area covered is little.

IV. PROPOSED METHOD

After taking into account the afore mentioned technologies, the army personnel are better equipped to organize theirbattle strategies thanks to the tracking of soldiers and navigation from soldier to soldier, as well as knowledge of their health status throughout the conflict. Soldier's base station receives their GPS location. By using gsm, the base station may access the soldier's current status as it is shown on the phone and take the necessary action.

V COMPONENTS REQUIRED

1. ARDUINO UNO: The Arduino Uno is an open-source microcontroller board built around the Microchip ATmega328P processor. A variety of extension sheets (safeguards) and circuits can be connected to the board's automatic and basic information/output (I/O) sticks in groups. The board has 6 basic I/O sticks, 14 computerised I/O

pins, six of which are configured for PWM output, and is programmable through a type B USB connection using the Arduino IDE (Integrated Development Environment). It usually receives energy from a USB port or an external 9-volt battery, but it can also work with voltages of 7 to 20 volts.

Figure 1: Arduino Uno

1. GPS Modem

In all conditions, at all times, and wherever on or near the Earth where there is an unhindered line of sight to four or more GPS satellites, the Global Positioning System (GPS), a space-based global navigation satellite system, can deliver accurate location and time information.

Figure 2: GPS module

2. GSM Module

GSM, often known as the global system for mobile communications, is the most widely used cell phone technology available today. Mobile devices join the GSM network of a cell phone service provider by searching for nearby cell towers. The base system and breakout board of the SIM900 Quad-band/SIM900A Dual-band GSM/GPRS module are collectively referred to as the GSM module. You can talk to controllers using AT commands (GSM 07.07, 07.05 and SIMCOM enhanced AT Commands). This module can power on and perform a software reset. It has a quad-band 850/900/1800/1900 MHz and a dual-band 900/1900 MHz It is managed by AT commands and only consumes 1.5mA of electricity (sleep mode).

Figure 3: GSM module

3. LCD Display

The operation of flat panel displays of the LCD (Liquid Crystal Display) kind primarily makes use of liquid crystals. Because they are often used in phones, televisions, computers, and instrument panels, LEDs have many applications for both consumers and enterprises.

Figure 4: LCD

4. MAX30102 Sensor

The MAX30102 is a body temperature and heart rate monitor module that is incorporated. It includes built-in photo detectors, LEDs, optical parts, low-noise electronics, and ambient light rejection electronics. The MAX30102 provides a comprehensive system solution to streamline the design-in procedure for mobile and wearable devices.

The MAX30102's internal LEDs are driven by a separate 3.3V supply and are powered by a single 1.8V source.

The communication channel is often an I2C compliant interface. Since the module can be turned off using software and no standby current, the power rails can always be powered..

Figure 5: MAX30102 Sensor

5. Adapter

An adapter or adapter is a tool that converts features of a single electrical device or system into those of a compatible device or system. Some change the power or attributes of the signal, while others simply adapt to thephysical condition of one connector to another.

Figure 6: Adapter

VI BLOCK DIAGRAM

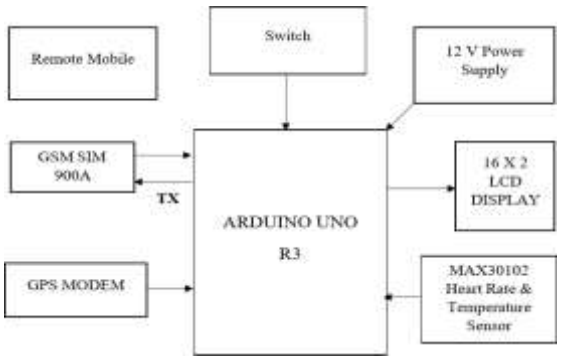

Figure 6: Block Diagram of Proposed System

VII ALGORITHM

Step 1: Collect all the Components (Arduino UNO, LCD, GSM, GPS Modem, MAX30102 Sensor, Buzzer,Button).

Step 2: Arrange all the Components Based on the Block Diagram.

A. GSM is Connected to Supply Pin, GND pin, Transmitter Pin in the Arduino board.

B. GPS is Connected to Supply Pin, GND Pin, Receiver Pin in the Arduino Board.

C. Button is Connected to Analog pin 3 in Arduino Board.

D. MAX30102 Sensor is Connected to Analog Pins(A4,A5), Supply Pin, GND Pin in the Arduino Board.

E. LCD is Connected to the Pins (7,6,5,4,3,2) in the Arduino Board.

F. Buzzer is Connected to the 13th pin in the Arduino Board.

Step 3: Now place the Adapter in the Switch Board and turn on Switch.

Step 4: Initialize the LCD Step 5: Place the Finger on the MAX30102 Sensor.

Step 6: Now we have to Observe the Heart Rate and Body Temperature on the LCD Display.

Step 7: Whenever Body Temperature goes Abnormal, then message will gets displayed on LCD as well as wewill get SMS alert to our Registered Mobile.

FLOW CHART

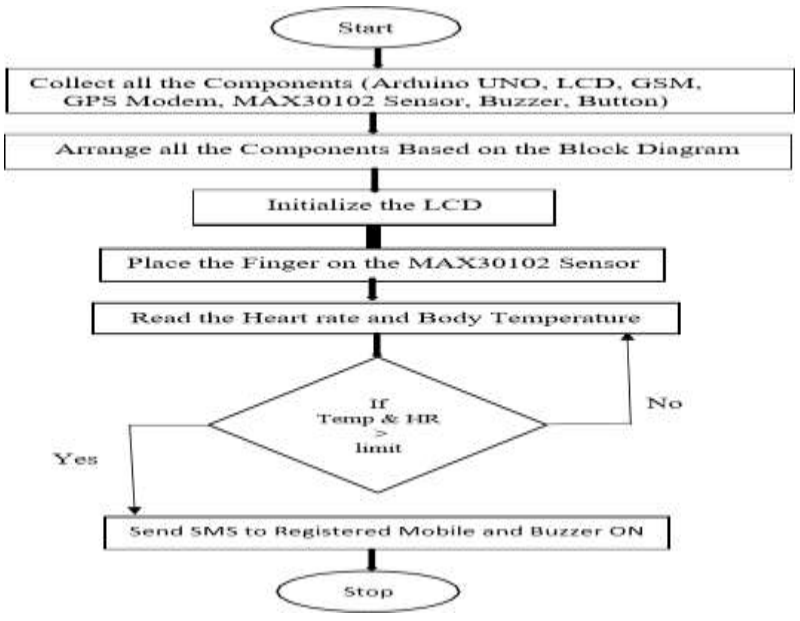

Figure 7: Flow Chart

Finding the injured soldier's precise location on the battlefield is the main goal of this research. This GSM-based military health and position tracking system returns the exact longitude and latitude of a soldier. The Arduino receives this information and uses it to communicate with a GSM modem. The Arduino utilises a GSM modem to send an SMS to the appropriate authority after gathering exact location data from the GPS. The data received by the Arduino will be displayed on the LCD screen before it is sent through GSM, which is connected to the Arduino. This concept will be highly beneficial to the army base station in tracking its men.

VIII RESULTS

In this project, the GPS will be used to ensure the security and safety of the soldier by tracking their whereabouts anywhere on the planet and monitoring their health parameters. Continual communication will be possible by GSM everywhere, allowing soldiers to contact their members whenever necessary. The idea of a tracking and navigation system is crucial and beneficial for soldiers because of how simple the circuit is and how little power it uses. Base station will obtain a real-time view of the soldier on the field when soldiers are engaged in combat.

Step 1: Connect the components as per the block diagram and check all the connections before giving the powersupply in order to avoid errors.

Figure 8: Interconnection of Components

Step 2: Give the power supply to the total circuit using adapter and any power source.

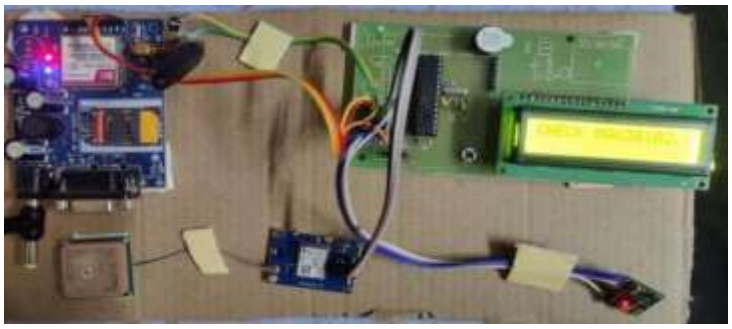

Figure 9: Turning on the power supply

Step 3: Initially it check's the MAX30102 Sensor

Figure 10: Initial Setup

Step 4: Place the Finger on the MAX30102 Sensor.

Figure 11: Placing Finger on MAX30102 Sensor

Step 5: Whenever you place the finger on the sensor it recognizes the bodytemperature as well as Heat rateand after that it display on the LCD.

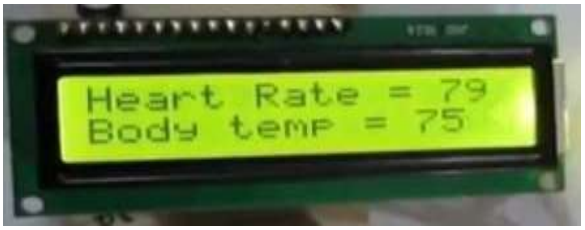

Figure 12: Displaying the Readings in Normal Condition

Step 6: When Ever you Place the Finger on the sensor. On that Body Temperature is

Abnormal then itSends Message to the registered numberAutomatically.

Figure 13: Alert Message Sending in Abnormal Condition

A message confirming the GSM and GPS settings is sent to the registered number. the body's parameters later (temperature and heartbeat). When the sensor's readings deviate from the predetermined threshold levels, a warning message with the soldier's exact location is sent to the base station.

Figure 14: Message Displayed in Registed Mobile

IX CONCLUSION

In the technology described above, GSM is employed to break down communication barriers between soldiers and b ase unit authorities, and GPS and wireless body area sensor networks (WBASNs) offer precise location and health in dicators, respectively. All information is transmitted via the GSM modem to the base station so that the field comma nder can respond appropriately.
We can employ improved GSM modules to place an emergency call and offer a real-
time solution for the problems that soldiers are having in the field of war if a soldier's health metrics go above a cert ain threshold or if their coordinates deviate from a predetermined course.

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