Automated Soldier Health Tracking and Monitoring System

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***Abstract*— The soldiery in the world is one of the hardworking and contributing tribes , although they with stand mear circumstances they believe in protecting the country. When they compete in the war the soldiers suffers with injuries and chronical conditions in health .This proposed paper work focuses on solider health monitoring in the war field . The tracking system which helps to track and monitor the soldier's health and location .This Automated Soldier Health tracking and monitoring system enables one to locate the soldier in the remote areas and would give an idea about the current health status of the soldier who is being injured in the location .When the soldier is injured the alert message would be sent to the base camp which would help in reaching out the soldier .**

***Index Terms*— Automated, Injuries ,Location , Soldier ,Tracking**

I. INTRODUCTION

The security of a nation, both internally and externally, is significantly influenced by its armed forces. Activities like patrolling, counter-insurgency operations, surgical strikes, and others achieve the same goal. Deploying a group of soldiers with a clear chain of command who follow the designated leader's instructions constitutes the mode of operation for these activities[1]. Every operation has a command base station that oversees the overall operations of numerous such troops and primarily keeps track of them through communication.

With RF devices like communication sets and intercom. Early information retrieval about the events taking place in the operation's area is important plays a significant role in making decisions and organizing follow-up actions. In actuality, a casualty is presumed when a soldier does not respond to a reporting device, such as a walkie-talkie or communication set, or does not show up to provide the situational report within the allotted time. This practice is out-of-date and dated.

The group leader typically divides the group into a small subgroup of soldiers before setting off on a patrol. The military suffers greatly from the lack of knowledge regarding personnel injuries, which may increase the number of fatalities and long-term disabilities. The cause of casualties has been acknowledged to be injuries rather than direct attacks on the battlefield. These figures can be decreased if the control room has access to real-time information about the soldier's condition and location. Soldier safety is a challenging problem. A few of the main safety concerns are the ability to know where soldiers are at all times, maintaining constant communication with the control room while conducting operations, not having access to immediate medical care, and conducting operations in various geographical locations.

II. LITURATURY SURVAY

The army suffers greatly from the lack of information on personnel injuries, which could raise the mortality and permanent disability toll. It has been noted that injuries rather than direct attacks on the battlefield are what lead to casualties. If the control room has access to real-time information on the soldier's condition and whereabouts, these numbers can be reduced. The safety of soldiers is a complicated subject. The ability to continuously communicate with the control room during operations, the lack of access to immediate medical care, and operations in various geographic locations are a few of the most important safety concerns. Over the past few decades, innovations in tracking technology using GSM and RF transceivers, walkie-talkies, and cable-based systems.

III. PROPOSED MODEL AND FLOWCHART

The block diagram in Fig. 1 was conceptualized using sensors to measure casualty counts, track physiological health, and identify the location. The other component of the system is the transmission section and processing circuitry.

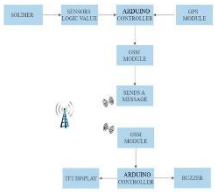


Fig.1 – design implementation and flow chart

The complete sensor and module configuration is completed in a soldier's jacket. When a soldier is near a border or on a battlefield, the jacket's technology activates. When a sensor output significantly changes or crosses a boundary condition, an Arduino trigger is delivered, and an SMS is sent through the use of GSM to the recipient in the transmitting end. When the signal is transmitted through the GSM1 from the transmitting position then GSM2 at the receiving end receives the message, displays it on the TFT screen, and generates a buzzing noise.

IV. COMPONENTS

The modules and sensors which are used in the Automatic soldier health tracking and monitoring system uses several hardware components that include

2.1Arduino MEGA

The ATmega2560 Microcontroller powers the Arduino Mega. The ATmega2560 is a microcontroller with 8 bits. To get started, we'll need a simple USB cable to connect to the computer and an alternating current to DC adapter or battery. The Arduino Mega is organised using the Arduino (IDE), which is available for a variety of platforms. IDE is an acronym for an integrated development environment. The Arduino Mega operates in the same way as other Arduino boards. It does not necessitate any additional components to function. The ATmega2560 Microcontroller is compatible with the majority of Arduino UNO shields.

2.2MLX90614 Contactless Temperature Sensor

The MLX90614 is a Contactless Infrared (IR) Digital Temperature Sensor that can be used in a variety of applications. Temperature measuring device with a temperature range of -70° C to 382.2° C. The Without any physical contact, the sensors detect the temperature of the object using infrared rays. The I2C protocol is used to communicate with the Arduino.

2.3 MAX30100 Pulse Oximeter Heart Rate Sensor

The MAX30100 pulse oximeter and heart rate sensor is a low-power, plug-and-play biometric sensor based on I2C. Students, hobbyists, engineers, manufacturers, and game and mobile developers who want to incorporate live heart-rate data into their projects can use it. Analog Devices' MAX30100 - a modern, integrated pulse oximeter and heart rate sensor IC - is used in the module. It detects pulse oximetry (SpO2) and heart rate (HR) signals by combining two LEDs, a photodetector, optimized optics, and low-noise analogue signal processing. The MAX30100 has two LEDs on the right, one RED and one infrared. On the left, there is a highly sensitive photodetector. The idea is to shine a single LED at a time, measuring the amount of light reflected back at the detector, and then You can measure blood oxygen level and heart rate based on the signature.

2.4. Push Switches

A push switch (button) is a momentary or non-latching switch that changes the state of an electrical circuit only when it is physically actuated. The buttons are typically made of plastic or metal, and the push button can be flat or ergonomically designed. There are numerous button switch models that are powered by either momentary or latching action

2.5 SIM800A GSM Module

The SIM800A Quad-Band GSM/GPRS Module with RS232 Interface is an LGA (Land grid array) solution that can be embedded in customer applications. SIM800A supports Quad-band 850/900/1800/1900 MHz and can transmit voice, SMS, and data information while consuming little power. Its small size allows it to fit into the slim and compact demands of custom design. Its inclusion of and Embedded AT enables total cost savings and a quick time-to-market for customer applications.The SIM800A modem includes a SIM800A GSM chip and an RS232 interface, allowing for simple connection to a computer or laptop via the USB to Serial connector or to a microcontroller via the RS232 to TTL converter. After connecting the SIM800A modem via the USB to RS232 connector, you must to locate the correct COM port in the USB to Serial Adapter's Device Manager. Then launch Putty or another terminal software and connect to that COM port at 9600 baud, which is the modem's default baud rate. Once a serial connection is established between your computer and your microcontroller, you can begin sending AT commands. When you send AT commands, such as "ATr," you should receive a response from the SIM800A modem that says "OK" or another response depending on the command.

2.6 Neo- 6M GPS Module

The Ublox Neo 6M GPS Module is a full GPS module based on the Ublox Neo 6M. This module makes use of the most recent Ublox technology to provide the most accurate positioning information. It also has an external GPS antenna and TTL UART connections. This module includes an onboard rechargeable lithium-ion battery, allowing it to hot start in most cases and obtain a GPS lock faster. The UBlox NEO 6M GPS Module Engine is excellent, with a high-precision binary output. Because of its high sensitivity, it is also suitable for indoor applications. The onboard battery also allows for EEPROM storage of configuration settings. The module has a UFL Connector for connecting to GPS. A cable is used to connect an antenna. It enables flexibility in GPS Module mounting, allowing the antenna to be positioned so that it always faces the sky for optimal performance. As a result, it is suitable for use with automobiles and other mobile GPS applications.

2.7 TFT Non-Touch Display

A TFT (thin-film transistor) display screen, which is an LCD with a transistor for each pixel and is frequently used in notebook and laptop computers, is a type of LCD (that is, for each of the tiny elements that control the illumination of your display). Because each pixel contains a transistor, the current that initiates pixel illumination can be reduced and thus switched on and off more quickly. TFT is another name for active-matrix display technology (as opposed to "passive matrix" display technology, which does not have a transistor at each pixel). A TFT or active-matrix display reacts faster to changes. A TFT display, for example, is fast enough to reflect mouse movement when you move it across the screen cursor.

2.8 Power Supply

The AC input voltage in mains-powered electronic systems must be converted into a DC voltage with the appropriate value and degree of stabilisation. The peak voltage across the load in these basic configurations is equal to the peak value of the AC voltage supplied by the transformer's secondary winding. The output ripple produced by these circuits is far too high for most applications. However, for some applications, such as driving small motors or lamps, they are adequate. The output voltage waveform is

significantly improved when a filter capacitor is added after the rectifier diodes. Sections b-c are straight lines. During this time, the load current is supplied by the filter capacitor. As the current increases, the slope of this line increases, bringing point Lower c. As a result, the diode conduction time (c-d) increases, resulting in increased ripple. With no load current, the DC output voltage is equal to the rectified AC voltage's peak value. The diagram shows how to get positive and negative outputs based on a common ground. They are especially useful for calculating the voltage ripple for a given load current and filter capacitor value. The obtained voltage ripple value is proportional to the load current and inversely proportional to the value of the filter capacitor. The performance of a power supply that is commonly used in consumer applications - specifically, audio amplifiers.

V. SIMULATION

The simulation fig 2 is the depict the proposed model with Arduino, GSM module, TFT display. Which is placed at the receiver end. The simulation fig 3 is the depict the proposed model with Arduino, GSM module, GPS module ,Temperature sensor and Pulse Oximeter Heart Rate Sensor . Which is placed at the Soldiers body.

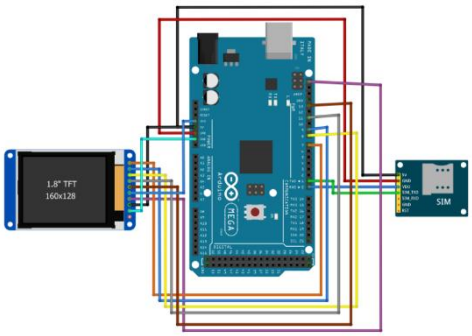
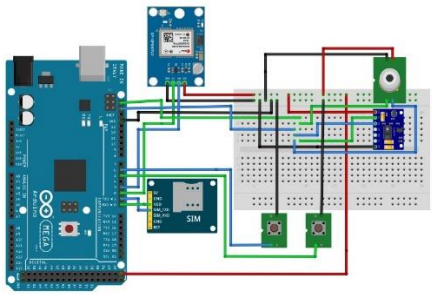


Figure 2



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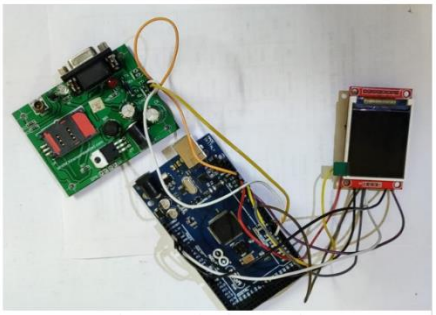

Figure 4

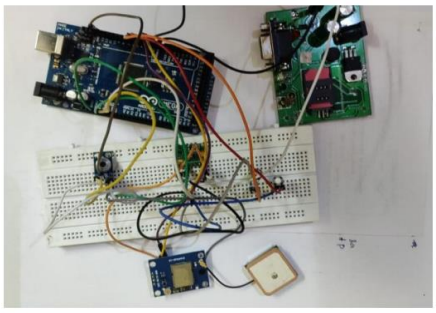

Figure 5

Figure 4 and 5 are implementation Circuit at Transmitter side, Circuit at receiver side. The base station can access the current status of the soldier which is displayed on the Screen and hence can take immediate action by sending help for the soldier or sending backup for threat ahead. Using various biomedical sensor health parameters of soldier's are observed, as well as surrounding atmosphere pressure, oxygen levels are observed.

VI. WORKING

This project's primary goal is to locate the exact position of a soldier who has been hurt in combat and a soldier who is alert to a threat at the border. This GSM-based military health and position tracking system returns the precise longitude and latitude of a soldier. The ARM Controller obtains precise position information from the GPS and uses a GSM modem to send an SMS to the relevant authority. Army is one of the most important aspects of any country.

It is our duty to equip soldier with better advanced technology. In this proposed system, we are monitoring the soldier's health parameters such as heart beat rate and body temperature continuously measured and transmitted wirelessly to the control room using GSM. . Here we are using voltage regulator circuit for power supply, Blood pressure & heartbeat sensor, temperature sensor, GSM, GPS, buzzer and TFT display these are also the hardware parts of this projects. By using temperature sensor, we can monitor the soldier's body temperature. With the help of heartbea t & blood pressure sensor we can read the heartbeat, temperature respectively. With the help of that exact location, the soldier's information was sent to the military base station.

Once we "ON" the heartbeat & B.P sensor it will wait for a response, then whatever heartbeat & B.P may read by sensor that will be displayed on LCD. As we can't read this continuously because the sensor may pressurize the hand of the patient so we are given the delay of 30sec.for demonstration purpose. The ARM Controller is attached to a TFT display, which crosses the received data before it is delivered via GSM. The army base station will find this idea very helpful in tracking its troops. The circuit is configured as We employed GPS to track the soldier's locations, temperature and heart rate sensors (MLX90614 and MAX30100), and GSM to enable communication between the soldier and law enforcement. The ARM Controller receives power first, and then the GPS and GSM modules are started.

The soldier's temperature (in degrees Celsius) and heartbeat (in beats per minute, or BPM), respectively, are measured by the sensors. The soldier's precise location is tracked by GPS, which uses a GSM module, and an alarm message is sent to the authorities

if the temperature (t) is over 40 and the heart rate (t) is not between 65 and 100. 38 Gloves and push switches are welcomed simultaneously, and each switch has a unique, pre-defined instruction. The soldier can press the designated key whenever there is a need based on a health issue, a threat to the soldier, or an attack on the border. Every time the key is pressed, an input is received by the ARM controller, which subsequently sends a message to the camp that combines an alarm message and the position of the soldier linked to the GSM module. Make the connections as shown in the circuit diagram above.
A Raspberry Pi is attached to a TFT display at the base (or) receiver, which scrolls the message and location of the soldier received through GSM module. A busser is attached to the Raspberry Pi at the receiver end, causing it to sound an alarm whenever an alert message is received. Make the connections as shown in the circuit diagram above.

VII. Result

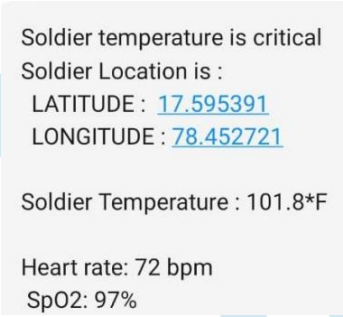

Figure 6 SMS at base

As we can see Fig.6 shows the body temperature exceeds the threshold levels detected by the sensors on the solder's jacket, we receive SMS at the receiver end.

VIII. Conclusion

We would conclude that A warning message is later sent to base station along with the location of the soldier since the regular frame parameters have changed. • The nearby soldier can then identify the actual affected soldier by utilizing a vibrator when the message is received from a room.

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