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Survey on Soldier Health Monitoring and Tracking System Using IoT

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ABSTRACT

In this project, the exact location and health status parameters of the soldier can be transmitted in real-time to the base station so that the appropriate actions can be taken in an emergency.The army rescue control unit's effort in search and rescue operations is reduced thanks to this technology. This system utilises a wireless body area sensor network and a GPS module to record all parameters in real-time and transmit them to the base station. GPS records latitude and longitude to make determining direction simple. In this case, the soldier's current level of health is assessed using the body temperature sensor and heart rate. Wearable technology is the project's most important component. The monitoring process is streamlined and accelerated by the IoT, allowing for quicker decision-making. We are trying to use this equipment to implement a basic lifeguarding system for a soldier that is both affordable and dependable.

Keywords: GPS, Arduino board, Heart Rate sensor, Temperature sensor

INTRODUCTION

The infantry soldier of the future is anticipated to be among the most technologically advanced modern combatants ever. numerous research initiatives worldwide. It was difficult to combine the disparate parts into a small, efficient package that would accomplish the desired result without being overly heavy, bulky, or power-intensive. The primary challenge in military operations is communication with the base station. The proper navigation between soldier organizations also greatly facilitates careful planning and coordination. This paper focuses on tracking the whereabouts of soldiers using GPS, which is useful for control room stations to know the precise location of the soldier and accordingly guide them. High-speed, short-range soldier-to-soldier wireless communications are also used to relay information on situational awareness, such as bio-medical sensors, GPS navigation, and Wireless communication. The biosensor is made up of temperature and heart rate sensors.

A system called an "Embedded System" is created when hardware and software are combined into one unit and integrated to achieve design objectives like speed and efficiency.The ability to design a system with the desired functionality by selecting the hardware and software components of your choice is the main benefit of an embedded system. The advantages of the embedded system mentioned above are the foundation of this project. So that soldiers' locations and important health indicators can be tracked in real time while they are on the battlefield, the defence industry must develop wearable technology that is portable and uses very little power. Using this soldier navigation system, the base station can direct the soldier to their desired location.

The primary distinguishing feature of this project is that it is an Internet of Things (IoT)-based project. Interconnected machines, computers, machines, people, and other objects with specific functions make up IoT systems. Without the need for computer-to-computer and human-computer interaction, their data can be transferred from one location to another over the network by utilising the IoT.

SYSTEM ARCHITECTURE

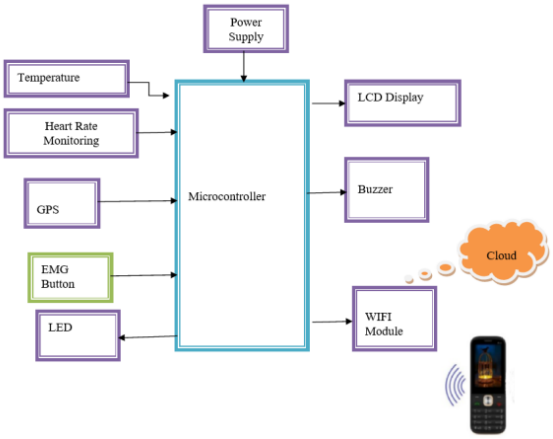

Fig.1: System block diagram.

Above figure depicts the block diagram of the system for tracking soldier positions and health along with environmental analysis. It is intended to use Arduino Uno because it needs high-speed communication. To track health status, the processor incorporates biosensors like heartbeat and body temperature sensors. A soldier's location is logged using the GPS receiver and saved in the microcontroller's memory. To determine a location's geographic location, a GPS receiver compares the signal it receives from orbiting GPS satellites. We can designate an emergency using the keypad. Additionally, it uses IoT to transmit data to the army base station that includes a soldier's location and health parameters.

The location and health status of the soldier are shown on a system at the base station using software that is integrated with IoT. The Army Based Situation unit receives information about the soldier unit through a GPS receiver. By using MIT App Inventor, the obtained data can also be viewed on mobile devices.

The LCD is used to show the soldier's temperature, heart rate, and position. The output from the heart rate sensor and the temperature output along with latitude and longitude will be uploaded to cloud Thing speak and viewed in the military base camp.

A. Problem Statement:

Soldiers get lost and hurt during army search missions and battles. There have been many advancements that make it possible to track the whereabouts of soldiers at any time and anywhere. These initiatives seek to offer soldiers real-time medical monitoring. These current innovations or systems. Radiofrequency (RF) technology, Bluetooth technology. Soldiers' position data and biosensor data are wirelessly transmitted using GSM technology, among other things. There are numerous problems with the current systems. Some of these current systems employ GSM technology for wireless data transmission.

HARDWARE REQUIREMENTS

1. ARDUINO UNO:

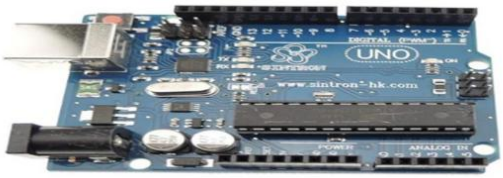

Fig. 2: Arduino Uno Board

The term "Arduino" refers to both the programming software and an open-source electronic platform or board. For designers, hobbyists, and anyone else interested in creating interactive environments or objects, Arduino aims to increase accessibility to electronics. The open-source nature of the hardware means that an Arduino board can be

bought already put together or assembled by hand. In either scenario, users can update, share, and modify their versions of the boards to meet their specific needs. Arduino board designs employ a variety of microprocessor and controller types. The boards' sets of digital and analogue input/output pins can be used to interface with a wide range of expansion boards, breadboards, and other circuits. The boards have serial communications interfaces, some of which can load software from personal computers using USB (Universal Serial Bus). Microcontrollers are typically programmed using a dialect of the C and C++ programming languages. A platform for hardware and software prototyping, Arduino is free and open-source. Using Arduino boards that can read inputs like the lights on a sensor, a user's finger on a button, or a tweet, something can be tweeted, a motor can be started, an LED can be turned on, and something can be published online.

2. HEART RATE SENSOR:

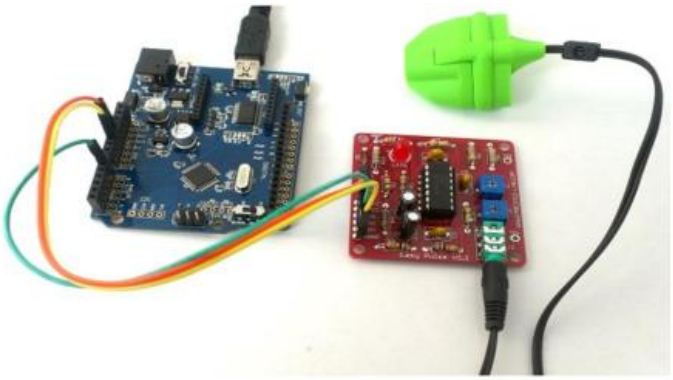

Fig. 3: Heart Rate Sensor

The heart rate, also known as the pulse rate, has been recognised as a vital sign and has been closely associated with a person's cardiovascular health since the dawn of medicine. Here, a PC-based heart rate monitoring system is created using an Arduino board and an Easy Pulse V1.1 sensor. Using the transmission photo-plethysmography (PPG) principle, the pulse signal from a fingertip is detected by the pulse-detecting sensor Easy Pulse. Before transmitting the data to the PC via a serial interface, the Arduino board reads the sensor output. The instantaneous heart rate and the PPG signal that was received are displayed using a PC application that was made using the Processing programming language.

3. GPS SYSTEM:

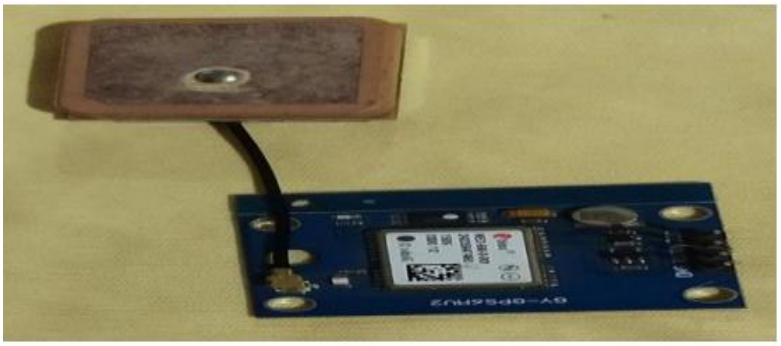

Fig. 4: GPS System

The Global Positioning System (GPS) is a space-based satellite navigation system that can provide location and time information in any weather, anywhere on or near the Earth, with an unobstructed line of sight to four or more GPS satellites.Anyone with a GPS receiver can freely access it because it is maintained by the US government. Typically, when someone refers to "a GPS," they mean a GPS receiver. The Global Positioning System is a group of 27 satellites orbiting the Earth (GPS). The U.S. military developed and implemented this satellite network as a military navigation system, but it was soon made accessible to the general public. These three to four-ton, solar-powered satellites rotate the earth twice per day at a distance of about 12,000 miles. Because of the arrangement of the orbits, there are always at least four satellites "visible" in the sky from anywhere on Earth.

4. TEMPERATURE SENSOR:

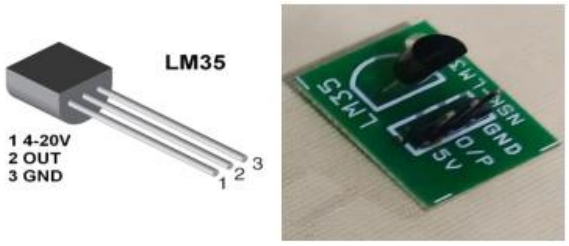

Fig. 5: Temperature Sensor

LM35 thermometer sensor. With the help of a commonly used temperature sensor known as the LM35, temperature can be measured using an electrical o/p comparative. It is more accurate at measuring temperature than a thermistor. It may not be necessary to amplify the output voltage because the output voltage produced by this sensor is higher than that of thermocouples. The LM35 has an output voltage that varies in direct proportion to the temperature in degrees Celsius. A scale factor of 01V/C is used.

5. LED:

Fig. 6: LED

The 3mm LED is just one of the numerous shapes and sizes that are available for LEDs. We carry a broad range of the most widely used 3mm, 5mm, 8mm, and 10mm LED models. The size of the LED is its external diameter. While 8mm and 10mm models are used in locations where you want to emit as much light as possible, 3mm LEDs are used in small spaces. Super bright 3mm LEDs are excellent for use in models, illuminations, head lumps, spotlights, and car lighting because of their extreme brightness. Anywhere you need low-power, high-intensity, dependable light or indication, 3mm LEDs can be used.They slide right into the board. Positive (Anode) and negative (Cathode) leads are present in an LED. Except for two arrows that point outward, the LED's schematic symbol is very similar to the diode's. A triangle designates the anode (+), and a line designates the cathode (-). An LED's longer lead is typically the positive (Anode), and its shorter lead is the negative (cathode).

6. BUZZER:

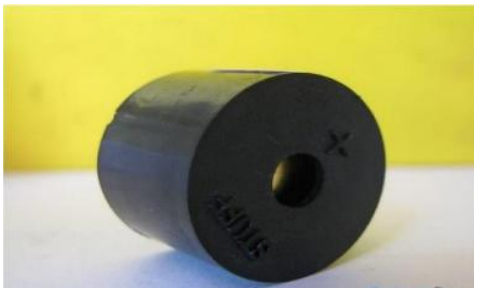

Fig. 7: Piezo Buzzer

An extremely popular piezo buzzer, also known as a piezo transducer, is shown operating at DC voltage in the image above. It is covered in a cylindrical layer of plastic and has a hole on the top face for sound to pass through. The hole reveals a yellow metallic disc that is crucial to sound production. A Piezo buzzer is a type of electronic instrument used frequently to create sound. It has many uses and is lightweight, affordable, and easy to make. Some examples include computers, call bells, cars, and trucks with reversing indicators. The piezo buzzer is built on the inverse piezoelectricity

principle, which Jacques and Pierre Curie discovered in 1880. It is a phenomenon that causes electricity to be produced when certain materials are subjected to mechanical pressure, and the opposite is also true. These substances are known as piezoelectric materials. Piezoelectric materials can be created artificially or naturally. A class of artificial material known as piezoceramic, which exhibits a piezoelectric effect, is frequently used to create the piezo buzzer's disc.

LITERATURE SURVEY

JOURNAL NAME & YEAR	AUTHOR	TITLE & METHOD	REMARKS
International Journal of Engineering Science and Computing, March 2017	Akshitha. V Armarkar, Deepika J, Punekar Mrunali V. Kapse, Sweta Kumari, Jayshree A. sheik	System for tracking and monitoring soldier health. GPS is used to track soldiers, and GSM is used to provide a wireless communication system.We use biomedical sensors, such as temperature sensors, to keep track of the soldiers' health parameters. In order to equip the soldiers appropriately in the event of climatic changes, an oxygen level sensor is used to monitor atmospheric oxygen.	.GPS & GSM is used to provide wireless communication biomedical sensors used for temperature. An Oxygen level sensor is also used.
International Journal of Electrical, Electronics and Computer	Kruthika Patil, Omkar Kumbhar, Sakshi Basangar,	Soldier Navigation and Health Monitoring System Based on	GPS & wireless body area sensor is used to record all

Systems(IJECS) ISSN(Online): 2346-2820, Volume-5, Issue-1, 2017	Priyanka Bagul	IoT.This system uses a wireless body area sensor network and a GPS module to record parameters in real-time and transmit them to the base station. Each army official's health is evaluated using the system's various sensors, such as the humidity sensor, temperature sensor, and pulse sensor. The most crucial component of this project is wearable technology.	the parameters. Humidity sensors, temperature sensors, and pulse sensors are used. This is a Variable technology.

International Journal of Advanced Research in Electrical, Electronics and Instruction Engineering Vol. 2, Issue 3, March 2013.	Shruti Nikam, Supriya Patil Prajkta Powar, V.S.Bendre	GPS-based system for tracking and monitoring the health of soldiers. In this paper, we focus on tracking soldiers' GPS locations, which helps control room stations determine the exact location of the soldier	The control room station uses GPS to provide an accurate location of the soldier and to direct the soldier. .

		and give them the appropriate instructions.	
2017 International Conference on Computing, Communication, and Automation (iccca), IEEE.	Niketpatil, Brijeshiyer	Soldiers' Health Monitoring and Tracking System Using the Internet of Things (IoT). The system described in the article uses the Internet of Things to track and monitor soldier health. The proposed system, which uses GPS to track the soldier's location and health, can be mounted on the soldier's body.	This system can be mounted on the soldier's body to track their Health status and GPS is used to locate the position.
International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 04 Issue:06 June 2017	Jasvinder Singh Chhabra, Akshay chhajed, Shamlee Pandita, Suchita Wagh	Soldier Tracking and Health Prediction System Based on GS and IoT. RF, DS-SS, and FH-SS are three forms of mobile communication that soldiers can use to reach out to other members of their squad when necessary.	Soldiers can communicate anyway using RF, DS-SS & FH-SS uses to help the soldiers to communicate with other squads.

RESULTS

The project's output displays the temperature, BPM, longitude, and latitude readings. The system's overall power consumption is decreased by the use of 328 controllers and peripherals with low power requirements. The used modules are more transportable because they are lightweight and smaller in size. Soldier security and safety are provided by GPS tracking of positions and health systems that continuously monitor soldiers' critical health parameters. Therefore, the idea of a tracking and navigation system is extremely helpful to soldiers while they are on the battlefield during a war. Additionally, the base station to receive a real-time PC display of the soldier's position on the battlefield. The results are seen on the base station or mobile device's computer.

CONCLUSION

The idea behind the IoT Based Soldier Health Monitoring and Tracking System is to track the soldier and navigate between soldier-to-soldier by knowing their distance as well as their health status during the war, allowing the army personnel to plan war strategies. This system makes it possible to track these soldiers using GPS. M-Health makes it possible. M-health is the combination of mobile computing, medical sensors, and healthcare communication technologies.This device will benefit military personnel who are properly positioned and organized and who use wireless networks to exchange information, as well as the host. The fact that the soldiers cannot communicate with the control room station is one of the fundamental difficulties in military operations. The Army Base Station unit receives the soldier's unit information via a GPS receiver and uses IoT-integrated software to display the soldier's location and health status on the base station's system.The various sensors will gather the data, and MIT App Inventor can also be used to view it on a mobile device. The most crucial component of this project is wearable technology.

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