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Advanced Position Tracking and Health Monitoring System for Soldiers Using Internet of Things

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Abstract
Defense forces are one of the most key elements of every country. It is our responsibility to provide advance-mechanics to the soldier. More closely in India, periodic lives are affected by cardiac problems and all the further significantly that the officers have not been provided appropriate and emergency assistance. This work is focused on frontline warrior tracking. We have designed and developed a stable, energy-efficient surveillance system for soldiers. It will periodically report Warrior parameters. This empowers the experts to constantly track the healthcare parameters of the soldier (temperature, location, etc.). Here soldier parameters are estimated dynamically and distributed wirelessly using IoT. This proposal offers a mechanism for enhancing efficiency and adaptability by strengthening the functionality and power management of the surveillance system for soldiers. Here we use IoT for wireless broadcasting. The Army Chief can get cord of the records of an individual soldier by merely accessing the soldier's database on his / her device. This paper at any given time helps supervise the soldier with GPS. In this paper, the health parameters of soldiers, such as heart rate and health protection, are continuously evaluated and wirelessly conveyed to the control room using IoT.

Keywords: *Soldier, Arduino UNO, GPS, NodemCu, LED, Proximity*

1. Introduction

Today Defense Forces are progressively changing with advance execution into new revolution. The well-being of the soldier is more vital as they are the protectors that protect our country. The fight against rivals in today's world is an important factor in the nation's welfare. National security relies mainly on military force (ground), naval force (ocean), air force (sea), etc. The Military Troopers played an important and fundamental role. There are several questions regarding those soldiers' health. This is very important for the military base station to be notified about the location and well-being status of each of its troops when any soldiers reach the enemy territory. In this project we propose a concept of following the trooper just as being notified about the warrior's well-being status during the battle, which empowers the base station to plan the war strategies. If he feels lost, the soldier can even ask for directions to Military base station. The base station will guide the fighter into safe zone by using the location sent by the GPS.

The frame is composed of two parts, the portable remote soldier unit and the tracking device. The compact remote soldier device consists of Advanced RISC Machines (ARM) with embedded operating system, GPS and a GSM, proximity sensor, vibration sensor, and heart beat. Design of a Soldier monitoring system using GSM and GPS to provide remote system for observing soldier parameters are as-heart rate and position. These parameters will then be conditioned by signal and stored in the memory. One of the main difficulties of military operation is that the Soldier is unable to access the authority of the control room. Therefore each organization needs to implement certain administrative

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and operational behavior while operating over the network designed and run by other organizations. In this way, one troop cannot contact the soldiers without careful arrangement and coordination or help the network infrastructure of country military forces operating in the same region.

2. Literature Survey

In [1] Niket Patii, Brijesh Iyer The paper discusses an Internet of Things (IoT)-based analysis of wellbeing of warriors and the following system. The proposed system can be placed on the body of the warrior to track their state of well-being and the current region using GPS. Via IoT these data are transmitted to the control room. The proposed architecture includes limited wearable physiological devices, sensors, and modules for transmission.

In [2] M. Mohamed Rabik. T. The system reduces the danger of warrior life by tracking and observing the progress of the interloper before the firearm is turned on. The system is an absolute accomplice of an integral ambush rifle, that an officer has, for the most part, the sensor positioned on the closest point of the attack rifle fixed on the rail of the tool and the course overview of the firearm balances the constant reaction of the sensor unit frame joined to the warrior's protective cap and guides the advancement of troopers head. The commotion of the sensor device takes on a significant job on the precision of the target bolting and terminating process.

In [3] David Yoo; Adrian Lastra; Tom Jensen A first-request empirical model was developed to test the impact of location and direction error (e.g. due to inaccurate GPS / compass data) on the ability to accurately place markers on objects in observation through head-mounted presentations for warrior information systems. Additionally, the effect of such errors on the trading of marker data between fighter hubs was examined. A scientific arrangement for the shut structure was derived and contrasted with numerical systems (Monte Carlo).

3. Existing System

In the existing system, the health of soldiers is tracked using expensive equipment. It doesn't offer satisfactory effectiveness.

A. Disadvantages

- It does not minimal the human work
- It is necessary to monitor every time
- Instruments once damaged, we need to replace

4. Proposed System

Different sensors such as Heart Rate, Proximity and Vibration are attached at appropriate locations to the soldier's body to capture real-time health data. Then these data are related with default threshold values for checking if the soldier is in good condition. The soldier's details is being revised accordingly.

A notification is also sent to the Head of the Army's mobile in the form of an warning via IoT modem and subsequent LEDs ON in case of any emergency situation. If the health parameter of a specific soldier falls below the threshold value, an automatic alert is sent which is interfaced with the Arduino microcontroller. In the event of the warrior's death, the sensor detects the beat rate change and the deceased warrior's area; preceded by the GPS module, IoT is then transmitted to the Army installation station. This structure empowers the base station of armed force to track the region and the strength of troops using GPS module and sensor systems of remote body territory. Proximity Sensor is used to prevent soldier from bomb attacks.

Advantages

- Wireless Communication
- Need to monitor manually
- It monitor each and every minute
- It needs less manual work.
- It helps to minimize the time
- Rescue operation efforts of army control unit.

5. Block Diagram

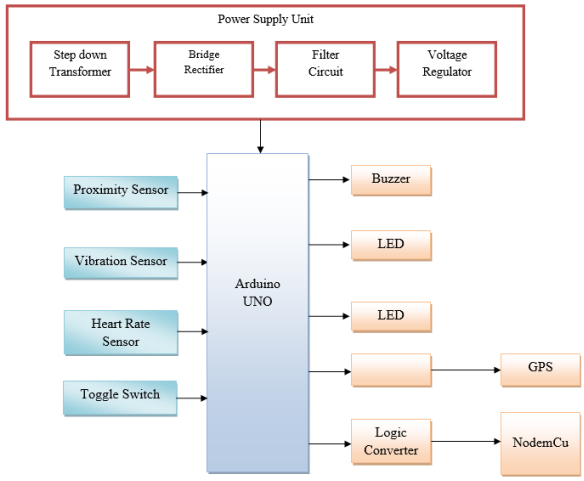

Figure 1: Block Diagram – Embedded Unit

6. Module Description

A. Power Supply Unit

Power source is a guide to electric power wellspring. This is known as a force supply unit or PSU as a gadget or device that provides electrical or specific kinds of vitality to a yield burden or burden set. The term is most often applied to supplies of electric strength, less often to mechanical supplies, and seldom to others.

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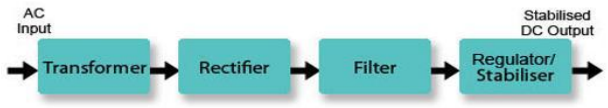

Figure 2: Power Supply Unit

B. Arduino UNO

An Arduino UNO is an embedded device based microcontroller package that can be used effectively by obtaining the hardware components from the website. Arduino Uno is a micro controller board built on an embedded device, built on the ATmega328. It has twenty pins. Therefore, there are 14 digital input / output connectors, and 6 analog inputs. It contains everything required to support the microcontroller kit; Just attach it to a Universal Serial Bus Cable PC or power it with an Alternative Current-to-Direct Current Connector or Charger to get started.

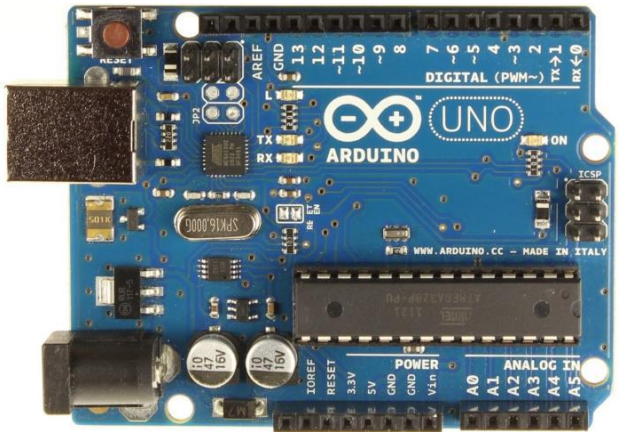

Figure 3: Arduino UNO

C. Proximity Sensor

Proximity sensor is a sensor able to differentiate between objects that have no physical contact and close proximity. A nearness sensor also generates an electric field or light emission radiation, and monitors for field or return signal changes. The element being sensed is referred to frequently as the target of the proximity sensor. Distinctive proximity sensor targets demands for specific sensor. For example, a capacitive or photoelectric sensor may be suitable for a plastic objective which needs a metal objective consistently by an inductive proximity sensor.

Figure 4: Proximity Sensor

D. Heart Rate Sensor

The heart beat sensor is programmed to produce computerized warmth beat yield when a finger is placed on it. The beat LED flashes as one with each heart beat at the stage the heart beat finder is functioning. This automated yield can legitimately be correlated with the microcontroller to measure the rate of beats per minute (BPM). It takes a shot at each heartbeat by blood finger at the level of light adjustment.

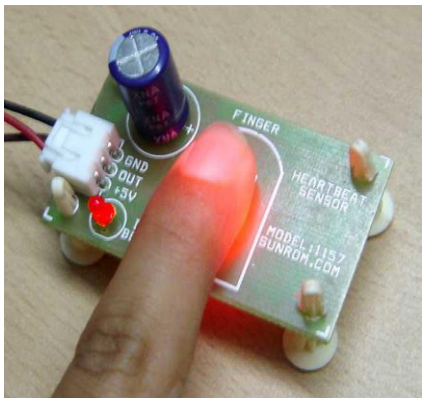

Figure 5: Heart Rate Sensor

E. Vibration Sensor

Vibration sensors are used in different applications, computers, and tasks. Regardless of whether you are attempting to determine a vehicle's speed or test an approaching quake's strength, the device you are likely to use is known as a vibration sensor. Some of them operate by themselves and others need their own source of energy.

Different working conditions of the system relating to temperature limits, attractive fields, vibration level, recurrence run, conditions of electromagnetic similarity (EMC) and electrostatic release (ESD) and the required sign quality include the requirement for a sensor assortment.

Figure 6: Vibration Sensor

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F. LED

LED (Light Emitting Diode) consists of a chip of impregnated, or doped, semi-conducting material with polluting factors to create a p-n intersection. Existing streams effectively from the p-side, or anode, to the n-side, or cathode, as in separate diodes, but not in turnaround. Charge-transporters — electrons and openings — stream from anodes to various voltages through the intersection. It falls into a lower vitality at the point where an electron enters a gap, and discharges vitality as a photon.

7. Results and Discussion

In figure, it shows that output screenshot for our proposed system.

Figure 7: LED

G. Buzzer:

A buzzer is a flagging gadget of electronic, electromechanical, attractive, electromagnetic, electro-acoustic or piezoelectric vibration. A Piezo electric bell may be powered by an electronic swaying circuit or other source of sound signs. A tick, signal, or ring will indicate a catch was squeezed.

Figure 8: Buzzer

H. GPS

GPS represents a global positioning system that was developed as an overall route by the U.S. Department of Defense that identifying agency for both military and everyday citizen use. It is a spatially dependent radio-route system with 24 satellites and ground support. GPS provides customers with precise information about their location and distance, as well as time, anywhere on the globe and in any climate condition.

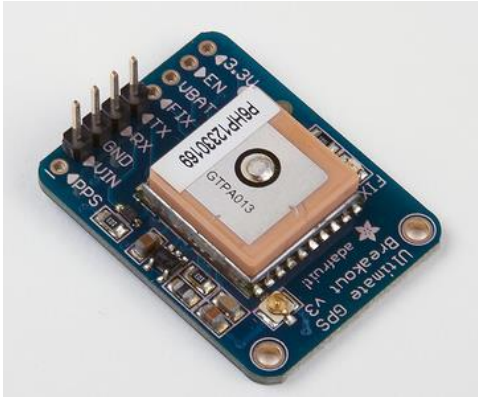
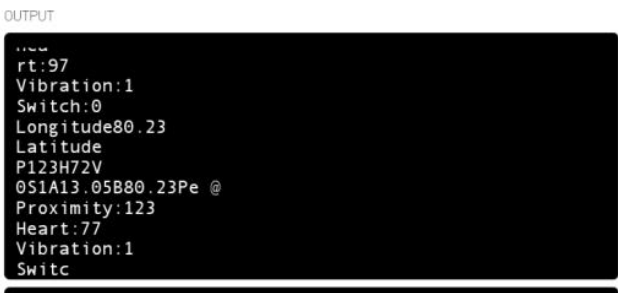


Figure 9: GPS

8. Results and Discussion

In figure, it shows that output screenshot for our proposed system.



9. Conclusion

We conclude that device helps to track soldier's health parameters using heart beat sensor to measure heart beats and proximity sensor to measure nearby area to soldier detection of explosive. This system helps the warrior in circumstances of warning to find assistance from the base station of armed force. Likewise, this system gives the military control room the field data and health parameters of the officer.

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