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Smart Device for Tracking and Protection in Military

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ABSTRACT: Safety of soldiers who guard our nation has been a major issue. The main focus of this project is to build a device especially for soldiers who do rescue operations in extreme conditions. This project consists of thermal heating coil made up of copperwires to provide heat so that the soldiers can withstand any cold climatic conditions in the high altitude war zones. This project also alerts the control room generals about the extremely injured soldiers so that they won't be left unnoticed, by using health monitoring sensor. We also use GSM, GPS module to track the exact location of the soldiers and send it to the control room officials so that the rescue operations can be made accurately. This project considers the safety of soldiers as its priority and aims to save the precious lives of soldiers.

KEYWORDS: Smart device, health monitoring sensor, GSM-GPS module, heating coil, Alerts, temperature maintaining sensor.

I. INTRODUCTION

The safety of the soldiers who guard our country are as important as the security of the nation. Our India has extreme cold climatic conditions in the northern part of the country. Many soldiers who guard in these areas are exposed to the risk of getting hypothermia. And at the times of wars, many soldiers lose their lives due to being left unattended where their lives can be saved if their health is

monitored from time-to-time. This situation also arises due to lack of information on the location co-ordinates of the soldiers. The smart device is designed in such a way that it could keep the track of the internal temperature of the body and also the health conditions of the soldiers. This device generates heat essential to sustain the normal body temperature under extreme climatic conditions. The heat is generated through the heat coils. Hence whenever the temperature below the normal body temperature is detected the heat induction coils will induce heat from the device thus protecting the body from getting numb.

The device also includes health monitoring sensor like pulse sensor which keep tracks on the pulse and heartbeat of the soldier. We see that many soldiers die in the war in the process of guarding the country. There are also times when the soldiers can be saved but due to lack of proper in-time rescue operation they are left untreated. Hence, we designed a device such that we can keep track of the health conditions of the soldier and any critical abnormal conditions can be detected by the health monitoring sensors and the information can be passed to the control room. After sensing the abnormal conditions of the army person, an immediate alert notification message is sent to the control room base. We use GPS and GSM module to keep track of the coordinates of the warzone. At the time of unusual activities an immediate alert message will be sent to the control room through the GSM module. Then the control room will initiate the rescue operation and the precious life of the effected army person can be saved by taking the necessary measures. Thus the main motive of this device is to save the valuable lives of the army persons who guard our nation risking their own lives.

II. LITERATURE SURVEY

1. **Sofia Scataglini, Giuseppe Andreoni, Johan Gallant [1]:** A review of Smart Clothing in military is published in Research Gate. In this paper the authors explain the idea of inserting the embedded sensors into the soldiers suit. This paper focuses on the health status monitoring and energy production in smart clothing. In terms of energy production, the authors introduced a bionic power product consisting of a knee brace. Both of the soldier legs are embedded with the device that produces an average of 12 watts of electricity while walking. In this paper the soldier's health is monitored by software that is called sentients digital clone live software. It analyses data of the soldier and create health alerts.

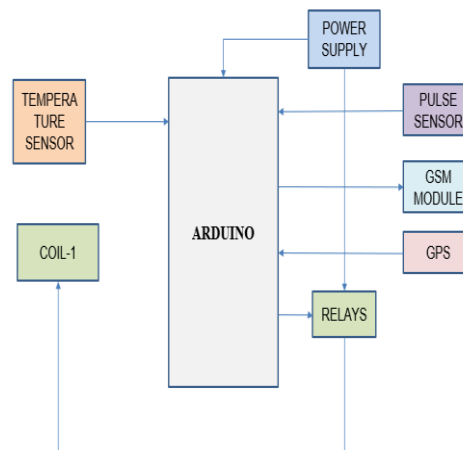
2. **Shweta Shelar, Nikhil Patil, Manish Jain, SmitaHande, Sayali Chaudhari[2]:** Soldier tracking and Health Monitoring systems. International Journal of Soft Computing and Artificial Intelligence. In this paper they are basically focusing on Soldier's health in terms of his heartbeats and his body temperature. If soldier gets injured and becomes unconscious by gunshot or due to any other reason, then his heart beats start increasing or decreasing gradually. In this type of situation where the information about current heart rate becomes the indispensable part of soldier, this project emerges out as best to acknowledge the doctors at server site with the correct and fast information. If heart beat either increases above critical level or decreases below the critical level, a message is automatically sent to server with the help of GSM modem. GPS tracker will give the current location of the soldier which will be useful for locating soldier's location and providing medical help as early as possible. In case if soldier is injured then by using the GSM modem attached to the device an SMS will be sent to hospitals in the vicinity or to the base station to provide help.
3. **M.Sivalingamaiah, E.Satheesh Kumar, M.VijayaLakshmi [3]:** Solar Based E – Uniform for Soldiers-Used For Temperature Control and Tracking. International Journal of Engineering Research and Development. There are two operating modes for the project: summer mode and winter mode. By choosing an operation mode that can power a body heater/cooler. In turn, the heater/cooler will assist us in providing a chilling or warming impact within the uniform, enabling the soldier to adapt to any type of external environment and perform effectively without experiencing heat or cold stress. The metal sensor will alert the soldier with a buzzer indication if it finds a metal-like explosive. The microcontroller and GSM are interfaced, and the GPS is also interfaced, allowing for the tracking of the entire soldier. Additionally, the location is messaged to the department or person of interest.
4. **.Archana Padikar.A, CinmayeeCK,Chaithra [4] :** Health monitoring and tracking system using IoT published in International Research Journal of Engineering and Technology (IRJET). In this paper the author proposed a device through which we can monitor psychological information of soldiers which includes temperature of the body, heartbeat, gases related parameters etc. The exact location and the medical related information of the soldier can be sent to the base station in real time, so that immediate steps can be taken by base station. Internet of Things (IoT) with Global Positioning System (GPS) is used for tracking the location of the soldier and monitoring of the health parameters like heartbeat, gas sensor and body temperature.
5. **E. Shalini, S. Priya, S. Sabitha, S.R. Shalini, C. Shanmugam [5]:** Soldier's health monitoring and tracking system. International Journal of Research in Engineering Science and Management. The soldier health monitoring and tracking system will discover the health status of the soldier and the precise location of the soldier. So this paper concentrates on tracking location of soldiers from GPS, which is useful for room station to grasp the placement of soldier. Also we use biomedical sensors for monitoring the health parameters, like heart pulse rate, presence of the hazardous gases, accelerometer and gyroscope values. Similarly, we find latitude and longitude values using GPS (Global Positioning System) module. The collected details are sent to the control station via GSM module. Thus, when any soldier has any serious issue are going to be rescued easily from the alerts collected from the various sensors via wireless technologies like GPS and GSM (Global System for Mobile Communication) techniques.
6. **Nanditha S, Deepikagowda K, Pavana R Kowshik[6]:** IoT based Health Monitoring and Location Tracking System for Soldiers. International Research Journal of Engineering and Technology (IRJET). A low-cost Internet of Things (IoT) based health monitoring and location tracking system is to be built. It will continually track the real-time health parameter and location of soldiers by polling sensors and GPS locations at set intervals of time. The monitoring node will be an Arduino. Here, temperature and heartbeat sensors are used as well as a Wi-Fi IoT module and a GPS receiver to track the whereabouts of soldiers. The monitored real-time data of soldiers is sent to the cloud using a Wi-Fi module. Jumper wires are used to connect the sensors, Wi-Fi, and GPS receiver to the Arduino Uno microprocessor, which is programmed in C. By inputting their username and password from the control room, users can connect in to the ThingSpeak web browser to view their current location and health parameters.

IIIS SMART DEVICE FOR TRACKING AND PROTECTION IN MILITARY

This project primary objective is to control a smart device to manage the temperature of soldier's body and to avoid the circumstances and possibility of hypothermia by inducing warmth to the body through coils. This device also detects the uneven conditions of the soldier sensed by the health monitoring sensors during critical injury or warfare. It

additionally guarantees to ship the alert message robotically each time any strange situations are detected. In this device we are using DS18B20 temperature sensor to perceive the fall in the temperature of the soldier in extreme low climatic conditions, we also use heat induction coils made up of copper wires to keep the body temperature stable. We additionally use fitness tracking sensor (pulse sensor) so that in vital accidents it is able to hold and record the pulse of the soldier's circumstance, and pursuits to ship the alert message if any strange circumstance is found. We are using GPS for monitoring the exact location of the soldier and also we are using GSM module to send the alert messages to the control room. Hence through this device immediate rescue operation can be performed and the valuable lives of the soldiers can be treasured.

BLOCK DIAGRAM



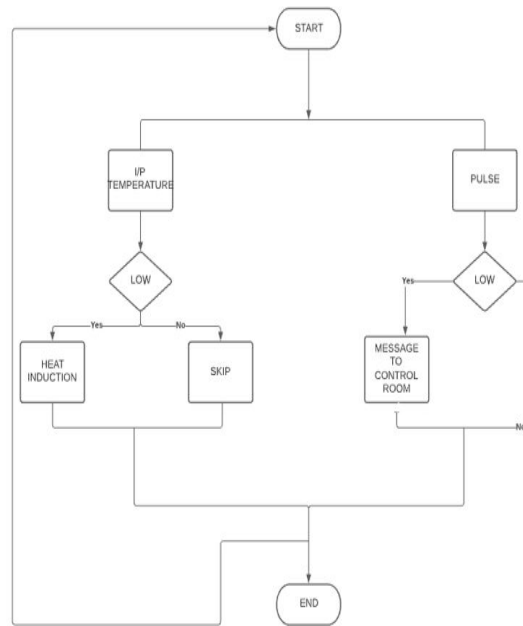
The Block Diagram of this Proposed System consists of:

- Arduino
- Temperature sensor
- Heat induction coils
- Power supply
- Relays
- GSM module
- GPS
- Pulse sensor

The temperature sensor senses the temperature continuously and when it detects the fall in temperature it detects and turns on the relay. The relay acts as a switch to the heat induction coils and thus the heat is induced through the device. The pulse sensor detects the fall in pulse after which the alert message is sent to the control room along with the location and pulse rate by GSM module thus the immediate action can be taken.

FLOWCHART

This flowchart shows short idea about how this Project works. Firstly, the system checks the temperature and pulse rate of the soldier. If the sensed temperature is low then the heat induction coils gets activated and the heat will be induced to the body through the jacket thus aiming to maintain the normal body temperature else the action is skipped. Now the pulse rate is also checked simultaneously to keep track of the health condition of the soldier if the pulse rate falls down then the alert message is sent to the control room else no action is performed.



IV.RESULTS

We have obtained temperature readings to detect a drop in temperature. When the temperature falls lower than the sustainability of the body, then the heat will be induced. If the pulse fluctuates to a critical value then an alert message will be sent to the control room with the exact position and health parameters through the GPS-GSM module.

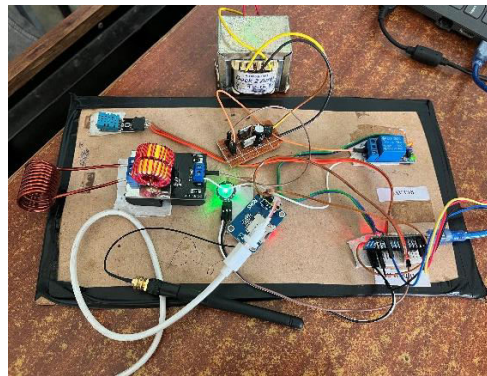


Fig: 1 Hardware implementation

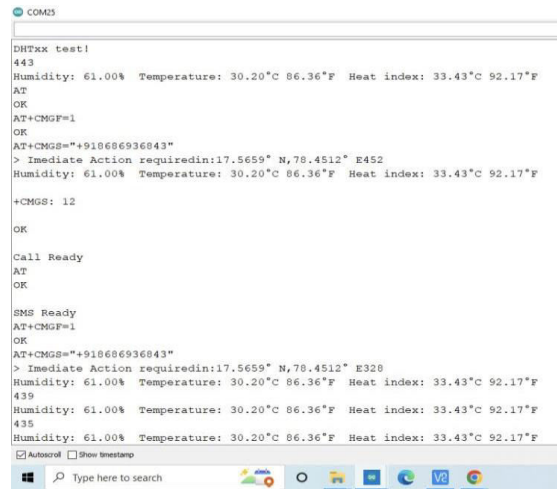


Fig: 2 Serial monitor output

The serial monitor displays the temperature and humidity of the soldier as well as the location if an emergency occurs.

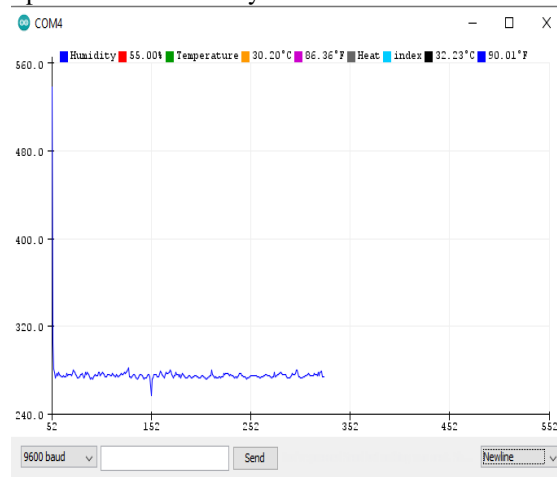


Fig: 3 Serial plotter output

The serial plotter displays the pulse rhythm of the soldier.

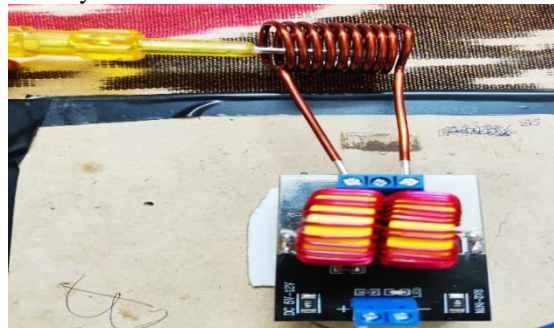


Fig: 4 Heat induction output

The heat induction coil induces heat to the soldier when the temperature falls critically low.

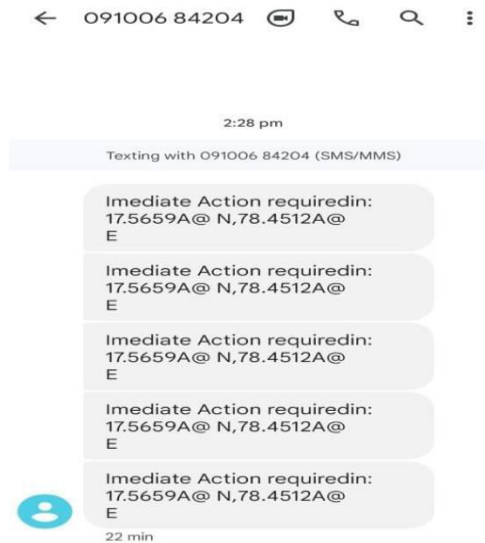


Fig: 5 triggering of alert message

Whenever any abnormal condition is sensed by the health monitoring sensor then the alert message is sent.

V.CONCLUSION

Army is the force that shields our country by working day and night without adequate amount of sleep and rest. Therefore it is our liability to protect them. Same is the motto of this project. So here we layout Smart device which offers higher safety to the army who are working in extreme weather conditions, whenever the temperature is very less, the warmth is supplied to the soldiers from the device with the help of coils. Not only restricting the use of this device to the cool climatic conditions we also use pulse sensor to keep track of the soldier's health during the intense warfare. When the soldier gets critically injured then instant alert message is dispatched to save the lives through the rescue operation. These smart devices are very much beneficial for military applications.

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