IOT AND SOLAR BAED E-UNIFORM FOR SOLDIERS WITH REAL TIME TRACKING

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Abstract— We know that every field is being advanced and changing as per the technology. IoT is a revolutionary term in advancement of technology. Soldiers are important part of army, hence for their safety purpose IoT based device can be designed called as Smart Safety Jacket. In order to collect and detect various signals for organizations, it is possible to use wearable devices like smart jackets and other accessories. If the soldier is injured the fluctuations with the heartbeat and the pulse rate will be measured and will inform the military base station through Wi-Fi module and from GPS we can locate the wounded soldiers. te sensors which coordinates with regards to the human body. It can be used to measure and observe different Smart jacket, Peltier parameters.

Keywords— Smart jacket, Peltier Plates, GPS, IOT, Safety

I. INTRODUCTION

Soldiers are an important part of the army. The defiance of the country is the primary mission of the soldiers. They do not fear death, they do their tasks, duty in different conditions like in very hot or very cold temperatures. e. If soldiers are working in very hot temperatures then they face problems like heat stroke, muscle cramps, fainting while in very cold temperatures the problems are hypothermia, frostbite. If such problems are ignored it may lead to the unfortunate death of people working in extreme weather conditions. Health status of the soldier is monitored using bio medical sensors such as temperature sensor and heart beat sensor. We are using technology of Internet of Things for the proposed system. IoT is simply the network of interconnected things/devices, which is embedded with sensors, software, network connectivity and necessary electronics that enables them to collect and exchange data making them responsive

All the sensors are connected to the network through wi-fi which further makes the system more valuable and relevant. Due to this, it is possible to monitor and control real-time data from the military environment from anywhere. Sensor fetched data from the military environment can be processed through controllers and stored for future use. The android app and personal computer can be used to monitor receive information.

II. LITERATURE REVIEW

Before initiating for designing an autonomous system which may detect the parameters related to the soldier who is working in Indian borrders; it was very important to study the previous suggested systems being proposed in past for same issue and do comparative analysis. There are huge manuscripts available describing the same autonomous systems by which one can get an accurate and exact situation awareness along with alert generation for rescue teams.

A German scientist, Thomas See beck, found that for a closed circuit made up of two dissimilar metals, an electric current would flow continuously through a circuit. But in such a situation the junctions of the metals should be maintained at two different temperatures. See beck falsely assumed or concluded that flowing heat produced the same effect as flowing electric current. In 1834, Jean Peltier, while investigating the "See beck Effect," observed that there was an opposite phenomenon. He observed and found that, when an electric current flowed within the closed circuit, thermal energy could be absorbed in one dissimilar metal junction and discharged at the other junction. Early in the 19th century, the "Peltier effect" was discovered and it is seriously exploited during the second half of the 20th century.

This system is thus an efficient and adamant solution to the drastic change in weather which causes many ill effects to humans due to sudden changes in the temperature. The usefulness & feasibility of such a suit is the motivating factor to commence on this proposed system. This jacket allows the user to keep tracking the internal temperature of the jacket from high to low temperatures, with the use of the thermoelectric effect and displays the results in both LCD module and a smart phone. A 12 V Direct Current Lipo rechargeable battery [6] is used for storing the energy.

III. PROPOSED SYSTEM

The proposed system is based on the microcontroller. The heating and cooling function is obtained by using peltier module and it can be done using relay operation. The power supply to the circuit is provided by the lead acid rechargeable battery. The system consists of LM-35 temperature sensor, Wi-Fi module. The climatic conditions are sensed by the temperature sensor continuously and it will display on the mobile application name as "VIRTUNO-6". Wi-Fi module is used to communicate Arduino with mobile application. The LM35 temperature sensor [1] continuously senses the surrounding temperature and gives the analog data to the arduino. The arduino takes the analog data as its input and gives the digital data to the "VIRTUNO-6".
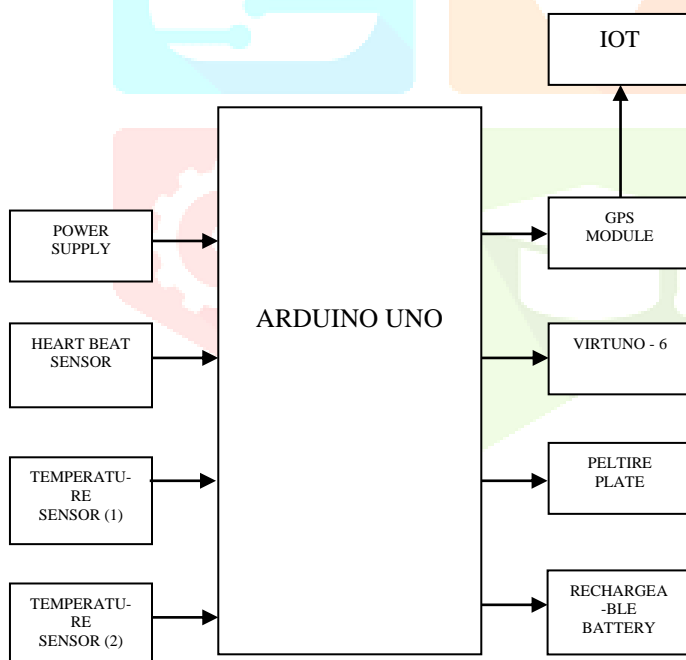
IV. BLOCK DIAGRAM

Fig. (a) System Architecture

A. This system increases safety in emergency response of military operation. Heartbeat sensor gives the heart rate by the sensor that measures the rate of flow of blood at the finger tip, by the amount of blood changes with time. Temperature sensor is the sensor that measures the amount of heat that it observes and gives the temperature in Degree Celsius. GPS is used to find the exact location of the soldier. The direction of the soldier can be find with the use of GPS modem. GPS modem receives the signal from the satellite and calculates the longitude and latitude of the direction of soldiers and send to the controller from serial data.

B. Node MCU is an open source microcontroller board based on the ESP8266. NodeMCU checks the status of heart rate and temperature. If the heart rate is greater than or lesser than its threshold value, NodeMCU turns ON the indication light, if the temperature differs from threshold value, it will turn ON the heater/cooler. The position information, heart rate and temperature value is sent to the cloud where it can be monitored. When Wi-Fi is available, NodeMCU uploads data in IoT. Node MCU is used for updating information to cloud and to control LCD display, heater/cooler as output devices.

V. HARDWARE DESIGN

5.1 Node MCU

The ESP8266 is the name of a micro controller designed by Espressif Systems. The ESP8266 itself is a self-contained WiFi networking solution offering as a bridge from existing micro controller to WiFi and is also capable of running self-contained applications. This module comes with a built in USB connector and a rich assortment of pin-outs. With a micro USB cable, you can connect NodeMCU devkit to your laptop and flash it without any trouble, just like Arduino. It is also immediately breadboard friendly.

Fig. (b) 1 Node MCU

5.2 Arduino UNO

The Arduino Uno board contains Atmega3248p microcontroller [2], it is a 28pin IC microcontroller as shown in figure 2. In that 28pins, 7pins are power pins, 6 are input/output analog pins & 14 input/output digital pins. This Arduino board operates at 5volts and it requires 7 to 12volts of input voltage. It has flash memory of 32Kb in which, 0.5Kb is used by system booter, 2Kb of static random access memory and 1Kb of electrically erasable programmable read only memory. Microcontroller is a heart of computer which is placed on a single IC. It consists of multiple CPUs, input output ports along with programmable memory.

Fig. (c) Arduino UNO

5.3 Temperature Sensor

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature. The output voltage is linear to the Celsius temperature. Its range is from -55 to +150 C. And has self-heating power. Operating voltage is from 4 to 30V. It measures the temperature of the particular surrounding environment. The LM35 senses the temperature and converts into analog signal which is then again converted into digital format by the ADC.

Fig. (d) Temperature Sensor

5.4 Heart Beat Sensor

The DHT11 is the digital temperature sensor which is cheap or available at low cost. It uses the capacitive humidity sensor and thermostat for measuring temperatures and the surrounding air. No analog input pins are needed to measure temperature with DHT11. We can calculate relative humidity by measuring the electrical resistance between any two electrodes. DHT11 is used to measure temperature and humidity.

Fig. (e) Heart Beat Sensor

5.4 Peltier Plate

For generating electricity the temperature difference between two electrodes is used. With the help of thermoelectric coolers or Peltier plate, soldiers can maintain temperature. A thermoelectric cooling module is a semiconductor-based electronic component and it functions as a small heat pump. If we apply DC voltage to TEC, the heat will be transferred from one side to the other side and it makes one side hot and another side cool.

Fig. (f) Peltier Plate

5.5 Rechargeable Battery

In this battery lithium ion move from negative to t h e positive electrode during discharging and reverse back when charging time of Lithium-ion batteries. Non-rechargeable lithium battery uses an intercalated lithium compound one electrode material, charging and discharging: When a battery is discharging at that time current carry current within a negative electrode to the positive electrode, via separator diaphragm. To prevent the battery from overheat and potentially burn the control system take care of overcharging.
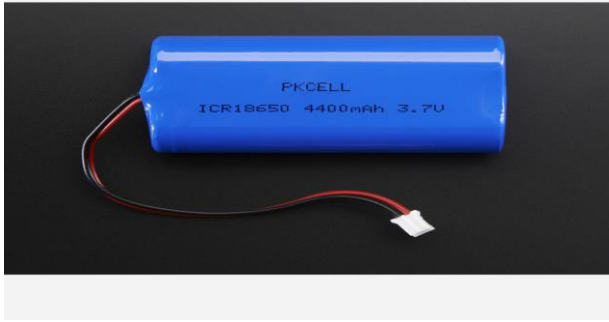
Fig. (g) Rechargeable Battery

Lead–acid batteries are usually used for energy storage in hybrid systems to store surplus energy, to regulate system voltage and to supply load in case of insufficient solar radiation and/or wind. Only 2 or 3 days of autonomy is required for batteries in wind– PV hybrid systems, while 5 to 6 days of autonomy are necessary in separate PV or wind systems. Other storage means can be used but lead–acid batteries are a low-cost, maintenance-free and highly efficient technology. A lead acid battery in its basic construction is made of more than one electrochemical cells interconnected in such a way to provide the required voltage and current.

5.5 Solar Panel

A sunlight into electricity by using photovoltaic (PV) cells. PV cells are made of materials that generate electrons when exposed to light. The electrons flow through a circuit and produce direct current (DC) electricity, which can be used to power various devices or be stored in batteries. Solar panels are also known as solar cell panels, solar electric panels, or PV modules solar panel is a device that converts

Fig. (h)

VI RESULTS

As per the result, the Weather Sensible Smart Adaptable Jacket maintains the optimum temperature of 30°C automatically. The temperature for the body is updated through mobile phone which is connected to the wireless Wi-Fi module. Thus the Weather Sensible Smart Adaptable Jacket acts as both heating & cooling system either automatically. Here, the system is built using one Peltier module, increasing the number of Peltier bring out the better performance so that each Peltier can be placed in different parts of the body where the temperature sensitivity is more.

Fig. (i) The hardware implementation

VII CONCLUSION

The project "IOT &SOLAR BASED E-UNIFORM FOR SOLDIERS WITH REAL TIME TRACKING" is successfully tested and implemented. This system is smaller, lighter and with low power consumption, so it is more convenient. This can help soldiers to work even in extreme climatic applications

From the proposed system we can conclude that the various biomedical sensors sense the body parameters in real time and transmit the data to the control room, there by tracking the current location of the soldier using GPS technology. The accuracy of system is affected by some factors Such as weather, environment around the mobile soldier unit, GPS receiver. It also provides the spontaneous communication with control room and other fellow soldier in a panic situation to get help

VIII FUTURE SCOPE

The project "Adaptable jacket based on climate conditions using microcontroller" is successfully tested and implemented. This system is smaller, lighter and with low power consumption, so it is more convenient. This can help soldiers to work even in extreme climatic applications. For the future expansion, this uniform can easily powered by a small portable solar panel and make it more echo friendly. The use of solar panel gives continuous output of power without less maintenance. We can also include rain drop sensors, humidity sensors for efficient working of jacket. These jackets can be wearable in all conditions and in all seasons. We can utilize this jacket to shield us from over-heating and over-cooling.

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