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Smart Jacket for Industrial Employees and Workers

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ABSTRACT: A smart module equipped with sensors and supported by Internet of Things (IoT) framed as “Smart jacket” is proposed for Industrial safety and Employee’s health at work place. This Smart Jacket ensures employee’s safety in hazardous industrial environments by monitoring surrounding temperature, heart rate and in addition, it also detects hazardous gases and sharp objects in the workplace due to heavy machinery. Thermoelectric plate is used to cool down the jacket, in case the surrounding temperature is above threshold. The monitoring is be done with a Thing Speak Channel connected to the all sensors with the help of NodeMCU

KEYWORDS: IoT, Smart Module, Sensors, ThingSpeak

I. INTRODUCTION

Industrial growth increases according to the needs of the company. The necessities of society are growing along with industrial expansion. In this production-based competition, a vast array of industries is struggling with employee safety and health. A large number of staff are dying at work because they aren't aware of industrial risks and surrounding physical conditions causing mishaps Many industries are in trouble with employee health and safety. As many workers as possible are dying at work from accidents and industrial risks in addition to not being aware of their health issues. Any organisation should be concerned about the health and safety of industrial workers because they are essential to the operation of the industries. A fresh idea is put out with the introduction of Smart Jackets into the industrial sector as a contribution to the health and safety of industrial workers using upcoming technologies like the Internet of Things.

Health status of the worker and certain emergency measures are taken when a worker is affected by health problems. The health of workers every second is monitored without interruption. Various safety precaution sensors such as ultrasonic and gas sensors, and pulse sensors are also linked to the Smart Jacket in such a way that if one of the workers could be affected by one of the hazards, they can anticipate it and take appropriate action. Various immediate measures to warn the worker so that he is aware and protects himself from dangerous situations before they lead to accidents. An employee's health is monitored via connected sensors in a smart jacket. Workers' health for every second is monitored continuously. The monitoring is done by the ThingSpeak Channel connected to the all sensors through NodeMCU ESP 8266.

The main objective of these Smart Jacket is to monitor the real time Employees Health condition in hazardous industrial environment and to detect hazardous gases and sharp objects in the workplace, therefore it helps in increasing the production rate of the industry.

The full model proposal for Smart Jacket is summarized in the methodology.

II. LITERATURE SURVEY

1. NarwadeD.S., MalvadkarR., MoreA., &SasteS. S. “Smart jacket based on IoT review”.

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. Temperature-related problems are the major problem which is caused by people. 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, we are designing the system which is based on different climate conditions which consist of ESP8266 microcontroller. In order to control the temperature of the entire system, Peltier belts are used. The designed system is wearable termed as “Smart Jacket”. The system comprises the different sensors such as Temperature sensor,

Humidity sensor, motion sensor, and notification panel. 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.

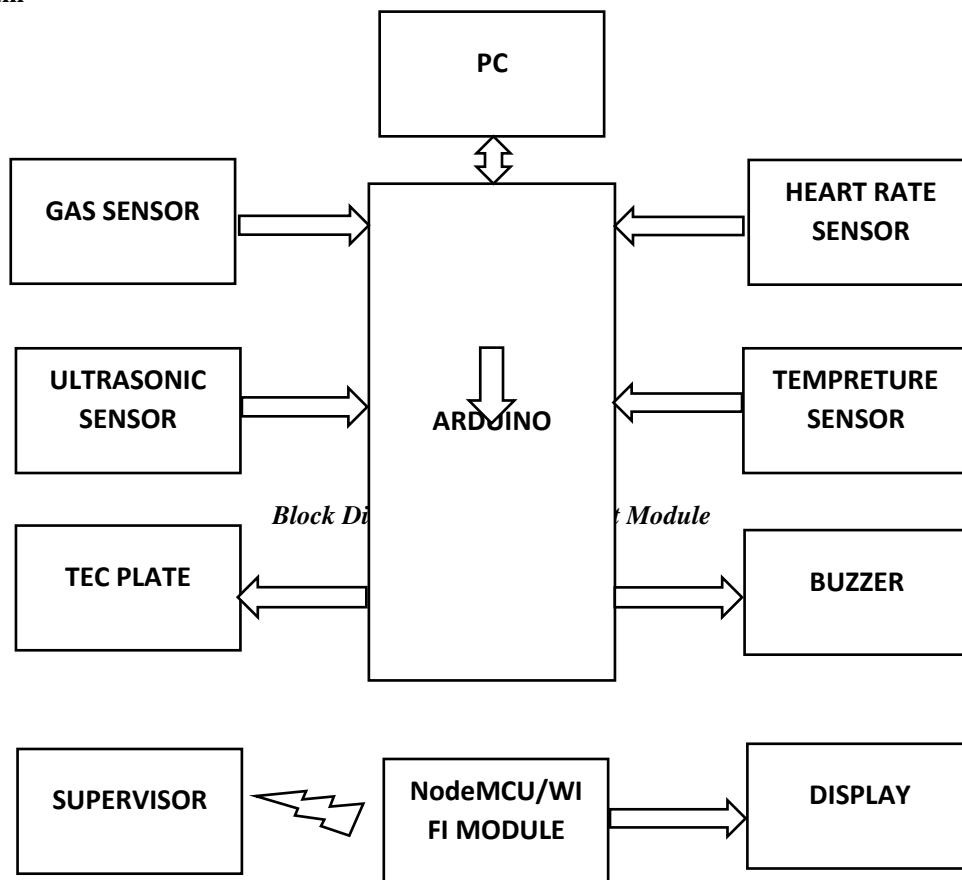
2.Gorli, Ravi. "Smart Jacket for Industrial Employee Health and Safety."

In contribution with Industrial safety and Employee health at work place a new costume which is equipped with the advanced technologies such as Internet of Things (IoT) and Wireless Body Area Network (WBAN) is proposed and framed as "Smart jacket". A Smart Jacket is a connectivity of smart sensors which will monitor the employee health and also provide precautionary measures for their safety at work from the Industrial hazards. The WBAN provides mechanisms for monitoring the health condition of the employee with a small device connected with sensors such as ECG, EEG, EMG, Pulse sensor and Respiration sensor. The safety precautions sensors as are also connected with the jacket for tracing the hazards that cause in the workplace due to Heavy machinery, harmful smoke or Gases. The monitoring will be done with a mobile device connected to the sensors with low power Bluetooth which will connect to the central Monitoring using the Bluetooth, Wi-Fi and ZigBee network.

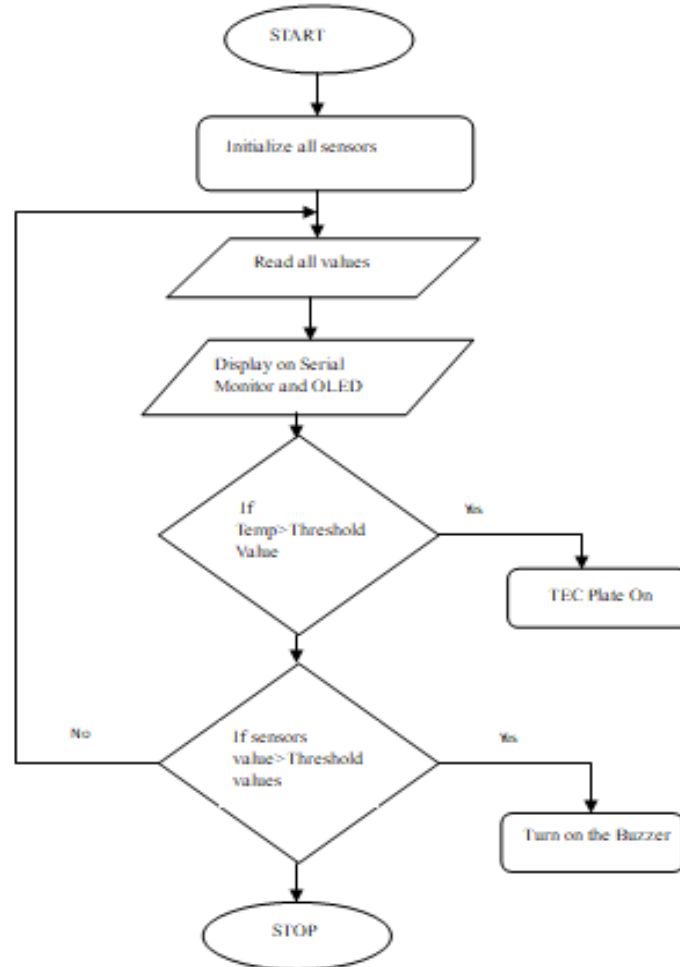
III. PROPOSED METHODOLOGY

A Smart Jacket is Equipped with different internal sensors and external sensors which will sense the input by using the designed working approach of the sensor and the information from all these sensors is transferred using a connectivity such as ThingSpeak Gateway and then the data is transferred to the central servers which are monitored from time to time and take immediate actions responding to the signals received by the sensors.

Block Diagram



Flow Chart:

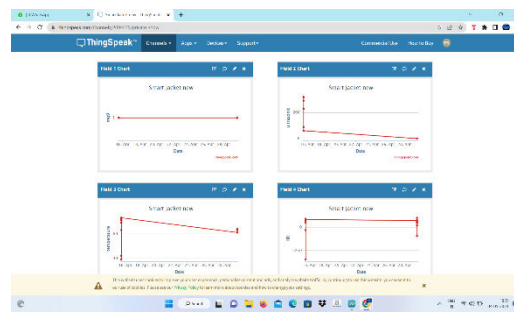
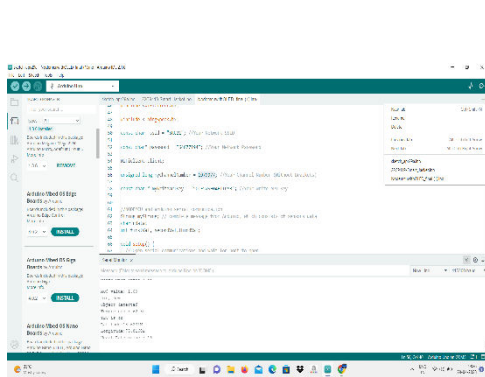
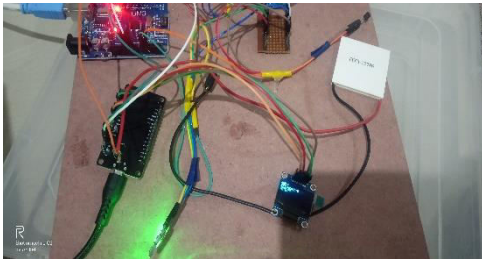


IV. WORKING

External sensors are sensors connected to the outside of the Smart Jacket. Sensors such as ultrasonic sensors, gas detectors, temperature sensor and pulse sensor are used to detect threats in advance. An ultrasonic sensor is a device that uses sound waves to measure the distance to an object. Measure distance by sending out a sound wave of a specific frequency and noting that the sound wave bounces back. By recording the time between the generation of the sound wave and its reflection, the distance between the ultrasonic sensor and the object can be calculated. With the help of ultrasonic sensors, an employee can detect dangerous machines or vehicles and perceive their distance Call from time to time and notify the agent. A gas sensor is a device that detects gas. A gas detector is a device that detects the presence of gas in an area, often as part of a security system. This type of equipment is used to detect a gas leak or other emissions and can be connected to a buzzer so that the worker gets notified. The gas detector can alert operators in the area where there is a leak and give them the opportunity to evacuate the area. Pulse sensor is used to detect the pulse of worker if the pulse of employees is higher than normal or lower than specific value then buzzer gets activated and it will inform to the employee. We used the LM35 temperature sensor for the detecting the environmental temperature if the temperature of surrounding become hot or cold then TEC plate adjusts the temperature of jacket accordingly. Using all of the sensors connected to the Smart Jacket, they will track dangerous information from time to time and take immediate action. We used the ESP8266 WIFI module for the data transmission to the supervisor through the ThingSpeak Gateway. Because the sensors capture information vividly, many workers can be saved from death and injury, or health effects can be understood and maximum precautions taken.

IV. RESULTS

Results are displayed on OLED and Serial Monitor and Data are recorded on ThingSpeak channel.



V. CONCLUSION

The proposed Smart Jacket monitors the temperature continuously and controlled automatically using the temperature sensor and TEC plate; either by the user, or other concerned people remotely, using the application and Internet of Things. Hazardous gases detect by the gas sensor and Buzzer informed to the employees. The pulse sensor detects heart rate information and records that data on Thing Speak, the Arduino controller will take actions, in case there are any precautionary measures needed to be taken and the concerned people are alerted.

VI. FUTURE SCOPE

This system can be improved in future for Indian Soldiers for their health monitoring and hazard detection when they on a mission.

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