SMART JACKET FOR INDUSTRIAL EMPLOYEES

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Abstract- The environment is affected by the intermittent changes in climatic conditions. Extreme heat or an absence of blood can be extremely hazardous to fitness. Extreme heat exposure and extremely low temperatures in the body may give rise to serious health issues. The most critical issue in an extremely hot climate is heart stroke. Hypothermia or hazardous overcooling of the body offer the most threat at extremely low temperatures. Occasionally, these uncommon weather conditions may result to terrible human fatalities. In order to provide better protection for those living in extreme weather conditions, we have designed a jacket called "Smart Jacket." Also, for business. The smart-Jacket could be quite useful, especially for our business employees who work in harsh weather conditions. The wearer can control and keep an eye on their internal temperature by wearing this jacket. This jacket also includes GPS and GSM modules that can track the employee's whereabouts and deliver alert messages when conditions are dangerous.

Key words: GPS, GSM, IOT, and sensors.

I. INTRODUCTION

  The commercial growth is increasing with the desires for the society. In this opposition of production, a large variety of industries are going through problems with employee health and safety. As most of the employees dropping their existence at paintings vicinity because of commercial risks and injuries. Industrial people are the key elements for jogging the industries, so their health and safety ought to be considered by using any enterprise. With the arrival of the smart jacket into the industries, a brand-new concept has been proposed as an asset to the financial labour fit and protection with rising technologies that incorporate a net various factor. As the fourth industrial revolution and the commercial internet of things (IIOT) advance in several industries, smart apparel can be utilized with connected sensors to read health. Wherein the related community while sporting this clever jacket. As the clever jacket geared up with temperature sensor, gasoline sensor, flame sensor. The temperature sensor on the way to reveal the health circumstance of the worker. GSM and GPS modules gives the document to higher government. So using this records the handling crew of the enterprise can be aware about employees circumstance in working area and sure immediate measures taken if any worker stricken by any injuries. Different safety precaution sensors, such as flame sensors, temperature sensors, and gas sensors, are also attached to smart jackets so as to prevent accidents at the workplace.If any worker is about to be affected by any hazards, this will sense it in advance, it means and several immediate measures are taken, such as giving the worker an alert by buzzer, so that he and his co-workers will be mindful of it and can be rescued from the dangerous circumstance.

II. LITERATURE SURVEY

[1].Dr. Chitra S. Rajasekar, Mr. Shivalaya Warule:
 His study involved examining lack of safety behaviour and safety performance is observed in various industries, for improving the safety culture and behaviour of the employee, industry needs to provide training, education, meeting, review etc. This paper deals with safety management awareness among

the shop floor employee, for creating safety lifestyle at workplace, as well as those who are associated with manufacturing industry.

[2]. Digvijay Guleria, Goli Dheeraj, Gokani Sriram, Konagani Karthik, Komal Chadha, Dr.AjayRoy: The paper suggests the design of a smart wearable jacket to protect the lives of coal miners. The prototype senses the various body parameters i.e. heart rate of miner presence of H gases exact position. These all parameters will then be transferred over Wifi shield to the dynamic internet protocol. The way one can monitor all the labours working inside the mines moreover in case of any emergency all the miners can be extracted immediately from the site. The proposed wearable embedded system will not only send the live location but also how many workers are working in that site what is the condition of the environment these all things ultimately helps in sensing the exact location of miners during any disaster so the extraction process can start immediately and maximum life can be saved.

 [3] Yacouba Mounmouni, Nawal Al Awadi, Mariam Al Hamadi, and Amal Al Hamadi:
This study aims to develop a life-saving suit with many sensors that makes fire fighters' jobs easier by giving them access to safety options. It had a variety of sensors, including laser detectors to detect far-off objects, temperature sensors, and gas sensors. It has an instantaneous data display Laser RGB coloured screen. A microprocessor and the aforementioned sensors were stitched onto the jacket.
The jacket which we designed consists of different sensors like temperature sensor, gas sensors like MQ-2, MQ-5, MQ-7,   MQ-9, Flame sensor, LDR, Buzzer. The jacket mainly consists of GSM and GPS Modules which sends exact location of the employee with alert message. The Buzzer makes sound if any one of the sensors is in abnormal stage.

III. MATERIALS AND METHODS
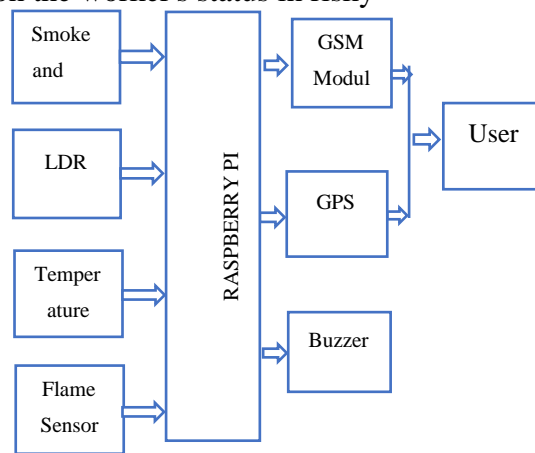Our "Smart Jacket" keeps an eye on the worker's status in risky

Fig 1.Block diagram

situations like fire attacks and the release of hazardous gases. A buzzer will sound and an alert message with the worker's position will be sent if they are in a perilous situation.
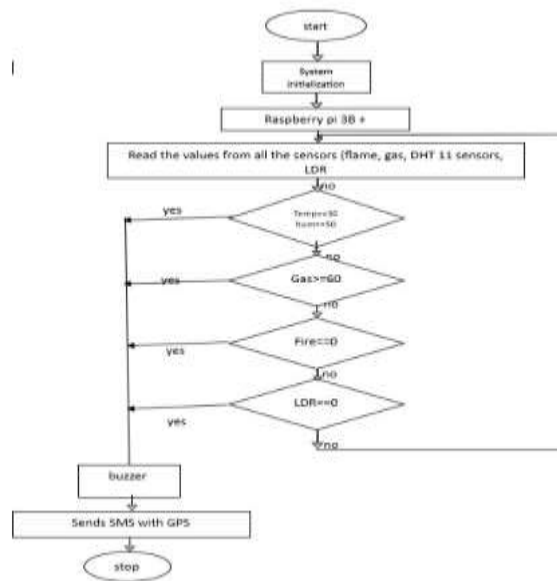
Fig 2. Flow Chart

The following are some of the numerous elements that can be used in creating a smart wearable jacket:

1 Raspberry pi 3B+
2 DHT11 Temperature and Humidity Sensor
3 MQ-2, MQ-6, MQ-7 Gas detecting Sensors
4 Flame Sensor
5 LDR
6 LED
7 BUZZER
8 GPS Module
9 GSM

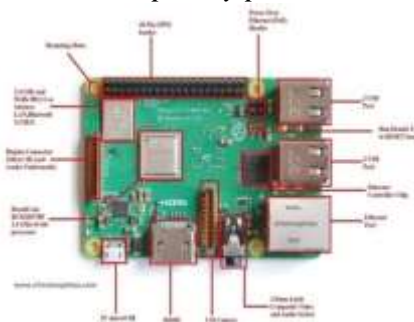*Raspberry pi 3B+ :-*

Fig.3 Wearable jacket   Fig .4 *Raspberry pi 3B+*

The Raspberry Pi is a credit score card-sized computer. The Raspberry Pi 3 version B+ is an stepped forward version of the Raspberry Pi three version B. It is based at the BCM2837B0 gadget on-chip (SoC), which incorporates a 1.Four GHz quad-middle ARMv8 64bit processor and a powerful Video center IV GPU. The Raspberry Pi can run a full variety of ARM GNU/Linux distributions, including Snappy Ubuntu core, Raspbian, Fedora, and Arch Linux, as well as Microsoft home windows 10 IoT core.

The Raspberry Pi 3 version B+ outperforms version B in numerous ways, including increased Ethernet throughput, twin-band WIFI, and a faster CPU clock speed (1.4 GHz versus 1.2 GHz). With an electricity over Ethernet HAT (now not protected), it also offers energy over Ethernet. A blog post from the MagPi magazine compares the performance of several Raspberry Pi models. The modular

compliance certification for the twin-band wireless LAN enables the board to be designed into finished goods with much lessened wireless LAN compliance testing, reducing both the cost and time to market. The majority of tasks that a typical computer can perform, including word processing, spreadsheets, high-definition video, games, and programming, can be performed on the Raspberry Pi.
The board's four USB ports can be used to connect USB devices, keyboards, and mouse.

DHT11 Temperature and Humidity Sensor:-

Fig .5 DHT11 Sensor Module

The DHT11 is a commonly used temperature and humidity sensor that has an eight-bit microprocessor to output the temperature and humidity values as serial facts and a dedicated NTC to measure temperature. The sensor is clean to connect with other microcontrollers because it is factory calibrated as well. With an accuracy of 1°C and 1%, the sensor can measure temperature from 0°C to 50°C and humidity from 20% to 90%.

MQ-2 Hazardous Gas Detecting Sensor :-

Fig .6 MQ-2 Gas sensor module

The MQ2 is one of the most frequently used sensors in the MQ sensor line. The sensor is not a MOS (metallic oxide semiconductor). Due to the fact that metal oxide sensors largely rely on the change in resistance of the sensing material when exposed to gases, they are also known as chemi resistors. The MQ2 petrol sensor uses 800mW of power and runs at 5V DC. LPG, smoke, alcohol, propane, hydrogen, methane, and carbon monoxide concentrations can range from 200 to 10,000 parts per million (ppm).

MQ-6 LPG Gas Sensor

Fig .7 MQ-6 LPG sensor module

The MQ-6 module is a gas leak detection device used in homes and businesses. It is particularly sensitive to LPG, isobutane, propane and LNG. Additionally, it might be used to identify the presence of cigarette smoke, alcohol, and culinary odours. The module outputs a voltage analogue to the concentration of the gases that represents awareness of the gases. The module also includes an internal comparator for comparing against a movable present price and displaying a virtual high or low. It may easily be interfaced with your Raspberry Pi or Arduino.

MQ-7 CO Carbon Monoxide Coal Gas Sensor :-
This sensor for measuring ambient carbon monoxide (CO) concentrations is simple to use. Anywhere between 10 and 500 ppm of CO-gas concentrations can be detected with the MQ-7. This sensor has outstanding sensitivity and responds rapidly. The output of the sensor is an analogue resistance.

Fig .8 MQ-7 CO sensor module

Simple steps to complete the pressure circuit include powering the heating coil with 5V, adding a load resistance, and connecting the output to an ADC. Similar to our MQ-three alcohol sensor, this sensor also comes in a bundle and may be utilised with the breakout board below.
MQ-135 Air Quality Gas Sensor:-

Fig .9 MQ-135 Air quality snesor

The analogue pin is TTL pushed, operates on 5V, and is compatible with the majority of commonly found microcontrollers..
The MQ-150 fuel sensor can identify hazardous gases and smoke, including ammonia (NH3), sulphur (S), benzene (C6H6), and CO2. Similar to other gasoline sensors from the MQ series, this sensor features a pin for both a digital and analogue output. The virtual pin is moving upward as the gases' levels rise above a ceiling restriction in the air. The on-board potentiometer may be used to adjust this threshold value. The analogue output pin generates an analogue voltage that can be used to gauge the concentration of certain gases in the surrounding air. The MQ135 air quality sensor module uses 5V and draws around 150mA. Before it can definitely produce correct results, it needs to be preheated.

FLAME SENSOR :-

Fig .10 Flame sensor module

A flame sensor is a sensor that reacts most strongly to ordinary light. As a result, flame alarms use this sensor module. This sensor picks up flame from the light source at wavelengths between 760 and 1100 nm. This sensor is easily susceptible to thermal breakdown. So, it is possible to position this sensor a specific distance from the flame. From a distance of 100 cm, the flame may be detected, and the detecting angle is 600. This sensor produces an analogue signal or virtual signal as its output. These sensors serve as a flame alert in firefighting robots.

LDR:-

Fig .11 LDR sensor

Photograph resistors, also known as light structured resistors (LDR), are light-sensitive electronics that are typically used to detect the presence or absence of light or to gauge the strength of the light. Their resistance can be very high in the dark, often reaching up to one M, but when the LDR sensor is exposed to light, the resistance rapidly decreases based on the light depth, sometimes even reaching just a few ohms. LDRs are nonlinear devices having variable sensitivity depending on the wavelength of applied light. Although they have various uses, other devices like photodiodes and phototransistors are frequently utilised to carry out this light detecting function. A few nations have outlawed lead- or cadmium-based LDRs due to environmental safety concerns.

LED: -

Fig.12 LED

In comparison to incandescent light sources, LEDs have a number of advantages, including lower electricity usage, a longer lifespan, improved physical toughness, a smaller length, and faster switching. Instead of these generally positive characteristics.

BUZZER:-

Fig .13 Buzzer

A mechanical, electromechanical, or piezoelectric audio signalling device, sometimes known as a buzzer or beeper. Buzzers and beepers are often employed as alarm clocks, timers, train announcements, and to signal human action such as a mouse click or keyboard press..

GPS MODULE:-

Fig .14 GPS Module

The global Positioning system (GPS) is a satellite-based navigation system that provides time and location information. In recent years, GPS has gained widespread use and evolved into an essential component of smartphones. Applying the GTPA010 module is simple.

Having both a USB interface and an RS232 port. It runs over a 3.3V to 5V supply range, allowing for 3.3V and 5V microcontroller interface.

GSM MODULE:-

Fig .15 GSM module

A GSM modem, often referred to as a GSM module, is a device that uses GSM mobile telephone technology to provide wireless data access to a network. GSM modems are a component of mobile phones and other devices that connect to mobile phone networks. For the network to recognize their device, they use SIM.

IV.RESULTS

Jacket is the maximum not unusual get dressed code that each commercial worker and miner has to put on at the same time as working in their paintings space. Smart jacket for commercial worker, is a device that may be without problems worn through people clothes containing sensor which might be carried out on board which might be in addition connected to outside hardware even though wireless verbal exchange, hardware integrates all the sensors without delay senses and connects to raspberry pi 3B+ via cables .We used four sensors(MQ-2, MQ-6, MQ-7, MQ-nine) connected to raspberry pi .These sensors will help stumble on harmful gases placed beneath the mines and dangerous gases which can be extract from and used for processing the uncooked material. While there is a surprising increase in poisonous gases the sensor will hit upon it and permit the individual recognize earlier than something happens. And additionally we're supplied with flame sensor for detecting the surprising fireplace injuries and while the sensor senses the fireplace happening in within the surrounding, it'll buzzes the buzzer to alert security. The flame sensor is hooked up to it raspberry pi to come across worker's place of business. DHT 11 sensor is likewise used on this jacket to come across and measures the temperature and humidity across the people administrative center, this may additionally enables in offering steady remark for their health. Similarly to energy these all sensor we've used lithium battery p.C. To energy the jacket .
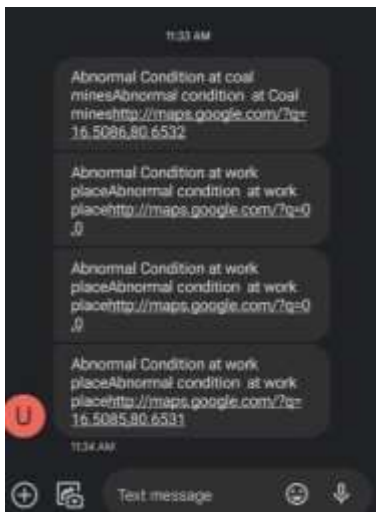
Fig .16 GSM received SMS

The result for above proposed device has been carried out by way of the usage of a general jacket after which in addition putting in the whole device in to it after which connecting it to the principle server by using using the VNC viewer, in which all the information may be similarly processed and analysis. We do have used a show that show all the caution signal it's far some thing like a automobile console that display warning if some thing went incorrect in car and its surrounding surroundings. For transferring the statistics and emergency message to the needed and licensed individuals to continue with the similarly protection protocols taken in the direction of the emergency vicinity we are the usage of GPS module for offer present day vicinity of the area in which the accident held and by using using the GSM module to despatched message to the close to via hospitals and hearth stations to take safety precautions. The whole sensor which senses individual frame might be at once in touch with pores and skin thru the jacket as a way to offer us the records related to gases degrees present in the paintings place, flame detection and temperature and humidity tiers and additionally checks the mild intensity ranges across the individual. All this information is supplied to precise locations.

V. CONCLUSION

This idea offers a sophisticated method of keeping an eye on the wellbeing of business personnel in risky situations in the workplace. The suggested strategy has been shown to be quite beneficial for economic professionals. The employees working in factories and mines have the best option thanks to this application.

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