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Using Microcontroller IoT Based Safety System of Coal Mine

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Abstract: In today's life security is the foremost challenge for all the mining workers. The mining safety system make sure the harm free working environment. The main purpose of the project is to reduce the mining accident and recover the working conditions. IoT based mine safety system has altered sensors for some purpose and the Arduino Uno is used for better reliability. All the sensors are organized considered as a unit and this system is placed in the mining industry. The few parameters such as temperature and humidity value, light intensity level, poisonous gas level in the air and trace of flame are observed from the working area by the sensors. These sensors values are sent to the Arduino for further process and if the values exceed the threshold equal an alert message is sent to the mining control room. In slightly emergency situations the buzzer is used to alert the workers who are working inside the mining working area.

Keywords — IOT, Coal mineworkers, Safety, GSM, GPS.

I. INTRODUCTION:

Internet of effects (IOT) is the fresh technology that join the whole world. It establish the connectivity among numerous scheme or bias and services in order to make robotization development in all areas. The main purpose of the design is to reduce the mining accident and develop the working conditions the troubles and hazards can be reduced significantly by making use of the rearmost smart technologies. The proposed system contains of the detector modules that senses all the data around the coal mine terrain and logs the data onto the pall controlled garcon runner using IOT unit. The ramify runner is maintained using the Java Garcon runner. The logged data is reused into the usual values for each entry on an interval base. These values are automatically reused using a predefined values maintained by the garcon runner. In India, we've 493 coalmines present. Coal is the most vital asset in the world. These petroleum products are natural means of the earth which help produce power and for some, purposes. Coal is an on-sustainable source which cannot be superseded generally by humans, there are multitudinous coalmine mischance passing in the mines, and the diggers are putting their lives in hazard by working in the coal mines, indeed formerly in a while they wind up losing their lives in the coal mines which is an unfortunate part. Substantially these mishaps are passing as a direct result of the old tackle and the wired systems, performing in the terminate mischance's, spillage of the noxious feasts in the coal mines are presenting immense troubles to the excavators inside the coalmines. They cannot leave the mine if there's no licit lighting which coming about them to harm the mineworker's vision because of working under low lighting area. So to stay down from this issue we've structured the coalmine security frame. In our work, we've dived the issues by checking every one of the information gathered by the detectors which we've employed and the observing is finished exercising the Thinger platform. Controlling is possible by both automatically and manually. The microcontroller then in the work we've employed is Node MCU.

II. LITERATURE REVIEW :

Numerous workshop has been carried out in monitoring coal mine feasts and physical variables. In 2016, Pablo Aqueveque, Christopher Gutierrez, Francisco Saavedra, Estevan. Pino, Anibals. Morales, Eduardo Wiechmann, they enforced a system to continuously cover and measure the physiological variables of the workers at high altitude. The physiological variables included were electrocardiogram, respiratory exertion and the body temperature and ambient moisture. They used Bluetooth as a communication media and the tasted data was transferred to the monitoring unit through the Wi- Fi link (1). In 2018, Ivan Alfonso, Camilo Gomez, Kelly Garces Jaime Chavarriaga proposed an optimization methodology for the deployment of wireless detector networks to cover feasts in underground coal mining. They proposed two stage approaches for minimizing deployment costs and maximizing WSN continuance (2). In 2017, Mohd Anas, Syed Mohd Haider, Prateek Sharma proposed the gas monitoring system they enforced a system to cover the real time feasts. They also stated the different feasts present in the coal mine terrain and the goods of the feasts. The admissible limit of the feasts is also stated in their work (3).

III. BLOCK DIAGRAM:

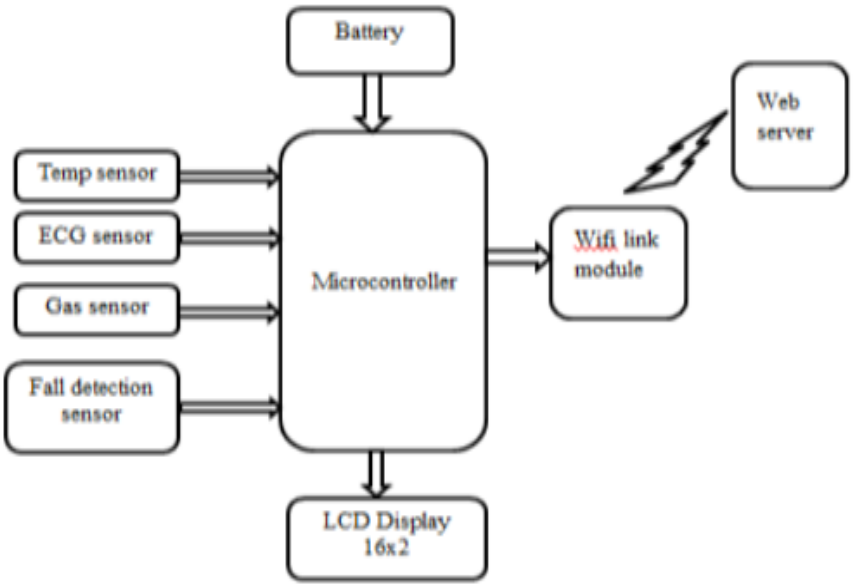


Fig (1) Block Diagram of Transmitter Unit

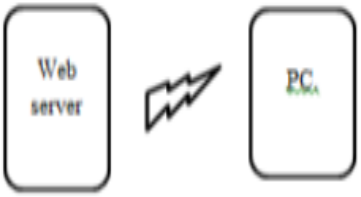


Fig (2)Block Daigram of Moniter Unit

The system consists of two units: i) Transmitter unit. ii) Monitor unit. In the transmitter unit all the main data processing carried out. We use four sensors, Temperature sensor, Gas sensors, Heart beat sensor, fall detection sensor. The temperature sensor used in this system is (LM35) which continuously monitor the environmental temperature. The graphical representation of this data is shown on the PC with date and time. The gases present in coal mine environment are harmful and may cause serious issues to the health of the worker when reached beyond the safety value. The gas sensors used here is the MQ5 sensor which is used to measure the methane and CO contain in the environment. When the methane contain increase beyond the safe value then this may affect the health of the worker and may cause shortness of breath, dizziness, Migraine, vomiting. The ECG sensor is used to continuously measure the heart activity. Graph is plot in accordance with the sensed data.

IV. FOLWCHART:

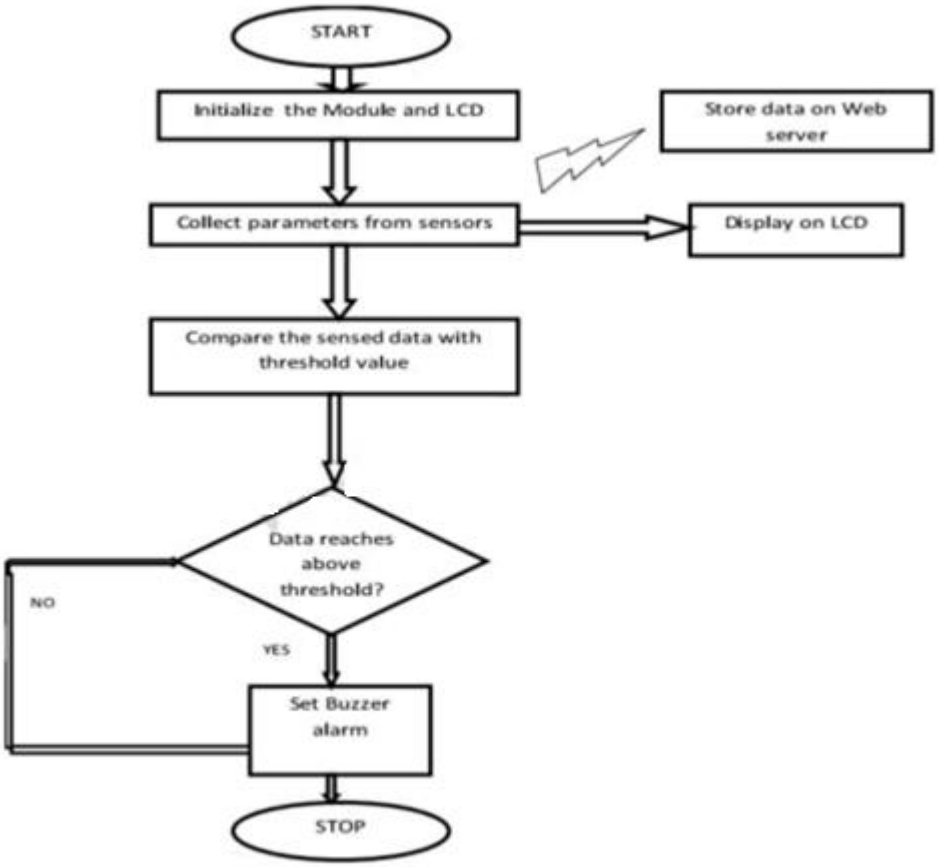


Fig (3)

The sensors are embedded on the T-shirt (first layer of clothing) they measure the physiological and environment variables. The communication between the monitoring unit and transmission unit is achieved by using Wi-Fi link module. The Wi-Fi system contains SOC and integrated with TCP/IP protocol stack. It gives the network contact to any microcontroller. Using this, real time health rank journalism to the monitor unit is possible. The Think-speak application can be loaded onto the PC and also in mobile. In the monitoring stage (PC) makes possible to show the physiological and environmental parameters and displays the plots and report the health status. For periodic record of analysis and control, the system allows to store the data.

V. RESULT AND DICUSSION:

In this chapter, we discuss the various simulation output results.

Fig 4 shows the updating Things speak IOT

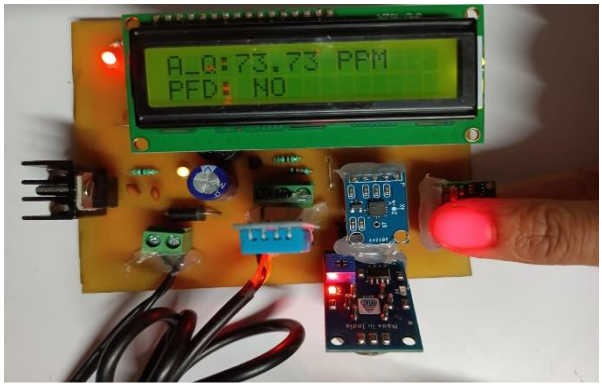


Fig 5 shows the Air Quality index and Person fall detection in terms of yes or no

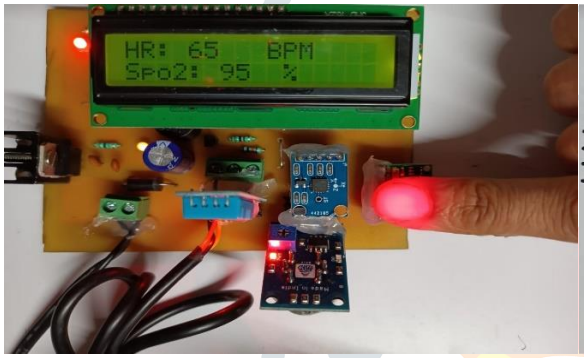


Fig (6) shows the heart rate in and SPO2

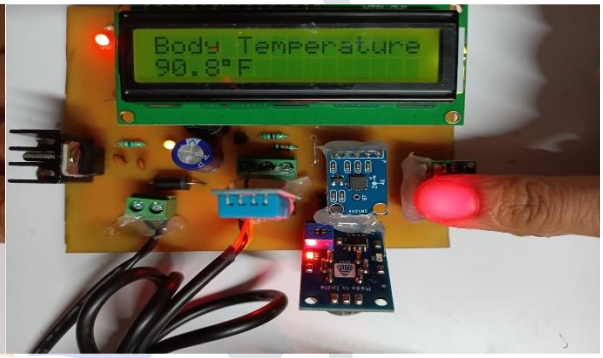


Fig (7) shows the Body Temperature

Fig (8) shows the temprature in degree and Humidity

1) People with healthy lungs should have an oxygen position of 85- 100 when measured with a pulsation oximeter.
2) A normal sleeping heart rate used for grown- ups ranges from 60 to 100 beats per minute.
3) Normal body temperature varies by person, age, exertion, and time of day. The average normal body temperature is generally accepted as98.6 °F (37 °C). Some studies have shown that the" normal" body temperature can have a wide range, from 97 °F(36.1 °C) to 99 °F(37.2 °C).
4) A temperature over100.4 °F (38 °C) most constantly means you must a fever affected through an infection or illness.
5) 250- 400ppm usual background attention in out- of- door ambient air
400-, 1000 ppm attention typical of engaged inner spaces with good air exchange
1000-, 2000 ppm Complaints of drowsiness plus poor air.
2000-, 5000 ppm Headaches, somnolence and stagnant, banal, stuffy air. Poor attention, loss of care, increased heart rate and slight nausea may also be present. 5000 plant exposer limit Factory (as 8- hour TWA) in utmost authorities.

5000>40, 000 ppm Contact may lead to serious oxygen deprivation performing in endless brain damage, coma, indeed death

Results in Graphical view:

The proposed system is tested and the output is shown in the graphical form using the think speak application. The data sensed by the sensor is processed and then send to the web server through the Wi-Fi link module. At the monitor unit the think speak application is installed onto the PC and here we can see the real time plots of each sensor. The think-speak application is very easy to use, just enter the channel ID and here you get your plots with the date and time information.

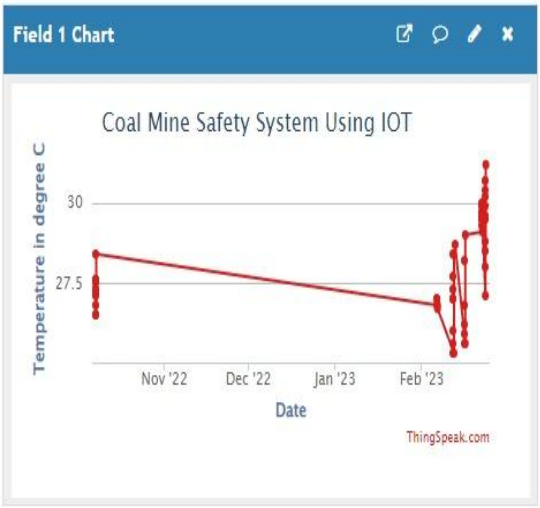


Fig (9) shows the graph of temperature in degree C

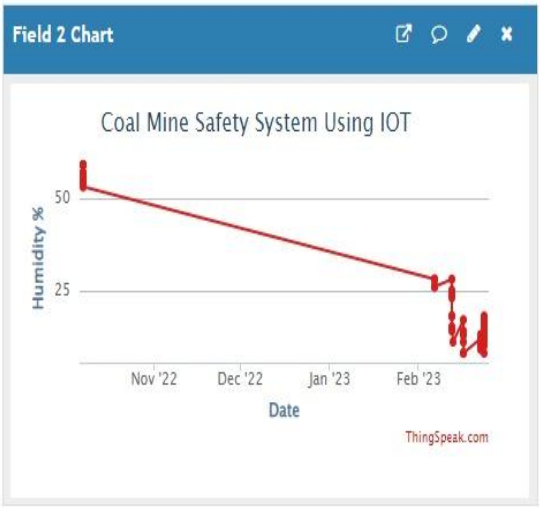
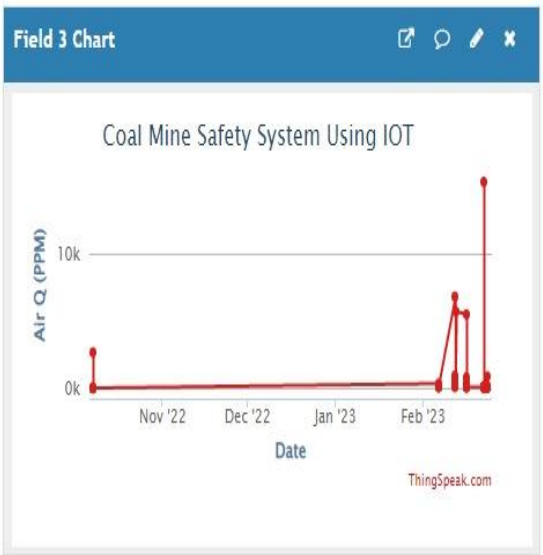


Fig (10) shows graph of humidity



Fig(10) shows the graph of Air Quality in PPM

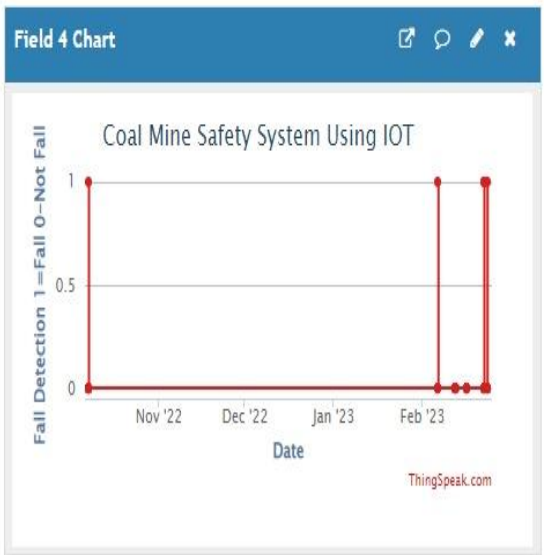
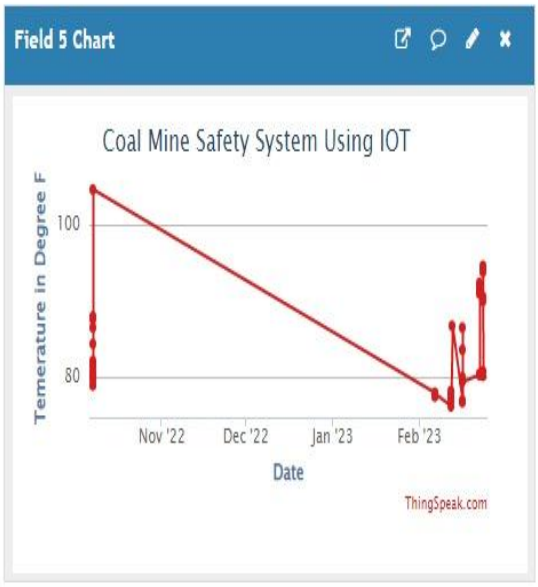


Fig (11) shows the graph of Fall detection



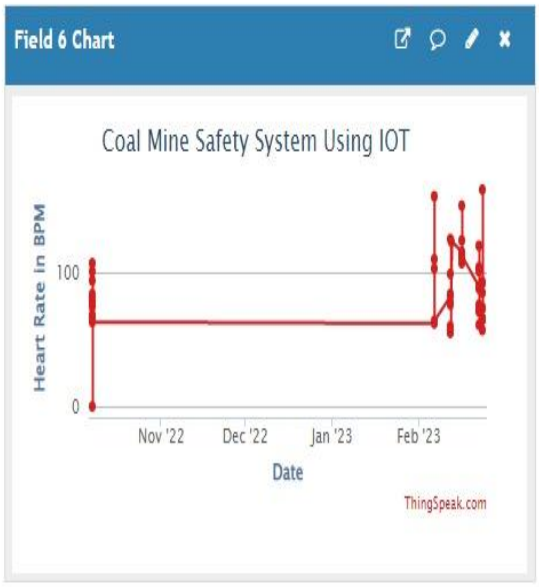


Fig (12) shows the graph of Temperature in F

Fig (13)shows the graph of Heart Rate in BPM

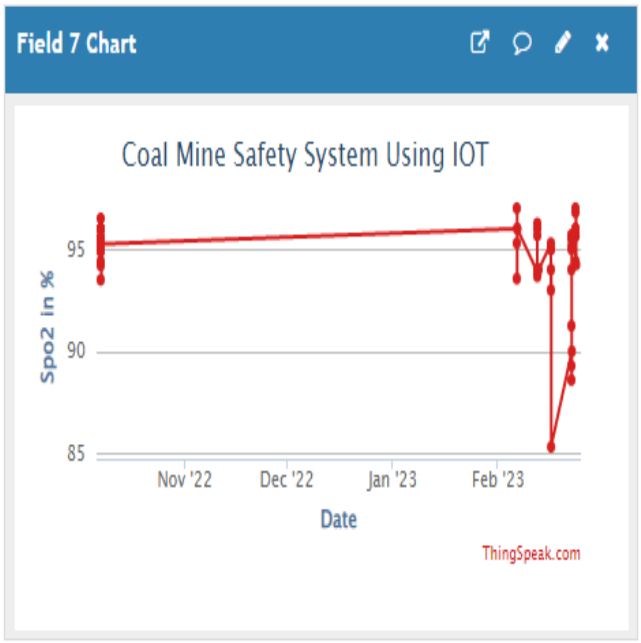


Fig (14) shows the graph of SPO2 in %

VI. CONCLUSION:

In our design we can just avoid detriment to the mining people, but we ca not bring them to the up. If a person affected by parameters by high temperature or dangerous feasts. We can just give the information that what's passing there, but we ca not back. So in future with this module add one robot to that, this robot helps to come out them. This paper represents the tackle perpetration of the real time covering the physiological and the environmental variables of the coal mine workers. We've concentrated on the design and perpetration of the monitoring system to continuously cover the feasts and the physiological variables of the workers. The detectors are bedded on the T- shirt of the worker and the communication is done by using wireless network between the T- shirt and the monitoring unit. By using IOT it's easy to store the data. The suppose- speak operation helps us to show the graphical representation of each detector. The alarm works rightly detecting any problems the worker is suffering. The system is tested and the results are attained consequently. This system substantially focuses on the safety of the workers therefore by reducing the unborn accidents which can be caused by the unforeseen change in the measured

VII. REFERENCES:

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