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IOT Based Hazard Alert System for Coal Mine Workers

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ABSTRACT: Internet of Things Based Coal Miner Hazard Warning System Summary: The coal mine is a hazardous field, it has changed the deadly factors that threaten people. Predominantly after the coal mine catastrophe, the rescue force was unaware of the coal mine situations that occurred. It is very unsafe to enter the mine without detecting the environment conditions as there is a chance of second explosion to occur. It can enter explosive environment and detect gas content, humidity and temperature, etc. The data can be sent to the controller in the security domain. The method that exists today is to not monitor the environmental conditions inside a coal mine, send people inside and connect sensors to their helmets. According to the information detected by the sensor (if a dangerous gas is detected), the horn of the headset will turn Clear in the dark, just like a smart helmet and turns on the buzzer and alert is sent to authorized person.

KEYWORDS: RPS, Arduino UNO (node \u200b\u200b\\ u200b \\ u200bMCU), temperature sensor, humidity sensor, gas sensor.

I.INTRODUCTION

Coal mine is a dangerous field, it has changed the deadly factors that threaten people. Especially after the coal mine disaster, rescuers did not know the situation of the coal mine tunnel. It is very dangerous to enter the mine without detecting the environment because a second explosion may occur [10] The coal mine detection and rescue module is a mobile prototype .It can enter an explosive environment and detect gas content, temperature, etc. The data can be sent to the controller in the secure area. Even under the best of conditions, coal mining is inherently dangerous, with a zero error rate[11].Even small security bugs can be catastrophic. The main airborne hazards in the mining industry include various types of particulate matter, natural gases, engine exhaust gases, and some chemical vapors. The main physical hazards include noise, segmented vibration, heat, air pressure changes, and ionization[12]. Radiation. This article is about a system that uses the Internet of Things platform as a medium to transmit data [13]. The system is proposed to monitor environment conditions on different parameters in mining area, such as light detection, gas leaks, temperature and humidity conditions, and smoke detection in coal mines[14]. All these sensors are put together as a single module and arranged in the coal mine, and can be monitored by the operator using the Wi-Fi module on the LCD screen and in Blynk application[15].

II.LITERATURE SURVEY

Kumar et al[1] proposed design which is built on MSP430, In the coal mine various parameters like Temperature, humidity, gas and smoke are observed. Climate state is controlled by motor which is placed at center location where Zigbee transceiver is placed.

Lihui et al[2] implemented a system, where various parameters like temperature, humidity, methane values are monitored in coal mines are values are collected by the sensor nodes and the information is sent to ARM controller for processing, Zigbee is utilized for communication purpose. If any parameters reach threshold value or goes high, then an alert of SMS is sent , the safety of the workers is maintained.

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Madhu et al[4] developed a coal mine safety monitoring system by utilizing Temperature, humidity and the amount of carbon-dioxide present are checked. If any uncertain condition occur then message is sent to the forest and fire departments with the help of GSM.

Ashish et al [5] described a system that is based on ARM controller and different sensors like temperature sensor, humidity sensor and the gas sensor. To check the conditions in mining area an IR sensor is placed.

Wakode et al[6] suggested a system that mainly used to monitor the concentration of dangerous gases in the coal mine.

Aarti et al[7] developed a system that monitors temperature, humidity, methane values in the coal mine and all the information are sent to the ARM9 processor. By using a Wi-Fi module these values are monitored and continuously these values are updated in the webpage.

Dheerajet al[8] suggested a framework that values of all the environmental conditions of different parameters that are monitored are stored .These values are visualized in the cloud and those can be controlled using smart phone ,to maintain the safety of the coal mine workers.

Dong et al[9]proposed a coal Mine safety Monitoring system utilizing Zigbee and GPRS remote transmission was established. With GPRS innovation, remote information transmission was accomplished and informed through the short message sent to his cell phone, which adds to the early ID of genuine mishaps and continuous treatment, subsequently expanding the security of coal mining.

III.PROPOSED SYSTEM FORIOT BASED HAZARD ALERT SYSTEM FOR COAL MINE WORKERS

A coal mine security system that uses the IoT platform which is Node MCU as a means of transmitting data. The system is used to monitor various parameters in coal mines, such as light detection, gas leaks, temperature and humidity conditions, and fire detection in coal mines and also these parameters are controlled by various fields. All the sensors are put together and considered as single unit and arranged in the mining area. All aspects of the sensor are continuously monitored and are uploaded to the Internet of Things for analysis. If there is any doubt about the gas level, i.e. if any gas reaches it threshold values ,as these values are continuously monitored here hence the buzzer will be turned ON which is used to warn the workers .In this system, RFID communication is set up for security purpose .If there is a fire and smoke detection in the coal mine, an alert notification will be sent to the mail of authorized person and required initiation are taken such as to provide coolants and water to decrease the temperature and off the fire .Temperature and humidity values \u200b\u200bare also continuously monitored and displayed on the LCD and the IoT platform. And also the system is provided with RFID communication which provides security for the mining area. Through this RFID we can give assurance that it does not allow unauthorized persons to enter into mining area and also we can keep a track of each workers inside the mining area and their access.

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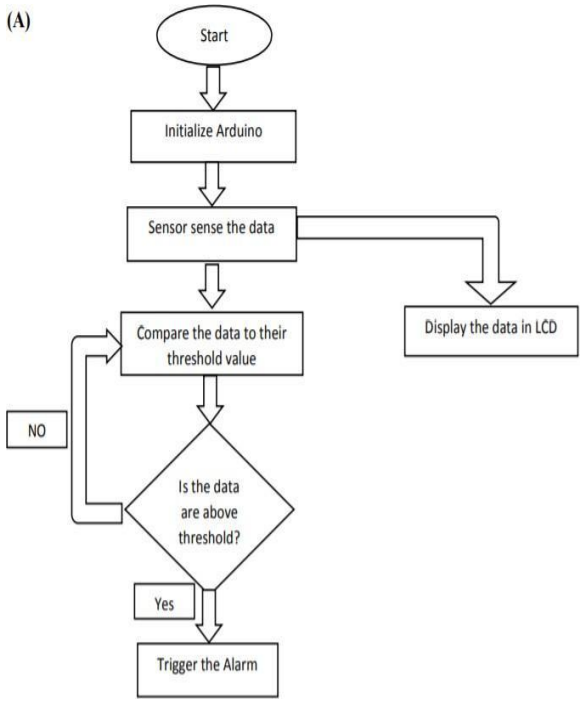
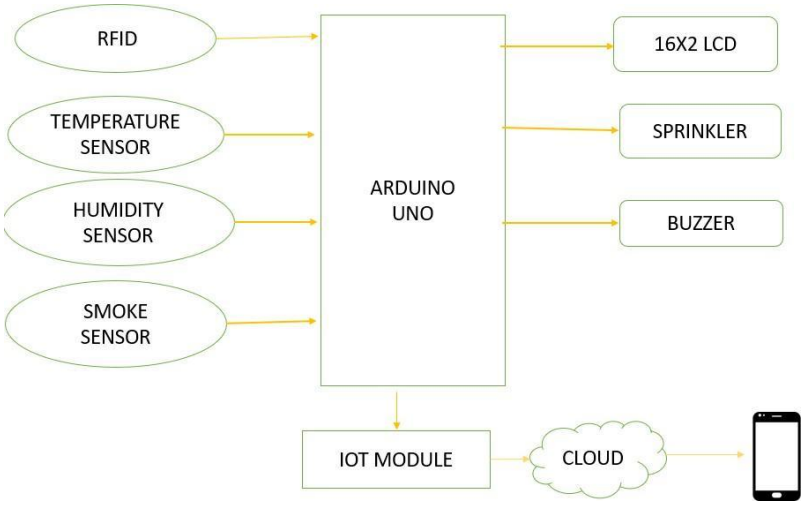
FLOW CHART



BLOCK DIAGRAM



IV.RESULTS

We have successfully designed the prototype of our project entitled "IOT BASED HAZARD ALERT SYSTEM FOR COAL MINE WORKERES" which is able to collect data using sensors and monitor environment conditions and able to view on LCD and Blynk application turns on alert system for hazardous conditions such as hazardous gases and high temperatures.

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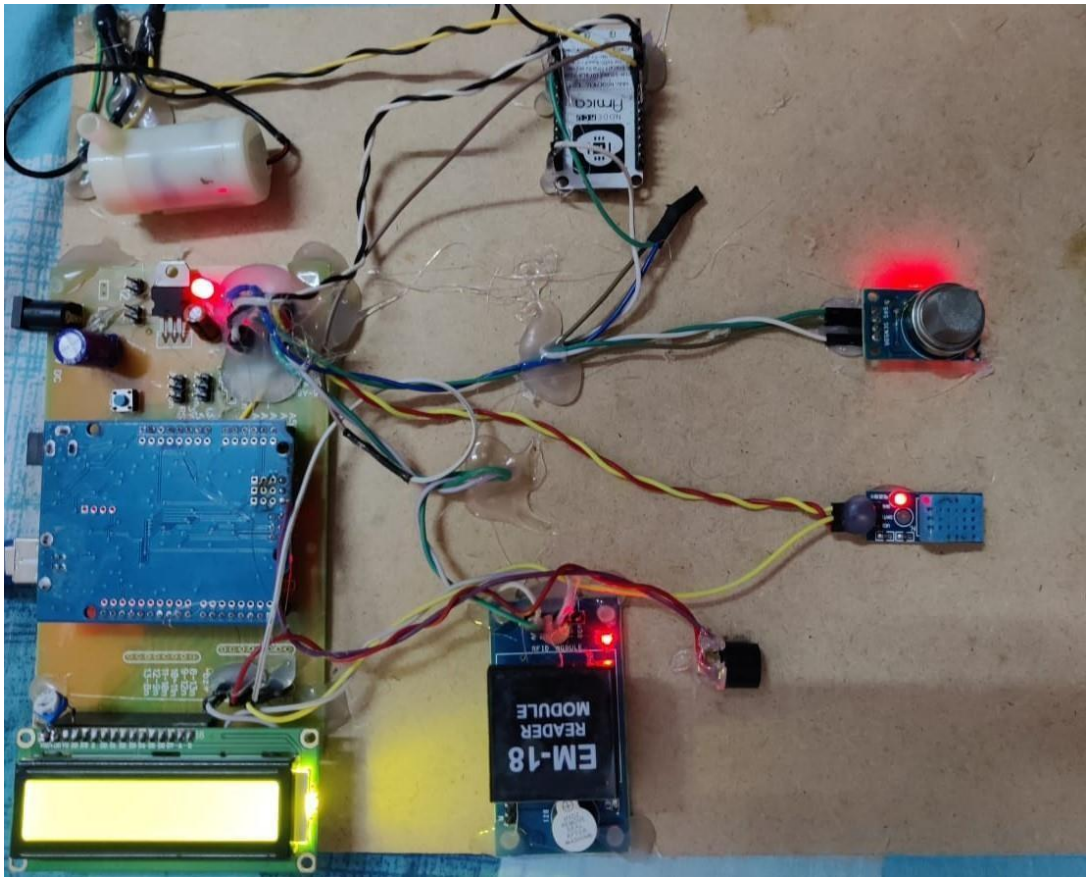

Fig. 1 Prototype of IOT based hazard alert system for coal mine workers

V.CONCLUSION

Hence, coal mine hazard alert system is implemented using smoke sensor, DTH 11 sensor for temperature and humidity and also for communication secure system in mining area provided by RFID communication . In this module we had provided with sprinkler which helps with coolant in it to decrease the temperature and humidity. This module is proposed for hazard alert and security for coal mining workers and mining area. By using this module is provided to give constant checking of environment conditions of mining area and also alerts for workers. Hence we can conclude that the system is also effective and also cost efficient.

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