

COALMINE WORKER SAFETY SYSTEM USING CLOUD

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ABSTRACT

Safety is the most vital part of any type of industry. In the mining industry safety and security is a fundamental aspect of all. To avoid any types of accidents mining industry follows some basic precautions. Still accidents take place in underground mines due to rise in temperature, increased water level, and methane gas leakage. Here we provide safety to worker. When worker in danger he can press panic switch in form security. To enhance safety in underground mines, a reliable communication system must be established between workers in underground mines and fixed ground mine system. The communication network must not be interrupted at any moment and at any condition. A cost effective zigbee based wireless mine supervising system with early-warning intelligence is proposed in this project. Worker status can be monitor over IOT.

Keywords—Arduino, wifi/GSM moule, zigbee, temperature sensor, gas sensor, water level sensor

INTRODUCTION

Mines are the world's most dangerous place to work because in the mines, explosion often happens and thousand people are dying and are centre port states that in such mine accidents an average of around 12,000people have died. Coal is a non sustainable origin that cannot be widely replaced by humans, there are several mishaps of coal mines occurring in the mines, and the diggers are putting their lives at risk, by working in the coalmines, even once in a while they enduplosing their lives in the coal mines that are an unfortunate part. Mainly such mishaps happen as a direct result of the old equipment and wired devices, resulting in the end, mishandling, spillage of the noxious gases in the coal mines, pose tremendous hazards to the excavators inside the coal mines. So we've designed the coalmine protection system to stay away from this problem. We tackled the issues in our research by testing each of the information collected by the sensors, we use and finishing the analysis using the Thingier system. Controlling can be done automatically or manually.

RELATED WORK

Ultra-modern mining workers have a big issue in phrases of safety. The mining protection machine ensures that the running environment is free of hazards. The undertakings number one purpose is to save you mining injuries and decorate operating conditions. The Arduino Uno is employed for extended reliability in the IOT-primarily based mine protection gadget, which has multiple sensors for numerous functions. This machine is used inside the mining enterprise, and all sensors are considered as one unit sensors screen an expansion of characteristics from the operating area along with temperature and humidity, light intensity, hazardous gasoline levels inside the air, and flame hint. Safety is the most important aspect of any industry. Safety and security are extremely important in the mining business. To avoid mishaps, the mining sector takes several fundamental safeguards. Temperature rises, water levels rise, and methane gas leaks continue to cause accidents in underground mines. It ensures worker safety here. When a worker is in danger, it can use the panic button to alert security. To improve underground mine safety, a reliable communication system between subterranean mine workers and the fixed ground mining system must be built. The verbal exchange community cannot be disrupted at any time or under any occasions. This suggestion proposes a low-free Zigbee-based totally wireless mine surveillance device with early-caution intelligence. The reputation of employees may be tracked via IOT.

Many coal miners are involved approximately their occupational protection bad ventilation in subterranean mines exposes people to toxic gases, heat, and dirt, which could reason illness, damage, and dying. This paper affords a concept for a web of things wireless sensor community that could detect temperature, humidity, and gasoline in an underground mines the usage of an ARM controller. The Arduino UNO, Node MCU, DHT11 sensor, gas sensor, hearth sensor to hit upon hearth and send an alarm, and LDR to detect mild depending on light levels are all used in this gadget. Traditional coal mineshaft monitoring systems are frequently wired organisation systems that play an important role in ensuring coal mineshaft security. It implements a safety system for coal mines and their workers in this study. Because of the dangers associated with coal mining, this method is required. For example, there is a risk of highly toxic gases being present in coal mines, and an increase in temperature inside the mine could be a serious concern, necessitating the implementation of a safety system for coal mine workers as well as to safeguard the mine's resources. It use a platform called Thing-Speak to develop such a system. Thing-Speak is a platform that displays data gathered from many sources. The source in this case is a Node-MCU, which provides inputs for connecting various sensors and will perform according to the specified code. The code was written in the Arduino IDE using the Embedded C programming language. Gas, humidity, temperature, fire, and light are all monitored by this system. This system uses Thing-Speak, MQTT, and Buzzers to warn the user in the event of any anomalies to the admin and workers.

Miners' safety is currently a big concern. Miners' health and lives are jeopardised by a number of serious challenges, including not just the working environment but also its consequences. The wireless sensor network totally coal mine protection tracking machine can exactly and immediately replicate the dynamic state of affairs of underground employees to the ground computer machine and mobile unit. Particulate count and gases which includes sulphur dioxide (SO₂), nitrogen dioxide(NO₂), and carbon monoxide(CO) are many of the pollutants launched with the aid of coal mines. Semiconductor gas sensors are used to monitor the concentration levels of hazardous gases.

ARCHITECTURE OF THE PROJECT:

A coal mine monitoring and alerting system is a complex system designed to improve safety and efficiency in coal mining operations. The architecture of such a system can vary depending on the specific needs and requirements of the mine, but generally consists of several key components.

Sensors: Sensors are placed throughout the mine to monitor various environmental and operational factors, such as temperature, humidity, gas levels, and equipment status. These sensors can be wired or wireless and can transmit data in real-time to a central control system.

Data Acquisition System: The data acquisition system is responsible for collecting and processing the data from the sensors. This system can be a standalone unit or integrated into the central control system.

Central Control System: The central control system is the brain of the monitoring and alerting system. It receives data from the data acquisition system and performs real-time analysis to detect anomalies or potential safety hazards. The central control system can also be used to remotely control equipment and make decisions to prevent accidents.

Communication System: The communication system is responsible for transmitting data and alerts between the central control system and personnel on-site. This system can use various communication technologies such as radio, Wi-Fi, or cellular networks.

Alerting System: The alerting system is responsible for notifying personnel of potential hazards or abnormalities detected by the monitoring system. Alerts can be delivered through visual and auditory alarms, text messages, or email notifications.

Data Storage and Analysis System: The data storage and analysis system is responsible for storing and analyzing historical data collected by the system

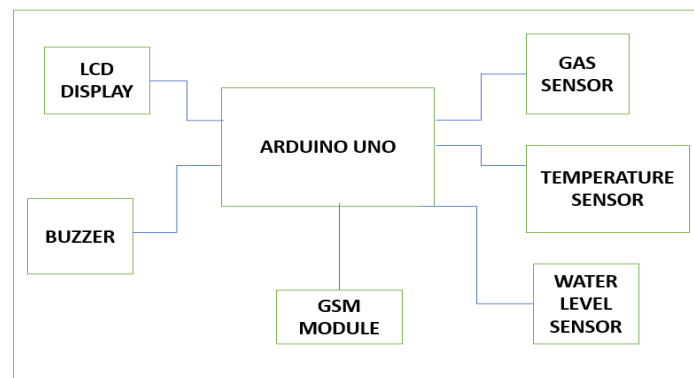


Fig 1 block diagram of coal mine monitoring system

EXISTING SYSTEM

In this paper, the existing literature on IOT based smart systems is analyzed with the suggested requirements. In addition, an investigation of the current state of technologies with respect to the enablers of the Smart farming is presented. To the best of the author's knowledge, no paper has surveyed and suggested comprehensive requirements for the Iot Based smart monitoring systems and analyzed existing research on these requirements.

PROPOSED SYSTEM

The physical traits of temperature and humidity, light depth value, and gas molecule attention are detected within the mining surroundings and saved on the cloud those outcomes may be plotted at the blynk net site or app, and that they may be stored for later exam. If there is any doubt, swift movement can be taken. Blynk is an open-supply net of gadgets utility and API for storing and retrieving data from matters over the net or via a local area community utilizing the HTTP and MQTT protocols. Blynk offers channels for storing statistics retrieved using IOT technologies. Every channel has eight information fields, 3 location fields, and one status field. The data is stored within the blynk channel as soon as it is allotted, and it can be stored for destiny has a look at The outcomes of the coal mine safety system as seen through the Blynk app are shown in the figures above. In this programme, we can see two units, each with a set of sensors, with only one temperature in the range of 30,40, and so on, while the remaining data are all between 1 and 0. When the value is 1, there is no problem; however, when the value is 0, flames, falls, toxic fumes, and other hazards are recognised. When the value of the sensors reaches a certain threshold, an alarm message will be delivered to Blynk app users. It will supply the values displayed on the LCD display in each unit before sending the alarm message, as well as the buzzer sound for the alert message.

BLOCK DIAGRAM OF PROPOSED SYSTEM

Figcoal mine safety monitoring and alerting system

In the above circuit diagram Shows the connection of Coal mine safety monitoring and alerting System by using this components arduino, LCD Display, water level sensor, temprature sensor, Gas sensor (mq 8),Buzzer, GSM module. Those are the components to connect the whole circuit.

Arduino is a popular microcontroller platform that can be used in coal mine safety monitoring systems. Here are some examples of how Arduino can be connected to various components in a coal mine safety monitoring system:

Sensors: Arduino boards can be connected to a wide range of sensors, such as temperature sensors, gas sensors, and humidity sensors. These sensors can be used to monitor various aspects of the mine environment and send data to the central monitoring system.

Communication Systems: Arduino boards can be used to control and manage communication systems in the mine, such as Wi-Fi networks and two-way radios. For example, an Arduino board can be used to control the power to the Wi-Fi access points and to monitor the signal strength.

Safety Equipment: Arduino boards can be used to monitor and control safety equipment such as ventilation systems, lighting systems, and emergency response systems. For example, an Arduino board can be used to monitor the status of emergency lights and activate them in the event of a power failure.

Monitoring and Control Systems: Arduino boards can be used to monitor and control various systems in the mine, such as conveyor belts, drilling machines, and ventilation systems. For example, an Arduino board can be used to monitor the speed of a conveyor belt and activate an alarm if it exceeds a certain speed.

Data Logging and Analysis: Arduino boards can be used to collect data from various sensors and store it for later analysis. This data can be used to identify trends and potential safety issues in the mine. For example, an Arduino board can be used to collect data on gas levels over time and alert personnel if there is a significant increase.

Overall, Arduino can be a useful tool in coal mine safety monitoring systems, as it can be used to connect various components and provide a flexible and customizable solution for monitoring and controlling the mine environment.

Mining equipment: The mining equipment, including drilling machines, conveyor belts, and ventilation systems, are connected to the control system. The control system can monitor their performance, adjust their settings, and shut them down if necessary to prevent accidents.

BLOCK DIAGRAM AND ITS EXPLANATION

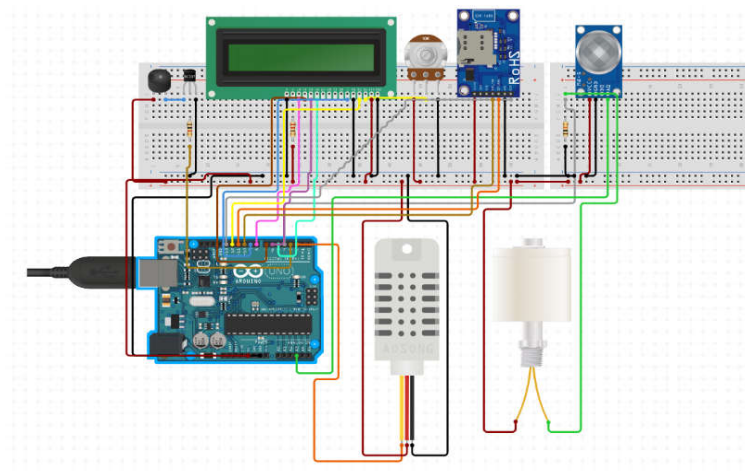


Fig 2: Block diagram of IOT based Coal Mine Safety Monitoring & Alerting System

This is the block diagram of our project, here we connected the temperature sensor, gas sensors, water level sensor in the breadboard to the VCC and ground. The buzzer is connected to the digital pins of output. Sensors are connected to the 11, 12, 13 pins of the Arduino Uno. LCD Display

CONCLUSION:

Here we concluded that the sensors utilized for the show of build are general with utilization of unpretentious sensors, the framework will work with extra exactness continuously. Ongoing natural remaining of underground mines is gathered by the detecting components networks perpetually and it will guarantee the well-being of diggers who are working underground and each movement of activity. In cautions, the administrator inside the room. It screens the significant time values during an efficient presentation. The thoughts of IOT helped in

growing low power effective arrangements. This project is declared that IOT applications will reach so a lot and wired into each side of the globe.

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