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IOT based coal mine workers safety monitoring and alerting system

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ABSTRACT

In this paper, a coal mine safety system is implemented using a Thinker Io platform as a medium to transmit the data. The system is implemented to monitor and control various parameters in the coal mines such as light detection, leakage of gas, temperature and humidity conditions, Fire detection in the coal mine. These all sensors are together considered as one unit and are placed in the coal mines. All the esteems of the sensors are continuously uploaded to the thinker for analysis. Here the gas is continuously monitored if any uncertainties in the level of gas arise, then buzzer is used to alert the workers. In this system LDR sensor is utilized to detect the presence of light. Automatically light gets one and can be controlled using the LED button. In case if any fire occurs in the coal mine, then an alert notification is sent to the mail of the authorized person. Temperature and humidity values are also continuously monitored and displayed on the serial monitor and also in the thinker platform. The developed system is mainly implemented to improve the working condition inside the coal mines and also to ensure workers safety

Keywords: LDR, Temperature, Humidity, LED

INTRODUCTION

As overall essentialness use additions and customary oil resources decay, breaking development is one of the noteworthy progressions to improve the maltreatment of oil and gas resources.

It is unprecedented vitality for the improvement of low-vulnerability stores and the instigation of low-yield wells. In light of the capriciousness of the stratum, various perils will be looked during the time spent breaking improvement, especially sand plug, which is the most notable, causing financial disasters and natural tainting, pummeling spillage in the course of action, and scraps the advancement well, etc. At present, the Internet of Things (IoT) has been commonly used in different fields, which makes huge data assessment stacked with challenges.

Definite data examination is basic to develop reasonable logical models. The oil business is a little bit at a time moving towards knowledge. Different sensors presented at the well site which can assemble data set up an IoT circumstance. The examination of the data assembled at the well site is made arrangements for removing key information by using data mining development, which can recognize data designs, and direct peril desire. Right now, use of data mining advancement to the early notification of splitting improvement is of uncommon immensity for avoiding the sand plug setback that occurs during the breaking technique.

LITERATURE SURVEY

"Capacitive Interfacing for MEMS Humidity and Accelerometer Sensors", Norliana Binti Yusof, Norhayati Soin, Siti Zawiah Md.Dawal, 2010, IEEE.

The paper proposes an early reprimand procedure for the risk of sand plug subject to twofold logarithmic twist. Directly off the bat, the coupled time region examination and GRNN figuring are used to predict the oil weight and bundling pressure parameters in the twofold logarithmic curve slant sand plug chance caution .What's more, a while later the inclination change is applied to perceive and condemn the sand plug, which can comprehend the early reprimand of sand fitting of breaking. Finally, in order to improve the precision of twist slant tally, the improved AP gathering computation is used to divide the oil weight and weight twist followed by twist fitting, at the same time figure the inclination of the fitted curve. The essential duties of the paper are according to the accompanying: (1) An early counsel model for the twofold logarithmic twist of sand connection of making is constructed laugh hysterically in the paper. (2) The time course of action examination count is proposed which can be

envision the oil weight and bundling pressure in the early notification model, and the GRNN estimation is used to update the desire realizes the time space assessment. (3) Improved AP gathering computation is used to pack the watching data to improve the precision of risk notice. The rest of the paper is sifted through as follows. Region 2 gives four logical models which fuses twofold logarithmic twist model, time game plan model, GRNN, improved AP gathering. Portion 3 portrays a perceptive model for coupling time plan time zone examination with GRNN. Territory 4 diagrams the improved AP packing early reprobation model. Section 5 gives building application assessment.

2. "A Wireless Home Safety Gas Leakage Detection System", LuayFraiwan, KhaldonLweesy, AyaBani-Salma, Nour Mani, 2011, IEEE.

A remote security contraption for gas spillage recognizable proof is proposed. The contraption is made arrangements for use in nuclear family prosperity where mechanical assemblies and radiators that use combustible gas and liquid oil gas (LPG) may be a wellspring of danger. The structure moreover can be used for various applications in the business or plants that depend upon LPG and combustible gas in their undertakings. The structure setup involves two essential modules: the distinguishing proof and transmission module, and the tolerant module. The ID and transmitting module perceives the distinction in gas center using an extraordinary distinguishing circuit worked thus. This module checks if an alteration in gathering of gas (es) has outperformed a certain pre-chosen edge. In case the sensor recognizes an alteration in gas center, it impels and differing media alert and gives a sign to the authority module. The authority module goes about as a flexible alert device to allow the convey ability inside the house premises. The system was had a go at using LPG and the alert was impelled as a result of progress in center.

3. "MQTT Based Environment Monitoring In Factories for Employee Safety", Ravi Kishore Kodali and Aditya Valdas, 2017, IEEE.

Prosperity of laborers, in any industry, especially at the creation line level is one of the most noteworthy edges to be considered by associations. This is of focal importance, both for the flourishing of the delegates and that of the organization all things considered. In preparing plants where working conditions are unforgiving and agents need to take staggering caution while moving toward their work, it is typical for episodes to occur. With numbers going as high as into the thousands it is noteworthy that there is an extent of security for the agents from any possible risky conditions.

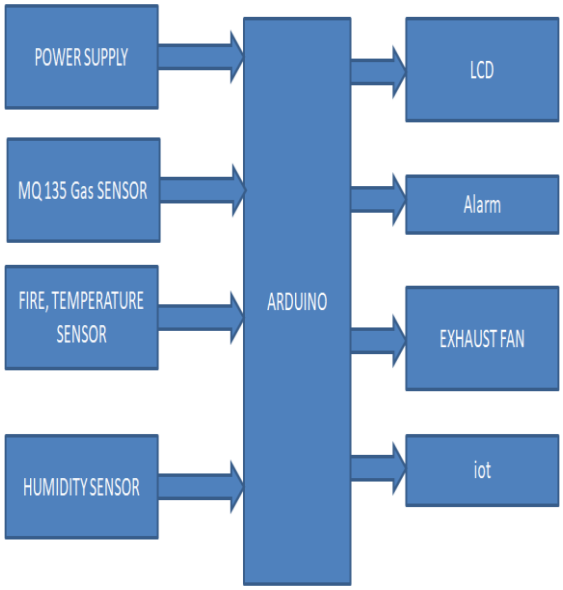
As a response for this issue, we propose a checking structure to be presented in mechanical offices. With this structure, we will have the choice to screen fundamental security parameters of the work environment in these mechanical offices so we are particularly mindful of the prosperity condition and the possibility of occurrence of any misfortune. For the structure of this system, we use an ESP8266 Wi-Fi chip engaged microcontroller Node MCU. To this are related three sensors - one to screen temperature and suddenness (DHT sensor), a ultrasonic sensor (HC-04) and a smoke sensor (MQ2 sensor). These sensors constantly screen the earth in the workplace and move the data onto the Losant IoT Platform, which is one of the most amazing cloud stages which help screen data by different portrayals and further game.

EXISTING WORK

- The current system used in detection of mine safety includes sensors which are incorporated in a room or other area.
- Sensor Datas are monitored using Wires or LAN
- Not suitable for all regions
- Application is less
- No remedial measures undertaken by the system by itself

PROPOSED SYSTEM

Here the system uses sensor to detect gases and earthquake or vibrations. The signals from the sensors are fed to the adc of the microcontroller where the analog to digital conversion takes place. The parameters are sent via the esp8266 through which we can monitor it remotely via wifi in IOT



HARDWARE MODULES

- FIRE SENSOR
- GAS SENSOR (MQ2)
- HUMIDITY
- RELAY
- FAN

- IOT MODULE
- ARDUINO MICROCONTROLLER

FIRE SENSOR

This fire sensor circuit mishandles the temperature distinguishing property of an ordinary sign diode IN 34 to recognize heat from fire. At the present time it recognizes heat, an uproarious alarm reproducing that of Fire separation will be made. The circuit is unnecessarily unstable and can distinguish a climb in temperature of 10 degree or more in its locale. Ordinary sign diodes like IN 34 and OA 71 shows this property and the inside restriction of these contraptions will lessen when temperature rises. The fire sensor circuit is exorbitantly sensitive and can recognize a rising in temperature of 10 degree or more in its locale. Standard sign diodes like IN 34 and OA 71 showcases this property and within restriction of these devices will lessen when temperature rises. In the pivot uneven mode, this effect will be progressively basic. Ordinarily the diode can make around 600 mille volts at 5 degree centigrade. For each degree rise in temperature; the diode makes 2 mV yield voltage. That is at 5 degree it is 10 mV and when the temperature rises to 50 degree, the diode will give 100 mille volts. This voltage is used to trigger the remainder of the circuit. Transistor T1 is a temperature controlled switch and its base voltage depends upon the voltage from the diode and from VR and R1. Commonly T1 conducts (as a result of the voltage set by VR) and LED sparkles. This shows run of the mill temperature.

GAS SENSOR (MQ2)

Fragile material of MQ-2 gas sensor is SnO2, which with lower conductivity in clean air. Right when the goal burnable gas exist, the sensor's conductivity is progressively higher close by the gas center rising. You should use clear electro circuit, Convert change of conductivity to look at caution sign of gas obsession. MQ2 gas sensor has high affectability to LPG, Propane and Hydrogen, also could be used to Methane and other burnable steam, it is with negligible exertion and suitable for different application. Sensor is delicate to flammable gas and smoke. Smoke sensor is given 5 volt to control it. Smoke sensor show smoke by the voltage that it yields .More smoke more yield. A potentiometer is given to change the affectability. In any case, when smoke exist sensor gives a basic resistive yield reliant on union of smoke. The circuit has a hotter. Power is given to hotter by VCC and GND from power supply. The circuit has a variable resistor. The check over the pin depends upon the smoke in air in the sensor. The deterrent will be cut down if the substance is more. Besides, voltage is extended between the sensor and weight resistor.

WORKING PRINCIPLE

The MQ2 has an electrochemical sensor, which changes its impediment for different assemblies of vacillated gasses. The sensor is related in course of action with a variable resistor to outline a voltage divider circuit (figure showed up underneath), and the variable resistor is used to change affectability. Right when one of the above vaporous segments cooperates with the sensor resulting to warming, the sensor's resistances change. The alteration in the block changes the voltage over the sensor, and this voltage can be examined by a microcontroller. The voltage worth can be used to find the block of the sensor by knowing the reference voltage and the other resistor's restriction. The sensor has differing affectability for different sorts of gasses.

ACCELEROMETER

The MQ2 has an electrochemical sensor, which changes its impediment for different assemblies of vacillated gasses. The sensor is related in course of action with a variable resistor to outline a voltage divider circuit (figure showed up underneath), and the variable resistor is used to change affectability. Right when one of the above vaporous segments cooperates with the sensor resulting to warning, the sensor's resistance changes. The alteration in the block changes the voltage over the sensor, and this voltage can be examined by a microcontroller. The voltage worth can be used to find the block of the sensor by knowing the reference voltage and the other resistor's restriction. The sensor has differing affectability for different sorts of gasses.

RELAY (2)

Moves are the fundamental protection similarly as trading contraptions in a huge bit of the control strategies or equipment. All the exchanges respond to at any rate one electrical sums like voltage or stream with the ultimate objective that they open or close the contacts or circuits. A hand-off is a trading device as it endeavors to confine or change the state of an electric circuit beginning with one state then onto the following. Gathering or the sorts of moves depend upon the limit with regards to which they are used. A part of the classes consolidate cautious, reclosing, coordinating, right hand and checking moves. Protective exchanges diligently screen these parameters: voltage, current, and power; and if these parameters harm from set cutoff focuses they make alarm or detach that particular circuit. These sorts of moves are used to guarantee equipment like motors, generators, and transformers, and so forth.

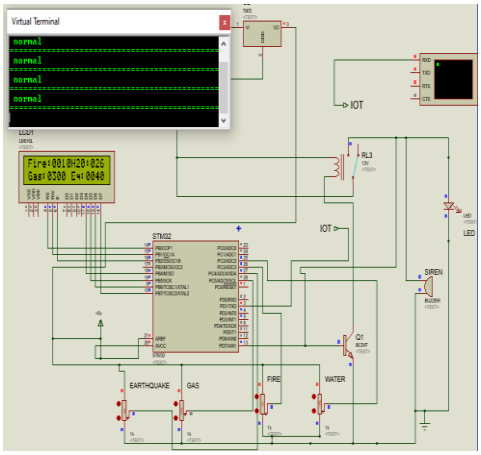
HARDWARE

- Power supply unit
- Microcontroller atmega8
- LCD display – 16x2
- Temperature Sensor
- Mq2 sensor
- Accelerometer sensor
- Gas Sensor
- Wi-Fi ESP8266

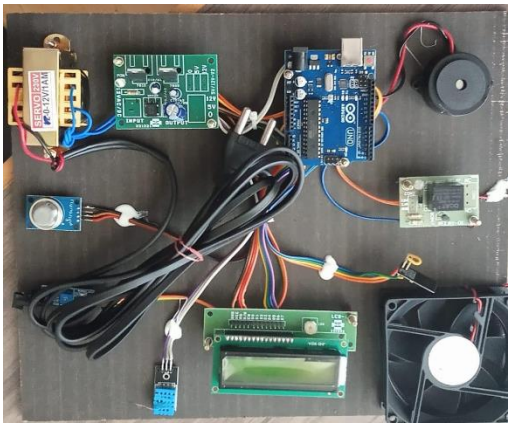
SOFTWARE REQUIREMENTS

- Platform - AVR STUDIO
- Compiler – Win AVR

SIMULATION RESULT



HARDWARE IMPLEMENTATION



CONCLUSION

Implementation of Coal mine safety system is implemented using Fire sensor, Gas sensor, vibration sensor, DHT11 sensor to increase the safety of the workers in the coal mine and to prevent them from danger, By using this system constant checking of the coalmine and alerting the worker is done by using IOT. The system is cost-effective and efficient.

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