COAL MINES SAFETY MONITORING AND ALTERING SYSTEM

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ABSTRACT

Today, safety of miners is a major challenge. Miner's health and life is vulnerable to several critical issues, which includes not only the working environment, but also the after effect of it. Coal mine safety monitoring system based on wireless sensor network can timely and accurately reflect dynamic situation of staff in the underground regions to ground computer system and mobile unit. The air pollution from coal mines is mainly due to emissions of particulate matter and gases include sulphur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO) etc. To monitor the concentration level of harmful gases, semiconductor gas sensors are used. Due to any reason miner's falls down and lose consciousness also proper treatment is not provided them at that time, so number of miners are died. To overcome this problem the system provide emergency alert to the supervisor if person fall down by any reason. Some workers are not aware for safety and they are not wear helmet. A Limit switch was then used to successfully determine whether a miner has removed his helmet . The system uses Zigbee technology and GSM for transmission of data. There is alert switch at receiver and transmitter side for emergency purpose.

keywords:*ZigBeemodule,temperature,humiditysensors,at89s52microcontroller.*

1. INTRODUCTION:

There were 20 deadliest underground mining disast ers ever, eight have been in China. Four accidents in 2015 killed over 70 people, an explosion in Liaoning that killed 210, a flood in Guangdong that killed 123, an explosion in Xinjiang that killed 83 and an explosion in Shanxi that killed 72. The worst m ining accident ever, a coal dust explosion, killed 1,549 miners at the Honkeiko Colliery in China. This leads to the significance of safety for the mine workers. In recent days monitoring the mine workers has become very difficult in underground mines. It requires lot of manual labor and ranging of the whole field. The mine workers movement can be exactly tracked from their locations.The received signal strength (RSSI) is a highly variable parameter in underground areas, so real data experiments are conducted using an inhouse test facility to investigate signal properties and to evaluate the potential of the concept for underground mining. The Radio Frequency communication technology uses transmission of radio signals, having the frequency range 30 KHz300 GHz, inside underground mines.The Smart environment always provides real world data by sensing them or through any interfaces. In this design, the sensing system is realized by

various sensors ac ting like a network. These sensors are used to sense and collect details of various parameters of the working environment. At the same time, underground roadway is a relatively closed limited space which composed of rocky wall, the transmission of electrom agnetic wave is limited by the wall.Therefore, lowpower, shortrange wireless communication in the coal mine is a hot topic many scholars concerned in recent years

2. OBJECTIVES

1) A ZigBee network controlled automatic system has been developed for assisting the rescue workers.

2) A coal mine system which replaces the traditional coal mine monitoring system which tend to be wired network system.

3) The underground system also collects temperature, humidity of coal mine through sensor nodes in mine.

3. Block Diagram
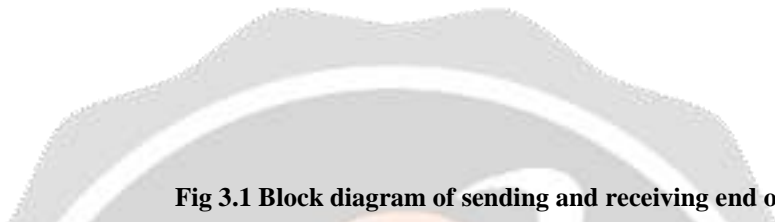
Fig 3.1 Block diagram of sending and receiving end of Module
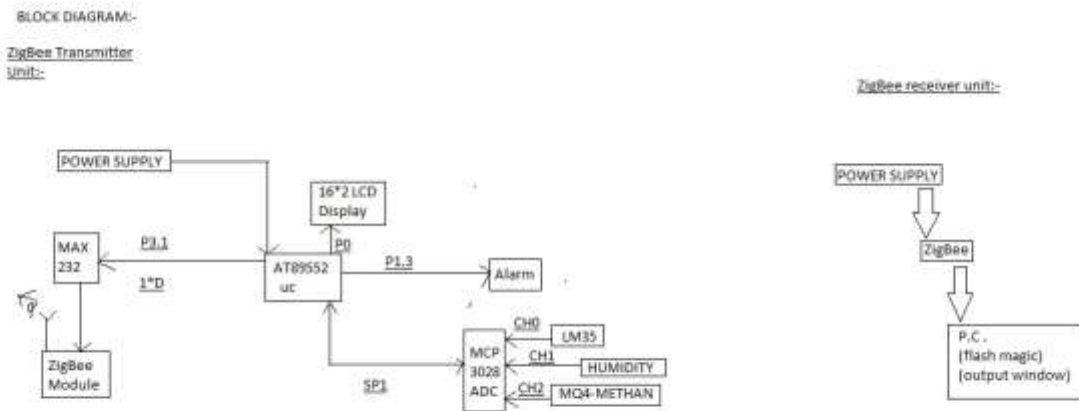
4. COMPONENTS

4.1 Temperature sensor

Fig.4.1 Temperature sensor

In this system we used temperature sensor as a thermistor. This thermistor detects small change in temperature. The change in small change in temperature. The change in temperature is measured by change in resistance of the device. Here it may be noted NTC thermistor has a resistance of about 10kΩ and 100kΩ at 500C to 1500C. It is connected to PIN no 13 that is P0.28

4.2 Humidity sensor

Fig -4.2Humidity sensor,

The amount of water vapor is expressed in terms of humidity. Here we used SY-HS-220 humidity sensor. This module converts the relative humidity to the output voltage. In daily language humidity is normally taken to mean relative humidity. Relative humidity is defined as the ratio of partial pressure of water vapor to saturated vapor pressure as prescribed temperature. Humidity sensor is on pin no 15 that is P0.30. 3.3 Arduino Uno

4.3 Zegbee Module
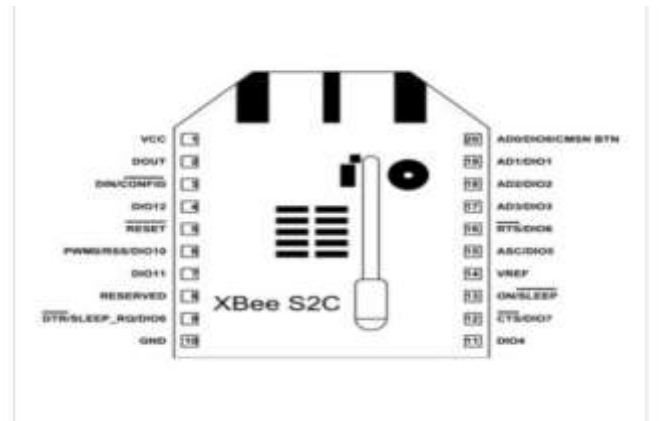
Fig. 3.3 ZigBee module

ZigBee is a new wireless technology guided by the IEEE 802.15.4 Personnel Area Networks Standard. It is primarily dZigBee is a new wireless technology guided by the IEEE 802.15.4 Personnel Area Networks Standard. It is primarily designed for wide ranging automation applications. It currently operates in 868 MHz band at a data rate of 20kbps in Europe, 914 MHz band at 40Kbps in USA and 2.4Ghz ISM band worldwide at a maximum data rate of 250kbps. The ZigBee specification operates in 2.4 Ghz radio band-the same band as 802.11b standard, Bluetooth, microwave & some other devices. It is capable of connecting 255 devices Range of transceiver is 30-70m in urban areas and 1 to 1.5km in outdoor i.e. line of sight. The transceiver has an on-chip antenna & it operates t a frequency of 2.4 Ghz[20]. ZigBee technology is slower than 802.11b but it consumes significantly low power [21]. Here a pair of ZigBee module is used one transmit data and another to receive the data. esigned for wide ranging automation applications. It currently operates in 868 MHz band at a data rate of 20kbps in Europe, 914 MHz band at 40Kbps in USA and 2.4Ghz ISM band worldwide at a maximum data rate of 250kbps. The ZigBee specification operates in 2.4 Ghz radio band- the same band as 802.11b standard, Bluetooth, microwave & some other devices. It is capable of connecting 255 devices Range of transceiver is 30-70m in urban areas and 1 to 1.5km in outdoor i.e. line of sight. The transceiver has an on-chip antenna & it operates t a frequency of 2.4 Ghz[20]. ZigBee technology is slower than 802.11b but it consumes significantly low power [21]. Here a pair of ZigBee module is used one transmit data and another to receive the data.

4.4 At 89S52 Microcontroller

Fig 4.1 At 89S52 microcontroller

The Atmel AT89S52 Microcontroller or commonly known as AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

5. Applications of Atmel AT89S52 Microcontroller:-

1. Multiple DIY projects.
2. Projects requiring more than logical control for devices.
3. Microcontroller applications for multiple device interface/Control.
4. Replacement for Arduino module.
5. Needs a USB AVR programmer.

6.Wireless sensors network

Sometimes wired network cannot be established or not suitable so that time ZigBee as a WSN can penetrate wall. With great usefulness and important features a wireless network is necessarily used in coal mines where it is not possible to establish a network. Also in case of hazardous environment, cave-ins or in the explosion the wire may get damaged making the whole network useless. So to avoid the drawback of wired network the wireless network is used. In environment such as homes & hospitals, for the number of purpose where their are many humidity. Relative humidity is defined as the ratio of partial pressure of water vapor to saturated vapor pressure as prescribed temperature. Humid.

7. FUTURE SCOPE

With the growing innovations future work of this experimentation may include, more development of the system by using other advanced sensors for monitoring the underground. Threats. Also, all the underground operations can be carried out from the ground surface. New developing communication technologies can be used for high-speed data transfer in integration with smart sensors for sensing the mine conditions. Also, more IOT enabled systems can be developed for more advanced functionality

8. CONCLUSION

The present underground Mines system can be usefully substituted by this IoT security structure proposed in this paper. This IoT structure encased the most outrageous Key and genuine part of right currently sent excavators security. Since this system is made of low power Wi-Fi module and control light with PWM strategy, degree of force usage is cut down, which is basic for any device that is energized by battery. Additional prosperity can be passed on to data servers and kept up exact information of mines.

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