

A Wireless Surveillance and Safety Parameters Monitoring System for Coal Mine

K.Rajesh Kumar¹, A Mohana Priya², M Monika³, N Monisha⁴, G Mownica⁵

Assistant Professor, Department of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India¹

U.G. Student, Department of ECE, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India²³⁴⁵

ABSTRACT: In today's world, everything has been secured by using network security protocols. In this project, the system is designed for coal mine safety which is based on a ZIGBEE network. With the help of ZIGBEE in underground environment conditions of temperature, humidity and gas are measured with the sensor and these information's are stored in the microcontroller. The ZIGBEE in the land area will receive the above information's and send to the controller and also displayed on the PC. In case of above Pre-defined range of the environmental conditions it alert through the buzzer. The system mainly operates using microcontroller, LCD display, and sensors.

KEYWORDS: Humidity Sensor, LM35 Sensor, MQ7 Sensor, MQ4 Sensor, MC AT89S52, Zigbee, Buzzer.

I. INTRODUCTION

In recent years, Coal mines were faced with many disasters which make a huge loss for mankind. The main reason for many disasters is due to lack of monitoring of mines, workers. To avoid frequent losses monitoring is required. This project suggests an idea to monitor four parameters which are abundant in the coal mines. These four parameters are methane, carbon monoxide, temperature, and humidity. There is a preferred range for the four parameters were there increased range leads to the way of disaster. But to measure this parameter in the underground is a dead job and cannot be monitored easily. For better and efficient monitoring ZIGBEE network is preferred here. Zigbee is the one type of communication network, it can act as LAN or WAN communication protocol, then in the Zigbee supports the multiple topologies which will be extended through the transceiver process.

II. RELATED WORKS

The power supply unit needs to be connected with the microcontroller. The microcontroller requires +5v DC voltage it will be converted 230v AC supply. The power supply voltage needs to be converted into the required voltage so A.C transformer is giving the input to the Bridge Rectifier. Bridge Rectifier converts A.C to D.C. After that we are using One filter and it is connected in parallel section. Its purpose is if there is any alternate peaks it will reduce the peaks due to that filtering repels. The regulator is the logic circuit it can be converts the 5V DC supply and sends through the microcontroller. The LM7805 regulator is simple to use. Finally it can be indicating through the LED whether the supplies convert or not. Here Reset button can be placed in the circuits which are restart at the process. When the switch is pressed it is shorted and the current will pass in the less resistance path The crystal oscillator is necessary to generate the timing pulses and its frequency is 11.0592MHz. LM35 is used to detect fire accidents occurred in the mine working place and send those signals to the microcontroller. In temperature sensor sensed the temperature level then it sends to the microcontroller in the receiving data shows in the PC with the help of Zigbee module and that ranges can be displayed on LCD. Where the ranges are increased it can be indicated at the buzzer. Then, also the gas sensor monitored the underground gases. When the gas is leaked, the gas sensor is activated then it sends the signal to the microcontroller and the message will be displayed on LCD and signals will be sent to monitor section PC. The monitor section in the ground contains PC and Zigbee module which is connected to serial port of the PC. In PC, sensors information can be uploaded with the help of HyperTerminal which is used to display at the four parameter sensors data will be updated at the information continuously.

III. EXISTING METHOD

The existing monitoring system of coal mine mostly uses cable network. This kind of network has mostly insecure. The cables are easy to aging and wear, and have a high incidence of failure. Even some fire accident happens in the mine that can

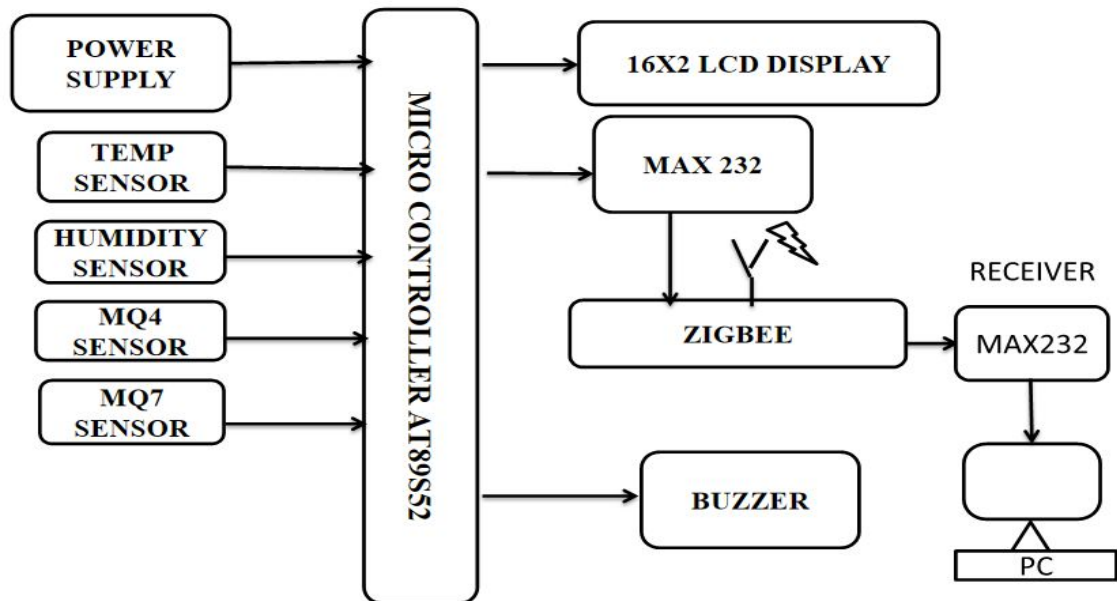
burn the cable, it's impossible to transmit the information for the receiver side .when an accident happened, particularly the explosion, the sensors, and cables usually damaged and they cannot send the information to the receiver side.

IV. PROPOSED METHOD

In the proposed method we are using Zigbee, it is the one type of wireless communication network. It is more suitable for data collection. The frequency of Zigbee is 2.4GHZ then the distance will transmit 10-20 meter covers the signal. The signal can be extended with the help of transeiver. In this project, the system monitoring method can be divided into two sections, one is transmitter side and another one is the receiver side. In the transmitter side, Temperature, Humidity, Methane, Carbon monoxide sensors are used to measure the range of the underground conditions. Sensed data can be transmitted to the microcontroller and the microcontroller sends the information to the receiver side with the help of the Zigbee module. The mining system can be monitor continuously with help of PC.

BLOCK DIAGRAM

TRANSMITTER



V. HARDWARE DESCRIPTION

TEMPERATURE SENSOR: The thermistor is used as temperature sensor. Very small changes in temperature will be detected by thermistor. The LM35 is an integrated circuit temperature sensor. The output voltage need not be amplified because it generates a higher output voltage than thermocouples.

HUMIDITY SENSOR: The Humidity sensor is used to measure at the underground moisture level. They were fixed at the particular threshold value it can be pass the information with the help of module then it will be displayed in PC.

MQ7 GAS SENSOR: Carbon monoxide gas is the one of the toxic gas that can be measured with the help of MQ7 gas sensor then the threshold value which is increased it can be intimate at the PC.

METHANE SENSOR: Methane sensor has high sensitivity to Natural gas. These sensors used to sense the gas

range at the underground mine. It is high precision and low heating consumption less than 750mw. The sensors can operate at a temperature from 10 to 50 degree Celsius.

LCD DISPLAY: In 16*4 LCD can be used to display the output of the received sensors. The connections are laid out in 2 configurations, one is 2 rows of 7 pins or another one is single row of 14 pins.

MC AT89S52: AT89S52 is the one type of microcontroller. It has the 8-bit microcontroller with 8k bytes of in-system programmable flash memory. It contains 32 I/O lines and 256 bytes. It has two data pointer then its serial port is full duplex and it contains six vectors two levels interrupt.

ZIGBEE: Zigbee is a software-based protocol. It is used to transmit the information through the communication network. It can provide a transparent layer for sending and receiving data from the network. In this process, Zigbee plays a major role in communicating the microcontroller and the receiver side of the PC. The address can be assigned then the working process of the module automatically performed.

Max232: Max232 chip can be placed in both transmitter and receiver side that can be used to converts the analog to digital signal. It is more capable for communicating between microcontroller and PC.

BUZZER: The Buzzer can play a role in intimating whether any disaster happened it can alarmed at the receiver side.

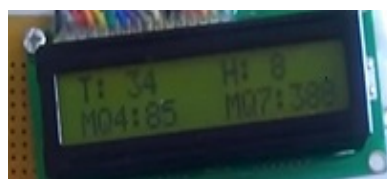
VI. EXPERIMENTAL RESULTS



(A) HUMIDITY:43



(B) TEMPERTURE:57



(C) METHANE: 494

VII. CONCLUSION

This project was designed and Implemented using a hardware kit. The output of the mine safety system which will be shown in the PC continuously updated at the sensor while it will be increased at the threshold value and then alarmed using the buzzer.

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