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A Smart Helmet for Coal MinersSafety Using IoT

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ABSTRACT: The main aim of this project is to provide safety and security to people who are working in coal mines. The few hazard types such as air helmet removal, fire, temperature, smoke sensor, water level sensor and humidity sensor. The hazard gases concentration levels values are monitor. The hazard gases like CO_2, SO_2, NO_2, are to be monitor, if the coal miner removing the mining helmet off their head, the limit switch is used to give the helmet alert. The fire sensor, smoke sensors are used to detect any fire is there. The temperature, humidity sensors are used to give environmental conditions. the water level sensor is used to give the water level. The air quality sensor MQ-135 sensor is used to give the quality of the air in coal. All these sensors values are to be monitor to the admin mobile or pc through IOT.

KEYWORDS: Hazard gases sensor, Temperature sensor, Humidity sensor,MQ-135 sensor, Water level sensor, Smoke sensor, Wi-Fi module, IOT.

I. INTRODUCTION

Coal mine is mined in every country which is mainly used to generate electricity. Thousands of mine workers killed every year. This paper been framed with the objective to transmit data from the mine section which can be monitored and immediate action can be taken. These disasters are takes place in underground coal mine. These are caused mainly due to the leakage of poisonous gas present in the coal and improper acknowledgement to the miners about helmet.In coal mines underground condition is poor and mining depth is deep and also the cool, dust, flood, and other which causes serious problems trouble I the development of the mining industry.

II. LITERATURE SURVEY

Yongping Wu and Guo Feng implement coal mine monitoring using the Bluetooth wireless transmission system. As a standard of unified global short-range wireless communication, Bluetooth technology is to establish a common low- power, low-cost wireless air interface and controlling software opening system . At the same time, the system uses CAN bus technology maturely, has realized the combination of wired and wireless data transmission system. The main difficulty of this system is that the Bluetooth is short distance wireless technology and use of cabling is difficult. When a natural calamity or a roof fall occurred, the cabling is damage. So the reliability and long life of conventional communication system is poor. Due to the harsh environment inside the mine, the installation and maintenance of the wired communication is very difficult. Jingjiang Song, Yingli Zhu proposed automatic monitoring system for coal mine safety based on wireless sensor network. The sensor groups of the system intensively monitor temperature, humidity and other parameters in the underground mine, parameters measured are sent to wireless communication module by the micro-controller.

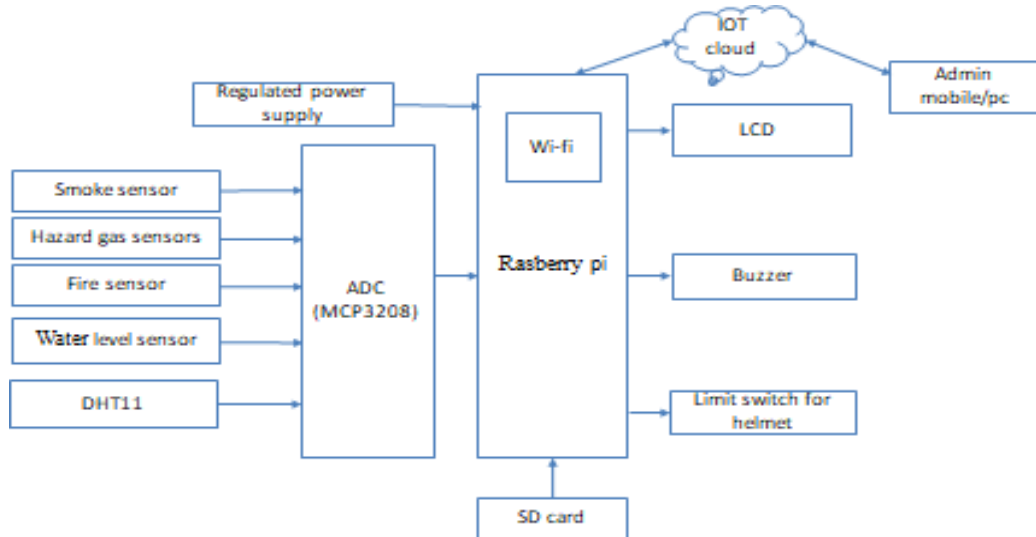## III.PROPOSED WORK

A Block diagram of proposed system

Fig1.Block diagram of proposed system

A. RASPBERRY PI

The **Raspberry Pi** is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and **uses** a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.
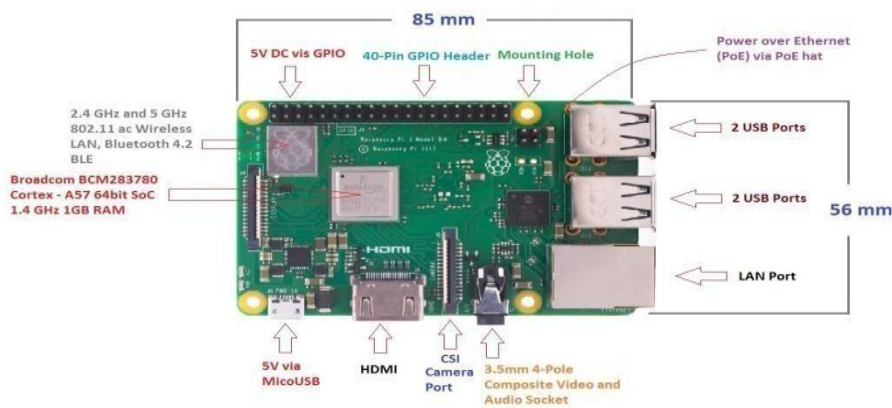

Fig2.Raspberry Pi

B. ADC(MCP3208)

The MCP3208 12-bit Analog-to-Digital Converter (ADC) combines high performance and low power consumption in asmall package, making it ideal for embedded control applications.

C. LCD Display

The term LCD stands for liquid crystal display. It is one kind of electronic display module used in an extensive range of applications like various circuits & devices like mobile phones, calculators, computers, TV sets, etc. These displays are mainly preferred for multi-segment light-emitting diodes and seven segments. The main benefits of using this module are inexpensive; simply programmable, animations, and there are no limitations for displaying custom characters, special and even animations, etc.
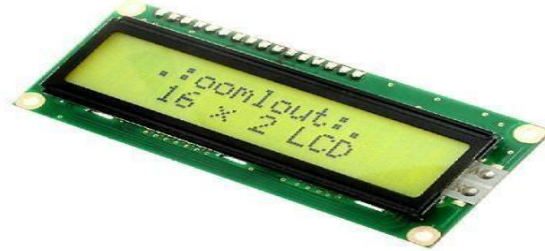

Fig 3.16x2 LCD

D. Fire Sensor

This tiny Flame sensor infrared receiver module ignition source detection module is Arduino compatible can use to detect flame or wavelength of the light source within 760nm~1100nm also useful for Lighter flame detect at the distance 80cm.Greater the flame, farther the test distance. It has the Detect angle of 60 and very sensitive to flame spectrum.It produces the one channel output signal at the D0 terminal for further processing like an alarm system or any switching system. The sensitivity is adjustable with the help of blue potentiometer given on the board.

E. DHT11 Sensor

DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital- signal-acquisition technique and temperature & humidity sensing technology, it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-effectiveness.

F. MQ-7 Sensor

This is a simple-to-use Carbon Monoxide (CO) sensor, suitable for sensing CO concentrations in the air. The MQ-7 can detect CO-gas concentrations anywhere from 10 to 500ppm.This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit isvery simple; all you need to do is power the heater coil with 5V, add a load resistance, and connect the output to an ADC

G. Air Quality Sensors

Air quality sensor for detecting a wide range of gases, including NH3, NOx, alcohol, benzene, smoke and CO2. Ideal for use in office or factory. MQ135 gas sensor has high sensitivity to Ammonia, Sulfide and Benze steam, alsosensitive to smoke and other harmful gases. It is with low cost and particularly suitable for Air quality monitoring application.

H. Water level Sensor

If you have ever had a water heater explode or ever tried to make submersible electronics, then you know how important it is to detect when water is around. With this Water Level Sensor, you can do just that! This sensor can be used to measure the water level, monitor a sump pit, detect rainfall or detect leakage.

IV.RESULT AND ANALYSIS

Fig4.Experimental Setup

Fig5. Water and gas sensors output

Fig 6.Temperature and humidity output

Fig7. Air quality sensor output

V.CONCLUSION AND FUTURE W O R K

- The project that we design about to solve the problem in under coal mine.
- People working in coal mine faces several problems like environmental condition mostly in underground coal mine.
- Our project mainly concentrate upon those above problems.

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