

IOT MINING TRACKING AND WORKER SAFETY HELMET**¹Aade Kailas Ukala,²Lingampally Shivprasad,³U.Alekya,⁴O.Usha Rani***¹²³⁴Assistant Professor**Department Of ECE**Kshatriya College of Engineering***ABSTRACT:**

Laborers in mining territory hazards their lives on the normal premise. Mining is significant need to the making of products, foundation and administrations. Mining is hazardous movement since Laborers are persistently in contact with perilous gases. In the case of something turns out badly, if the specialist becomes un concious because of hazardous gases, the signal or an emergency response which is mounted on the protective cap will help them in such circumstances. The specialist needs to press the catch thrice so as to illuminate the control room through ringer's sound, with the goal that the control room gives the necessary assistance to laborers. Examination of gases turns into a significant viewpoint here .

I.INTRODUCTION

Safety is an important aspect of any industry especially in coal mine industry. Underground miners experience many hazards includes poisoning of gases, sudden health problems due to the temperature and air quality [10]. Presence of hazardous gases will lead to explosion. So quality of air and dangerous event detection are very important to detect in early stages. This paper is about to develop the smart helmet which will equipped with the sensors like temperature sensor , humidity sensor, heart beat sensor and smoke sensor. The temperature sensor sense the temperature of the coal miner's working environment which helps in cases of the very high temperature and the very low temperature which the human body could not bare ,the humidity sensor senses the moisture level of the underground as the human body could not sustain the low humidity surroundings which leads to the fainting of the coal mine workers ,heart beat sensor checks whether the coal miner is free from the health risk ,If there is no risks are identified it clears that the blood circulation is normal. Gas sensor senses the present of the hazardous gases which could threaten the life of the coal mine worker .These sensors will collect information about the

current situation of the miner and send the information to the authenticated person. And these sensors are connected to the microcontroller arduino, the arduino transmitter transmits the information from the sensors and these data are received by the arduino at the receiver end. Delaying in information sharing also one of the main reason for the miner's death.

II.LITERATURE SURVEY

The mining industry mostly uses cables and wired network to communicate with the ground center. In mines, if an accident happens, the sensors and cables were usually damaged fatally by the explosion, and so we couldn't provide information for rescue search and detection events. We used wireless sensor network to communicate at times of such accidents and to detect a number of activities like helmet removal, collision detection and air quality measurement by using PIC microcontroller. For our paper, we observed from different reference papers developed by researches. Michael Zuba, Carlos Villa, Alexandria Byrd proposed about an Autonomous Coalmine System (AUV) networks are becoming increasingly popular in scientific, commercial, and military applications. In

undersea exploration and environmental monitoring AUVs are used for tasks such as detection of oilfields and marine life, distributed tactical surveillance for offshore and seaport defense and mine reconnaissance. AUV networks are also becoming an important interest in an effort to enhance the capabilities of coalmine sensor networks (UWSNs). In this paper we propose a control system for networked autonomous coalmine systems that includes both hardware and software modules. Burke, S.E. and Rosenstrach proposed a novel sonar sensor is described which utilizes two coincident, distributed, shaded methane sensor and co₂ sensors to provide high resolution target bearing estimates. Sensor shading is accomplished by suitably shaping the charge collection electrodes deposited on the sensing layer. When these two sensor shadings are matched via a derivative in space, the ratio of their signal outputs is linearly proportional to the direction cosine of an incident acoustic field; it is an extension of the well-known monopulse concept. C. J. Behr, A. Kumar and G.P. Hancke proposed “A Smart Helmet for Air Quality and Hazardous Event Detection for Mining Industry” has been developed that is able to detect of hazardous events in the mines industry. In this paper, no collision detection and helmet removal scheme is used.

PROPOSED SYSTEM

Modern mines often implement several safety procedures, education and training for workers, health and safety standards, which lead to substantial changes and improvements and safety level both in opencast and underground mining. Mine ventilation system can help in eliminating high risk atmosphere. Primitive techniques to monitor the mining atmosphere can be traced back to the use of canaries and other animals to alert miners, when the

atmosphere becomes toxic. Integrating ventilation monitoring system enables mine to intelligently make ventilation changes based on the extensive data, the monitoring system provides.

III.DESIGN OF HARDWARE

This chapter briefly explains about the Hardware. It discuss the circuit diagram of each module in detail.

ARDUINO UNO

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode. Arduino board has the following new features:

- 1.0 pin out: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second

one is a not connected pin, that is reserved for future purposes.

- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.



Fig: ARDUINO UNO

POWER SUPPLY:

The power supplies are designed to convert high voltage AC mains electricity to a suitable low voltage supply for electronic circuits and other devices. A power supply can be broken down into a series of blocks, each of which performs a particular function. A d.c power supply which maintains the output voltage constant irrespective of a.c mains fluctuations or load variations is known as “Regulated D.C Power Supply”.

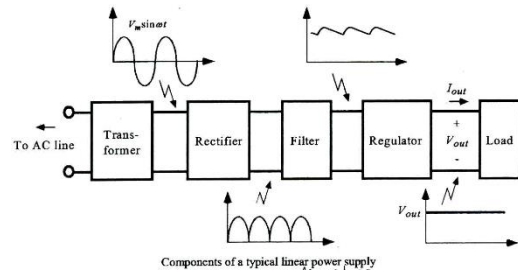


Fig: Block Diagram of Power Supply

LCD DISPLAY

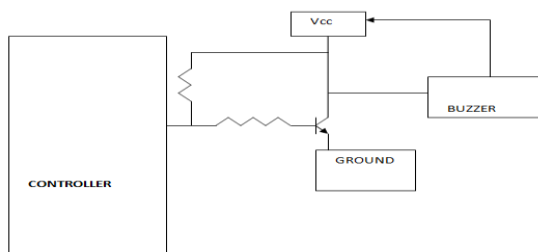
A model described here is for its low price and great possibilities most frequently used in practice. It is based on the HD44780 microcontroller (Hitachi) and can display messages in two lines with 16 characters each. It displays all the alphabets, Greek letters, punctuation marks, mathematical symbols etc. In addition, it is possible to display symbols that user makes up on its own. Automatic shifting message on display (shift left and right), appearance of the pointer, backlight etc. are considered as useful characteristics.



Fig: LCD

BUZZER

Digital systems and microcontroller pins lack sufficient current to drive the circuits like relays, buzzer circuits etc. While these circuits require around 10milli amps to be operated, the microcontroller’s pin can provide a maximum of 1-2milli amps current. For this reason, a driver such as a power transistor is placed in between the microcontroller and the buzzer circuit.



WIFI MODULE:

The **ESP8266** is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacturer, Espressif Systems.^[1]

The chip first came to the attention of western makers in August 2014 with the **ESP-01** module, made by a third-party manufacturer, Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted.^[2] The very low price and the fact that there were very few external components on the module which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation.^[3]

The **ESP8285** is an ESP8266 with 1 MiB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi.^[4]

The successor to these microcontroller chips is the ESP32.

Alcohol Gas Sensor Module



This module is made using Alcohol Gas Sensor MQ3. It is a low cost semiconductor sensor which can detect the presence of alcohol gases at concentrations from 0.05 mg/L to 10 mg/L. The sensitive material used for this sensor is SnO₂, whose conductivity is lower in clean air. Its conductivity increases as the concentration of alcohol gases increases. It has high sensitivity to alcohol and has a good resistance to disturbances due to smoke, vapor and gasoline. This module provides both digital and analog outputs. MQ3 alcohol sensor module can be easily interfaced with Microcontrollers, Arduino Boards, Raspberry Pi etc.

This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time. Sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple, all it needs is one resistor. A simple interface could be a 0-3.3V ADC.

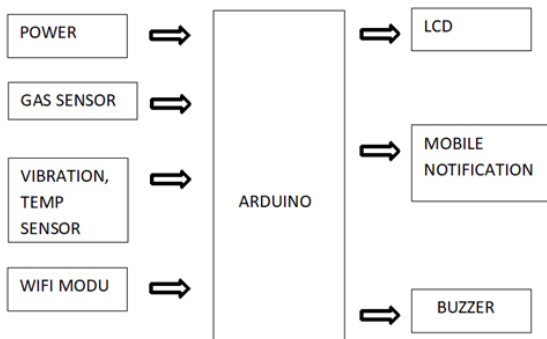
Vibration Sensor



This module features an adjustable potentiometer, a vibration sensor, and a LM393 comparator chip to give an adjustable digital output based on the amount of vibration. The potentiometer can be adjusted to both increase and decrease the sensitivity to the desired

amount. The module outputs a logic level high (VCC) when it is triggered and a low (GND) when it isn't. Additionally there is an onboard LED that turns on when the module is triggered.

IV. BLOCK DIAGRAM:



Working:

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. The kit equipped with Arduino is placed inside the helmet of the worker who is inside the mine. When the temperature or gas reach out its levels, the sensors will send an alert message to the main users by using IOT and the readings are displayed through LCD Display. It will be easy to take precautions before the incident.

V.CONCLUSION

Thus this system will enhances the security system for underground coal miners. A larger area and more depth inside hazardous underground mines are now can be covered and potential accidents can be controlled effectively. The sensor and Zigbee module can be preferably installed over the helmet of mine worker. Proper monitoring can help to take appropriate actions more rapidly and smartly if any abnormal situation occurs. The system also can be easily extended with ZigBee wireless image transmission facility in future.

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