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IoT Based Underground Worker Safety System

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Abstract: ***Industrial safety is one of the main aspects of industry specially coal mine industry. Underground mining hazards include suffocation, gas poisoning and gas explosion. Air quality and hazardous event detection is very important factor in mining industry. This system provides a wireless sensor network for monitoring real time situation of underground mines from base station. It provides real time monitoring of harmful gases like CO, CH4 and also temperature and Humidity. The main reason for death of miners is that, due to any reason miners falls down and loses consciousness also proper treatment is not provided them at that time. To overcome this problem the system provides emergency alert to the supervisor if person fall down by any reason. The system uses IoT technology for transmission of data from underground mine to base station. There is alert switch at mines and base station for emergency purpose.***
Keywords: Wireless Communication, ThingView, ThingSpeak, Safety, Industrial Applications, Miners

I. INTRODUCTION

Underground and mining operations proves to be a risky venture as far as the safety and health of workers are concerned. These risks are due to different techniques used for extracting different minerals. The deeper the mine, the greater is the risk. These safety issues are of grave concern especially in case of coal industries. Thus, safety of workers should always be of major consideration in any form of mining, whether it is coal or any other minerals. Underground coal mining involves a higher risk than open pit mining due to the problems of ventilation and potential for collapse.

This mainly Mining Industry can be categories as the most essential application for any developed country. It provides extraction and discovery of the underground materials. From Iron, gold, coal and diamond. Internet of Things is an information and Communication Technology (ICT) used to represent Wireless Sensor Network (WSN) communications, using the defined protocol IEEE 802.14.5 that enables Low Rate- Wide Area Network (LR-WAN) to communicate using specific modulation technique.

II. LITERATURE SURVEY

Certain experiments have been Performed from past few years by different research and development groups . Here are some of the following groups:

1) Praveen Kulkarni and Sangam has proposed Smart System for Hazardous Event Detection and Evaluation in Mining Industries A Safety helmet has been developed to assist the miners working in the mining industry. Harmful events tend to occur in the mining industry that can lead to severe injury or death. Zigbee wireless sensor networks are used to collect sensor data and transmit them. The Zigbee based system is cost effective and details are shared with central control unit. This paper presents a study of the mining environment and its hazards and how a Zigbee is used for transmission from miner to ground control system in case of hazardous events.

2) Mrs. A. Dhanalakshmi [2] has proposed A smart helmet for improving safety in mining industry. A smart helmet has been developed which includes various features such as the two way communication, detection of the hazardous gases, providing notification in the case of helmet removal, collision (miners are struck by an object), panic switch for emergency situations, continuous monitoring of the environmental conditions such as temperature and pressure in the mining industry and GPS is provided to track the location of the miner. Temperature and Pressure sensors are used for the continuous monitoring of environmental conditions. The information is sent to the control room through wireless network. The layout of the visualization was completed and displayed in the control room with the help of a Lab VIEW software.

3) Ali, Syed Shiyue Cui [3] has proposed this model which is helpful for Risk Prediction of Dyslipidemia in Steel Workers Based on Recurrent Neural Network Aiming at the problem that the petroleum industry is a high-occurrence industry with many occupational hazards, in order to comprehensively evaluate the hazards in coal mines, the number of supervisors for petroleum occupational hazards is small, the number of objects to be supervised, the frequency of supervision, and the scope of supervision are large, combined with cloud computing Based on the characteristics of cloud computing, an occupational hazard supervision system for petroleum companies based on cloud computing is proposed.

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III. PROPOSED SYSTEM

The Traditional Method requires uses Zigbee or Bluetooth Technology which transmits and receives short range of distance to overcome limitations of short distance the advanced method is proposed which is a IoT based model. The proposed system can measure the Temperature, Quality of air, Gas level and Pulse level of the worker. Quality of air is used to measure humidity and gas using sensors. Gas is determined by the demarcation level of carbon monoxide as well as humidity sensor to detect the humidity in the environment.

This proposed system uses IoT for Transmission and Reception of the data from underground to management system.

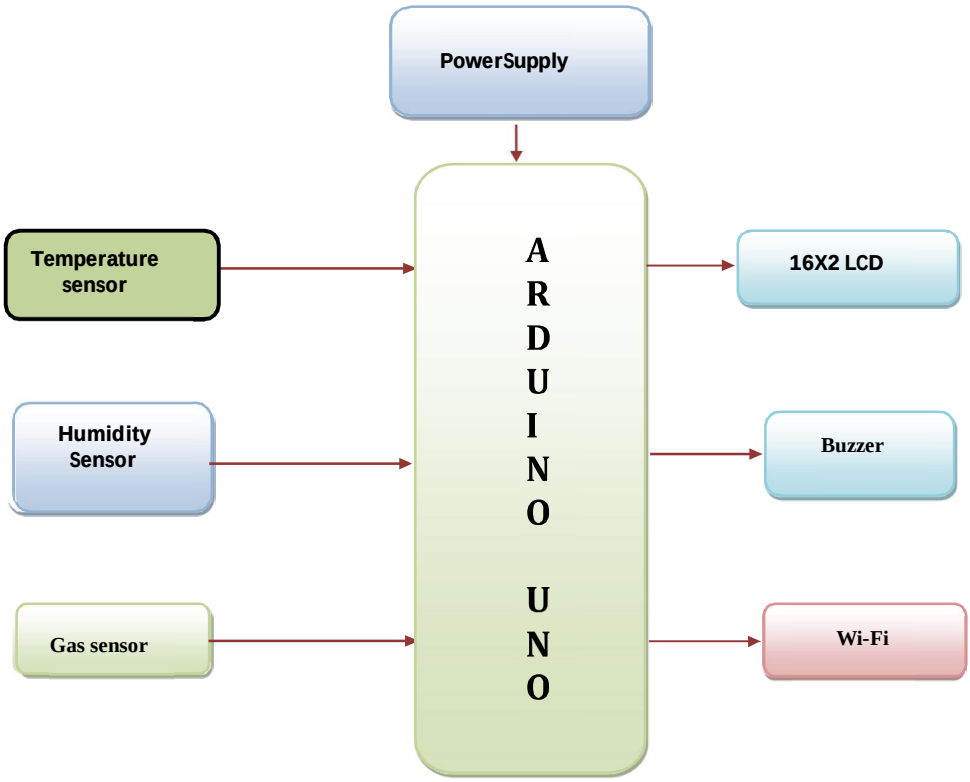


Figure 3.1: Architecture of the Model.

IV. RESULT



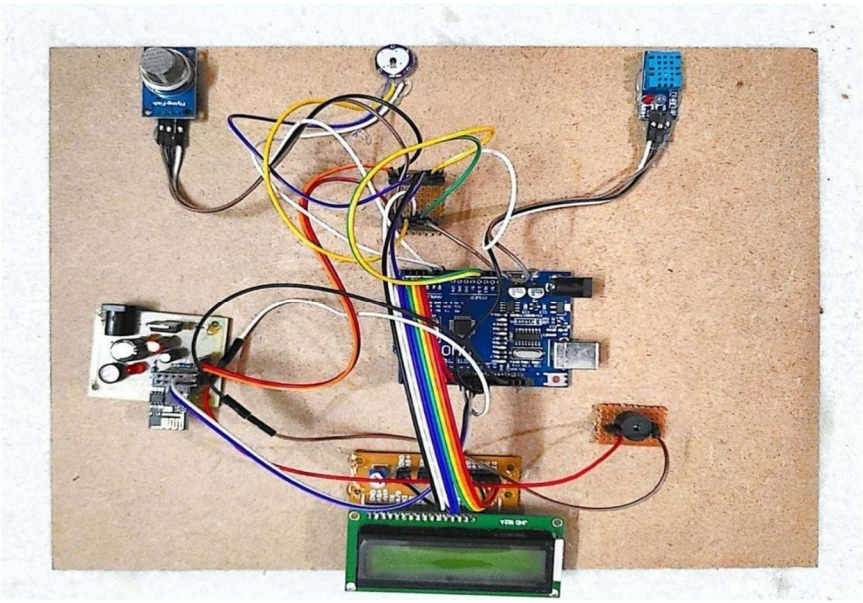
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V. CONCLUSION

This project has been developed to come up with the life saving measures for the miners, underground workers and the concerned authorities and also the cost of their total resource. The sensors used for demonstration of concept are general. The MQ-2 gas sensor is more sensitive to carbon monoxide but can sense methane, butane, LPG, hydrogen, smoke, etc. We found more heating of the sensor if operated for a long time. It is noise free and has a low power platform.

More advanced versions of controllers like Cortex-M3 can be used for more speed of execution and extreme low power consumption. With use of sophisticated sensors, the system can work with more accuracy in real time. It can be modified in industrial monitoring as well. A real-time monitoring system is developed to provide a clearer and more point to point perspective of the underground mine. This system is displaying the parameters on the monitoring unit; it will be helpful to all miners present inside the mine to save their life before any casualty occurs. Alarm triggers when sensor values cross the threshold level. This system also stores all the data in the computer for future inspection.

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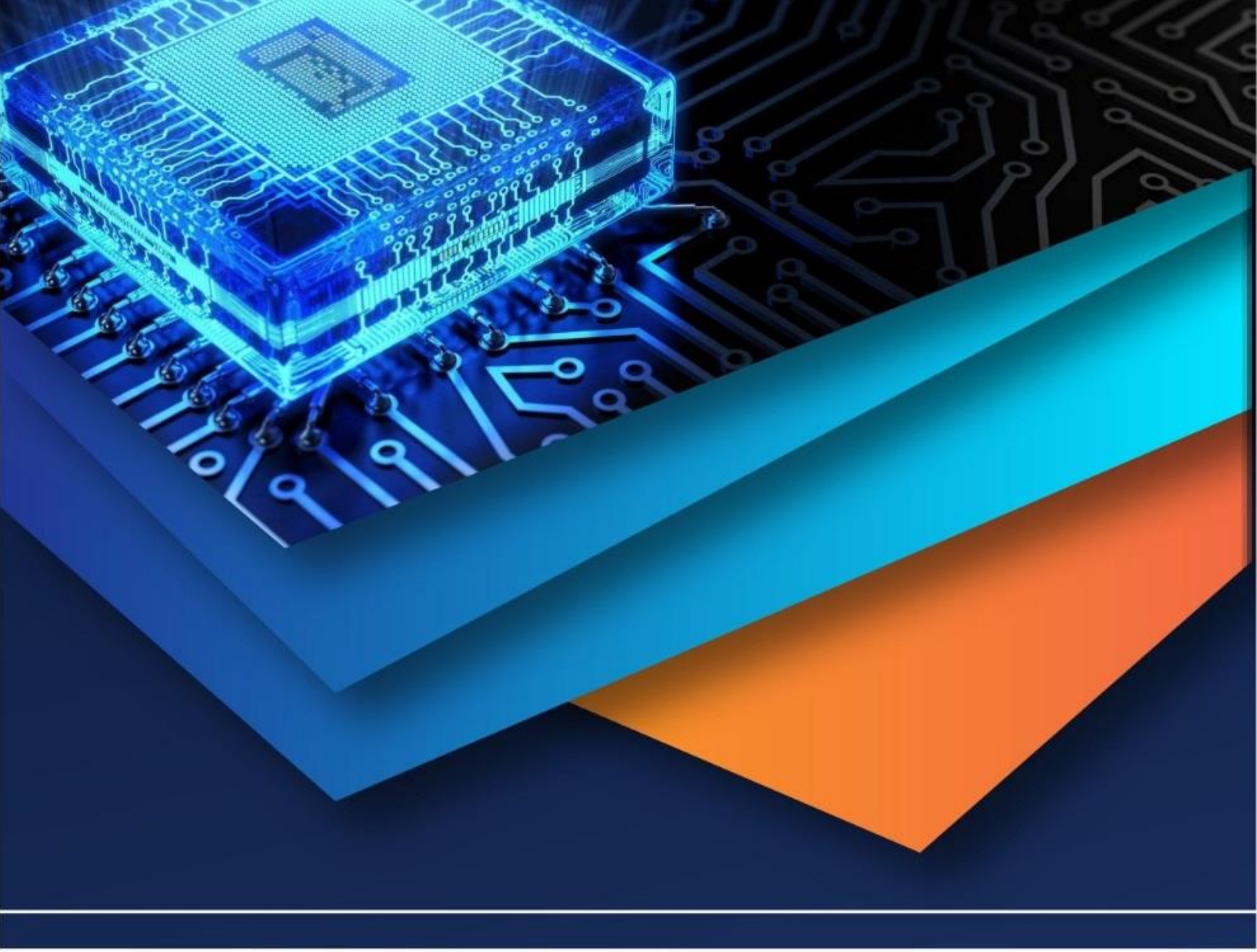
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