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IOT MINING TRACKING & WORKER SAFETY HELMET.

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Abstract - *Mining is one of the most dangerous trades all over the world. In some countries, underground miners lack safety, social guarantees and in case of injury may be left to cope without assistance. There are negative social impacts as well, such as displacement and lost livelihoods. The mining industry has the highest incidence of occupational deaths among all industries. Common causes of occupational deaths include rock falls, fires, explosions, methane intoxication, and electrocution. There are many case studies behind underground mines, a recent case study in china reveal that underground mining in China is the world's deadliest industry. To overcome all these disasters, we have developed a better communication technology which has to be employed for an intelligent sensing and warning system. For this, RF technology is chosen for the communication inside the mines. 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.*

Keywords: Temperature Sensor, Gas Sensor, GSM, ZIGBEE, WIFI, Microcontroller, Buzzer, LCD Display.

1. Introduction:

Are concerned. These risks are due in case of coal industries. Thus, safety of workers should always be of major consideration in any form of Underground 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. However, the utilization of heavy machinery and the methods performed during excavations result into safety risks in all types of mining [1].

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. Coal has always been the primary resource of energy in India, which has significantly contributed to the rapid industrial development of the country. About 70% of the power generation is dependent on it thus, the importance of coal in energy sector is indispensable. But the production brings with it the other by products, which proves to be a potential threat to the environment and the people associated with it. In lieu of that the present work is a sincere attempt in Analysing the graveness and designing a real time monitoring system of detection by using the ZIGBEE technology [9].

2. Literature review:

In underground mining, ventilation systems are crucial to supply sufficient oxygen, maintaining non-explosive and non-toxic atmospheres and operating an efficient mine. 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 [3].

Unexpected changes in the ventilation system are noticed by the monitoring arrangement, allowing prompt action to be considered. In underground mine, ventilation systems are critical to supply adequate oxygen, keeping up non-dangerous and non-lethal environments and an effective working mine.

To monitor an underground mine, can help killing high hazard environments. Primitive procedures of monitoring a mine's air can be followed back to the utilization of canaries and different creatures to ready diggers when the climate gets to be lethal. Incorporating ventilation monitoring systems empowers a mine to insightfully roll out ventilation improvements in view of the far reaching information given by the monitoring systems [7]. Sudden changes in the ventilation system are identified by the monitoring system, permitting quick move to be made. New and creating correspondence and following systems can be used to monitor mines more proficiently and transfer the information to the surface.

The progression of technology has allowed mine monitoring techniques to become more sophisticated, yet explosions in underground coal mines still occur. The safety issues of coal mines have gradually turned into a major concern for the society and nation. The occurrence

of disasters in coal mines is mainly due to the harsh environment and variability of working conditions [4]. So, it makes the implementation of mine monitoring systems essential for the safety purpose. Wired network systems used to be a trend for traditional coal mines, which have really played a significant role in safely production in coal mines. With the continuous enlargement of exploiting areas and depth expansion, laneways have become blind zones, where numerous unseen dangers are hidden out. Moreover, it is not possible there to lay expensive cables, which is also time consuming. So, it is essential to have a wireless sensor network mine monitoring system, which can be disposed in such mines in order to have a safe production within. Wireless sensor networks (WSNs) have earned a significant worldwide attention in current scenario. A WSN is a special ad-hoc, multi-hop and self-organizing network that consists of a large number of nodes arranged in a wide area in order to monitor the phenomena of interest.

These small sized sensors are quite inexpensive compared to traditional sensors and also require limited computing and processing resources. These sensor nodes can detect, measure and collect information from the environment and based on some local statistical decision process, they can convey the collected data to the control room. It has three major advantages over wired monitoring network systems:

1. There is no need of cables to lay and easy installation in blind areas, reducing cost of the monitoring system. The number of nodes can be increased to eliminate blind areas. Also, it offers a general communication and allocation of the goal.

2. The dense nodes ensure the data acquisition with high accuracy and optimum data transmission, and further realization of real-time monitoring system for mine environment.

3. System Overview:

The block diagram of the proposed system as follow:

1).Helmet unit-

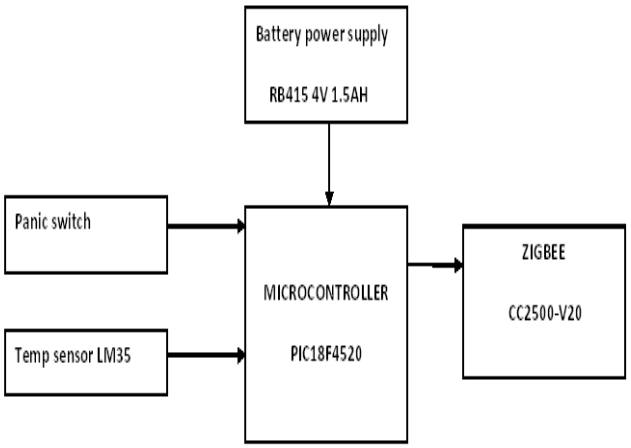


Fig- 1: Block diagram

2).Control unit-

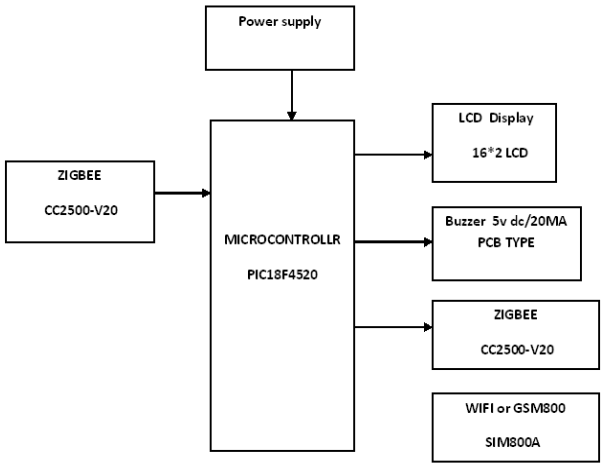


Fig- 2: Block diagram

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.

When worker in danger he can press panic switch inform security. To enhance safety in underground mines, a reliable communication system must be established between workers in underground mines and fixed

ground mine system. The communication network must not be interrupted at any moment and at any condition. A cost effective ZIGBEE based wireless mine supervising system with early-warning intelligence is proposed in this project. Worker status can be monitor over IOT.

4. Proposed Algorithm:

4.4 Flowchart:
In underground mining, ventilation systems are crucial to supply sufficient oxygen, maintaining non-explosive and non-toxic atmospheres and operating an efficient mine.

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.

1).Flowchart of Helmet & Control Unit-

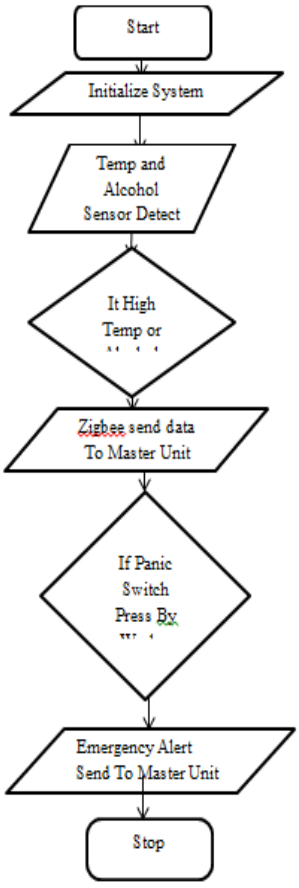


Fig-3: Flowchart for Helmet Unit.

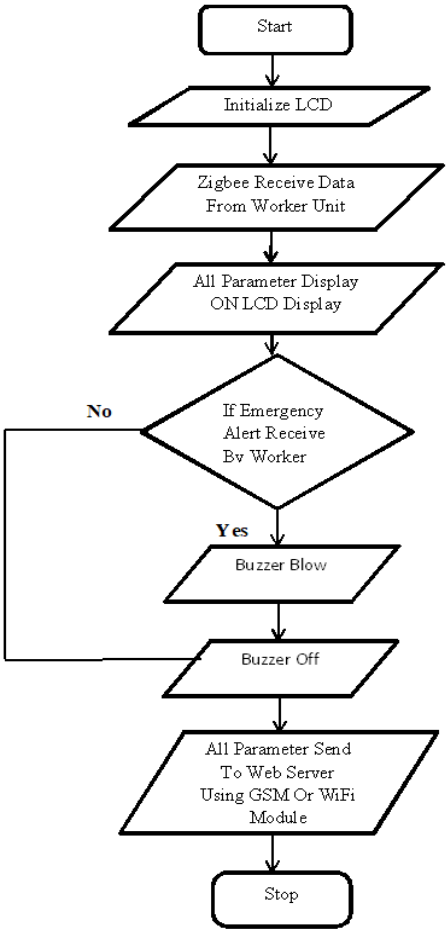
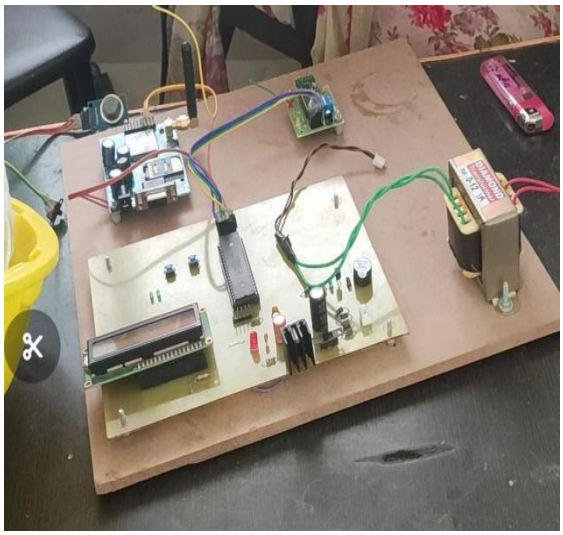


Fig-4: Flowchart for Control Unit.

5. RESULT SECTION:



Fig–5: Hardware of IOT Mining Tracking & Worker Safety Helmet.

The result analysis of our project includes

1. sensing the gas emission , temperature.
2. Transmission of data using Wi-Fi.

6. CONCLUSION:

A real time monitoring system is developed to provide clearer and more point to point perspective of the underground mine system and also provide reliable communication using ZIGBEE between mine workers.

In this way it will be helpful to all miners present inside the mine to save their life before any casualty occurs.

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