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# MINING SAFETY DEVICE

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**Abstract**

The project is aimed at designing a miner safety alert system. Mining work is one of the most dangerous work to do. So we as the engineers we are doing our small part by trying to reduce this danger. We are designing a safety device for the mining workers using Zigbee transmitter and receiver. We are using temperature sensors so that if any change in temperature it can easily be detected. We are also using gas sensor through which a small amount of gas leakage can also be detected. We are installing a button so that in case of emergency the mine workers can press the button which gives the alert at the base so that the rescue teams can easily reach the affected area with-in the time , so the people who are in danger zone are saved with in the time. Temperature and gas leakage will be monitored by emergency team all the time, so that in case of any danger they can immediately take action at particular area. Mines that are deeper, the more dangerous it could be to be running jobs. There are challenges related to leaving a mine in case of a crisis. So by using this device many lives can be saved and dangers can be avoided.

## 1. INTRODUCTION

Mining is indispensable to the creation of goods, infrastructure and services which enhance the quality of their lives. As a society we're blessed to enjoy the many advantages that industry manufactured.Safety in the mine industry has been considered an important issue, with coal mine being one of the most dangerous. Frequently the underground environment is shaky or unpleasant.Miners face immense dangers daily rising their lives. Some miners even lost their lives due to less safety measures also the time taken by the emergency team to reach the affected location is more due to lack of communication which increases the risk of danger.The mines that are deeper, the more dangerous it could be to be running jobs. There's oxygen leak that is restricted, and

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there are challenges related to leaving a mine if a crisis happen.

## 2. RELATED WORK

Under present scenario most of the employees die every day in mines as a result of industrial accidents and most of the employees suffered work related injuries. Majority of accidents are caused by unsafe work behavior or human errors. The workers attitude and behaviors are the most important antecedents to unsafe act, accidents and injuries. Unsafe behaviors are said to both directly and indirectly contribute to 90% of all accidents and incidents.As compare to other industries accidents in mines are still continuing at some disturbing rate. The records on the causes of accidents are available in the form of broad categories such as winding, haulage, dumper, explosives, inundation and dust or gas. Open cast mines are generally known as known to be safer than underground. From the analysis of accidents in Indian coal mines in last four decades, it is observed that accidents due to transportation system are a major contributing factor.

## 3. IMPLEMENTATION

We approached some locals and some mining sites and found that the employees are facing immense danger while mining. Many employees lost their lives due to the danger in the mine sites. Due to lack of communication the risk is even more.The major problem identified is that there are numerous accidents occurring in the coal mines due to improper maintenance and inadequate monitoring of the mining activities. These led to numerous life losses and immeasurable able resource loss.Our project aims at reducing deaths and to find the people who were missed. This helps to know which miner is in emergency and the help can be send to his location. By using this the security and emergency teams can directly reach the affected area without any delay. This can be used in emergency cases like -toxic gas inhalation, physical injury etc. The main objective is to save the affected people faster without any injury and reducing the risk.

### List Of Components Used

1. ARDUINO
2. Buzzer
3. Zigbee
4. Pollution sensor
5. Temperature sensor
6. Gas sensor
7. Button
8. Jumper cables
9. Bread board

The mining safety device comprises of an emergency button, temperature sensor and

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a gas sensor. We use transmitter to detect workers moving through the entire mining site. The system makes use of Zigbee transmitter to receive the data transmitted. This helps to know which miner is in emergency and the help can be send to his location.

These all components will be connected to the Arduino microcontroller. Whenever there is an emergency the employee can press this emergency button which will send a signal to the rescue team with the help of a transmitter. Here the Zigbee transmitter is used for long distance communications.Our system consists of gas sensor (MQ2), temperature sensor (DHT22) these are connected to Arduino. These sensors are available in the device to collect the temperature, Gas and smoke. Arduino will be connected to the voice module and also to the LCD. So that the employee can also view the temperature and gas levels and take necessary actions. This data will also be sent to the rescue team so that they can monitor the underground situations.

## 4. EXPERIMENTAL RESULTS

The mining safety device is a device which reduces the risk of danger for the employees. It works using a Zigbee module which is useful in receiving long range signals. The device consists of an emergency button which when pressed send an emergency signal to the rescue team. Other modules like temperature sensor and gas sensor will be detecting the changes. Thus this device reduces the response time taken by the rescue or medical team to reach the affected area.Mining work is one of the most dangerous work to do. In the mining industry many lives are risked due to its work in underground. Many accidents occur due to lack of communication in the mining sites. Due to improper signals in underground, deeper areas will have no communication. So by using the mining safety device a communication can be established, by which the rescue team can know if there is an emergency. The aim of this project is to ensure the safety of the mining employees. If there is any danger in the mining area the rescue team can take action as soon as possible with this device without any delay. Other data such as temperature gas toxicity can also be collected using this device.The normal safety measures such as helmet, flashlight, and walkie-talkie are carried by the employees to ensure they don't fall in risk. But even some of the employees fall in danger due to other factors like gas toxicity or any other physical injuries. The time taken by the rescue team to reach the

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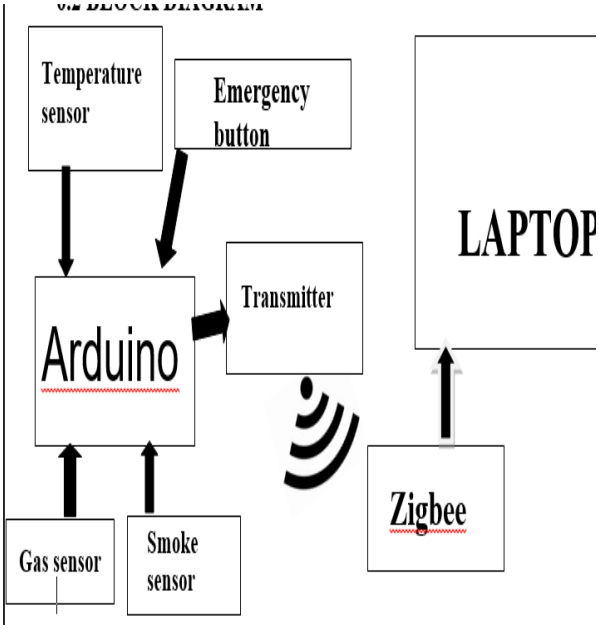
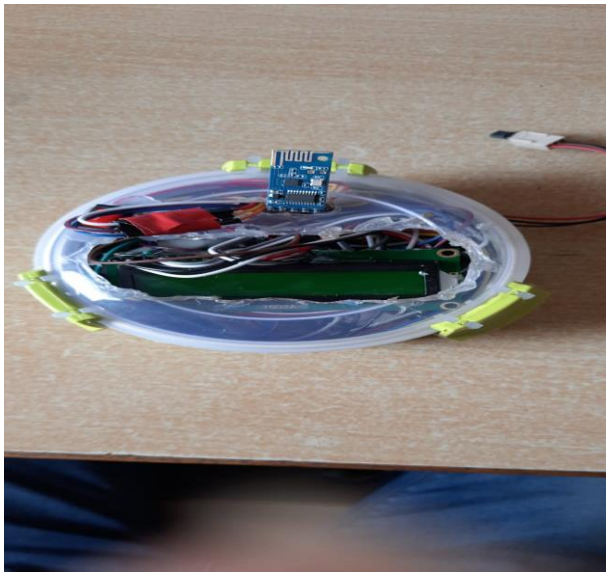
danger zone is also longer. So to reduce the time and save the employees mining safety device is used.It can be used by mining employees to ensure their safety.The mining sites can collect data of temperature and gas toxicity for future references.Other industrial workers can also use this device for their safety.




**Block Diagram**



**Prototype**

**Business Model**

## 5. CONCLUSION

In mining industry there are approximately 700,000 individual employees working daily. And every year several hundreds of miners gets injured due to the dangers in the mine sites. In many of these accidents the medical team takes a lot of time to reach the affected area due to which the risk even increases. So by using the mining safety device if there is any emergency immediately a signal can be sent to the rescue team to take action. Even other factors such as temperature and toxicity of gas can noted with this device. With the use of Zigbee the transmitting and receiving of signals will be faster. So many lives can be saved by using this device. We hope that these methods will be adopted as soon as possible so that the

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limitations we are experiencing with present method can be overcome.

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