



# Monitoring Gas Leakages in Mines

Nishtha Verma<sup>1</sup>, Ayush Singh<sup>2</sup>, Swati Soren<sup>3</sup>, Anshika Kushwaha<sup>4</sup>, Anju Gupta<sup>5</sup>

<sup>1</sup>Assistant Professor, <sup>2,3,4,5</sup> B.tech Final Year Student, Electronics & Communication Engineering Department, Axis Institute of Technology and management, Kanpur

**ABSTRACT:** Gas leakages in mining environments pose significant risks to the safety and well-being of miners and can result in harmful accidents if not promptly detected. This research paper explores various techniques like we are adding Vacuum pump in it. So that it properly accumulate the harmful gases in the mines. And also we are doing the work of counting the people who are entering and also at the time of exit so that the casualties can be removed. technologies employed for monitoring gas leakages in mines to enhance safety measures. The paper discusses the utilization of gas sensors, fixed detection systems, portable detectors, the importance of training and education for miners on gas detection procedures and emergency response protocols is emphasized. By integrating these advanced techniques and technologies into mine safety protocols, operators can effectively mitigate the risks associated with gas leakages, ensuring a safer working environment for miners underground.

**Keyword:** Vacuum, MQ5, Beam counter, Light

## I. INTRODUCTION

We know that mining industries are very important for us. The Mining industry plays a crucial role in supplying essential raw materials for various sectors of the economy. However, mining operations inherently involve risks, particularly concerning the safety of miners and the surrounding environment. Among the numerous hazards encountered in mining, gas leakages pose a significant threat, leading to accidents, injuries, and environmental damage. To overcome this problem we are using sensors and with the help of that we are able to count the number of people who are going inside and the time of exit it also counts the same way.

Gas leakages in mines primarily involve methane, carbon monoxide, and Butane, Propane among other hazardous gases. Methane, in particular, is highly combustible and can lead to explosions if not properly monitored and controlled. Despite the implementation of safety regulations and monitoring systems, gas-related incidents continue to occur. After watching all the scenario we are adding Vaccum pump in it. So that it properly accumulate the harmful gases in the mines.

## II. PROPOSED WORK

We have introduced a system which will help us to monitor the amount of gases inside the mines and will also help in reducing the amount of harmful gases so that the gases do not get mixed in the environment and harm the workers over there. We have also added sensors to detect the harmful gases so that as soon as the gas leaks out, the sensor sense the gas and the alarm is set on, to alert the workers to escape from the mines.

There is also a infrared counter which is used to count the workers inside the mines, this keeps check on the entry and exit of the workers so that in case any casualty occurs so we will come to know if anybody is left inside the mine and can rescue them as soon as possible.

### Circuit diagram

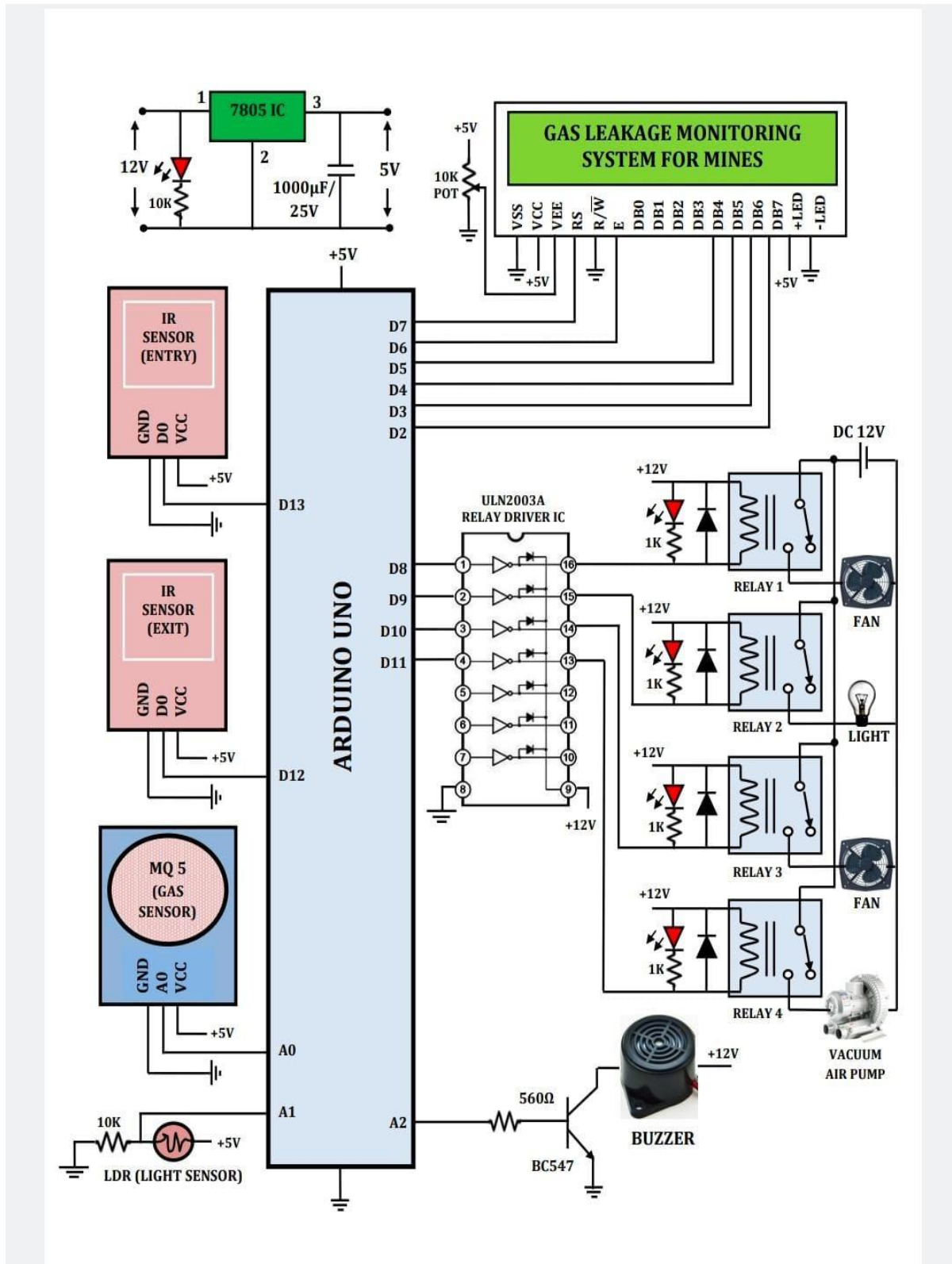


Figure 1: Circuit Diagram

## Block Diagram

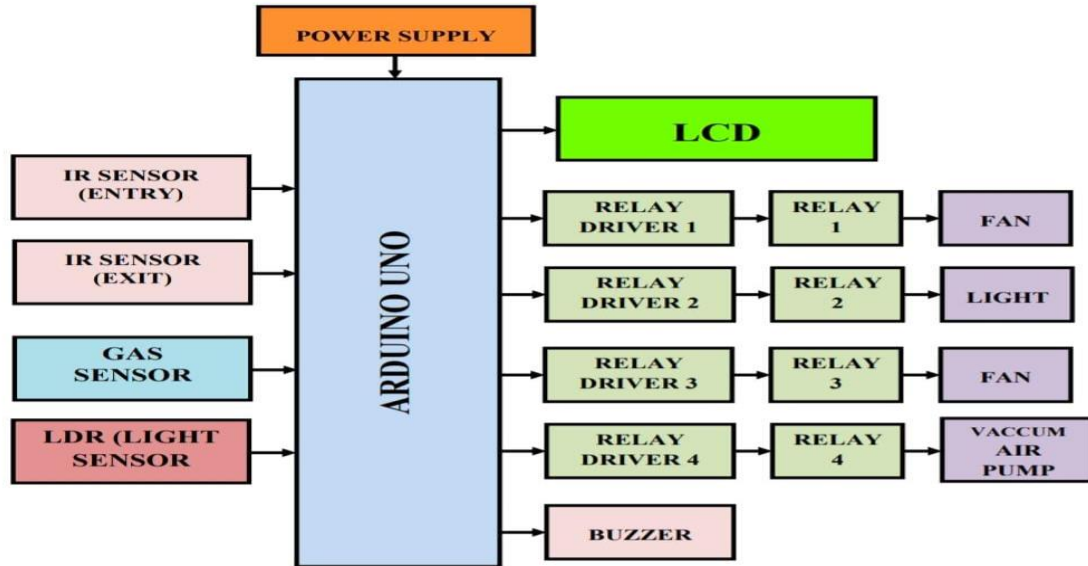


Figure 2: Block Diagram

### III. LITERATURE REVIEW

There were some research which were done earlier considering the same problem, they were also detecting gas inside the mines and also alert system was there but they they did not have any data of the workers working inside the mines and also there was no facility of light inside the mines as there are various places inside the mines where light is not appropriate. We had read many papers through which we came to know about the lack of things in the prior system which we have tried to cover in the proposed system. So we have all the essential requirements in our system including a infrared counter with the help of which we will be counting the workers inside the mine. There is also exhaust fan including the vacuum pump in the system which will help in to intake all the harmful gases and also the exhaust fan will remove the harmful gas from the mines simultaneously. There is also an automatic light source which will get on if there is no sufficient light at a place inside the mine.

### IV. METHODOLOGY

In this system there are several stages by which the system works efficiently so we have used various components in this system.

First of all we have to on the system and then the arduino is set to pass the instructions, now as the person enters the mine the counter will start counting the people and once they come out of the mine it starts decreasing the number of person as per the exit of a person.

After that we have already set a certain amount of gases during the programming so as to test the procedure so, when the gas starts leaking and it reaches the value greater than the normal one so the buzzer will beep and the fan gets automatically on and the vacuum pump will also start intaking the harmful gases that has emerged in the atmosphere. For this we have used the gas sensor to detect the gases.

And when the amount of harmful gases gets back to normal the fan automatically gets off itself. We have also provided an automatic light source which will work at places where the appropriate light is not available inside

the mine, this light gets automatically on if it finds that the place is having insufficient light for the workers to work.

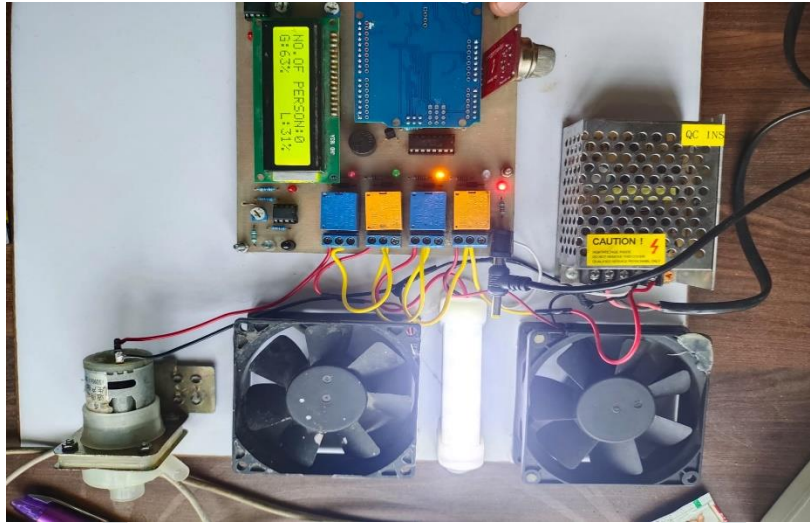


Figure 3: Proposed Model

## V. CONCLUSION

The project that we have made is appropriate to use and consist of all the components

Which are cheap and easy to use. We have not used any costly components and also the working of the project is easy and simple.

### Future Scope

The Proposed hardware, along with some modification can be used for the purpose;

**Implementation of IoT:** If we implement IoT technology then we can monitor the sensor data from anywhere in the world using the Third party using MQTT servers.

**Implementation of Zigbee:** If we implement Zigbee then we can monitor the sensor data received from remote location in the mines.

## VI. RESULT

After testing the project, we came to know that the system is working efficiently and it is able to fulfill all the necessary requirements which was needed. It is able to count the workers that are entering the mine and it is also detecting the gases and hence the fans and the exhaust starts automatically to remove the hazardous gases present inside the mines. There is also a light which is placed in the system, it will automatically set on if it is found that the light present inside the mine is not enough to do work.

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