Faculty of Information Technology

Miner Safety Helmet

Group No: 28

Index numbers	Name with initials
(L) **214086K**	**T. A. S. I. Jayalath**
214023R	A. M. C. I. Athapaththu
214211R	W. A. T. M. Thilakarathna
214177P	A. S. F. Sahla
214007X	A. D. R. V. Abeysiri

Supervisor's Name:

Ms. Nipuni Chandimali

Date of Submission:

30/09/2022

Signature of Supervisor:

……..

Contents

Introduction

The mining industry in Sri Lanka is relatively small, but it has the potential to grow. Because our country is rich in minerals such as graphite, ilmenite, quartz, rutile, and zircon among others. The government has identified the mining industry as a key driver for economic growth as it generates various opportunities for many sectors as a society and has taken several steps to support the development of the sector. we are blessed to appreciate the benefits that this sector manufactures by processing these materials and products that supply us. Despite these efforts, the industry faces challenges such as outdated equipment, low levels of technology, and a lack of skilled labour.

Problem in brief

As we all know, accidents are becoming more frequent in mines. Minors working in mines face a higher risk of injury and health problems due to harsh and dangerous environmental conditions such as harmful gases, temperature, and humidity. Minors face poor working conditions such as a lack of ventilation, inadequate lighting, and insufficient safety equipment. So, the main problem in mining is miners should aware of environmental factors and get more safety from mining.

Aim

Mining is a risky profession. So here we suggest a security system in addition to a mining monitoring system for the mining sector using Arduino-based circuits.

Objectives

- This device is to improve the safety of miners by monitoring and detecting potentially hazardous environmental conditions.
- Monitoring the temperature within the helmet to ensure that miners do not overheat, which can lead to other health problems.
- Detecting and alerting miners to high levels of harmful gases such as CO and methane in the air, which can be lethal in high concentrations.
- This device is more accurate rather than a robot.
- The device ensures that miners comply with safety regulations by providing accurate safety information.
- Providing real-time feedback to the minors and their supervisors about the levels of CO, humidity, Methane, and temperature in the mine, allowing for better monitoring and decision-making.
- The device allows real-time monitoring of the environment, which can help in quickly identifying changes in the environment and making necessary safety precautions.
- This device is to reduce accidents and fatalities in the mining industry.

Proposed solution

- This system measures the temperature and relative humidity of the air in the mine and identifies whether the environmental conditions are suitable for miners.
- If the temperature or humidity levels become too high or low than the suitable value, it sends data to the receiver and alert.
- The CO sensor detects the presence of CO gas in the air and the sensor continuously monitors the air and sends an alert if the CO levels exceed safe levels.

- The methane sensor detects the presence of methane gas in the air and the sensor alerts the miner if the methane levels exceed safe levels.
- Buzzer will turn on when there is an emergency.
- Mic is used to send information on two-way communication.
- We have LEDs for making alerts for the miner if the harmful gases are more than the required level.

- **Block diagram**

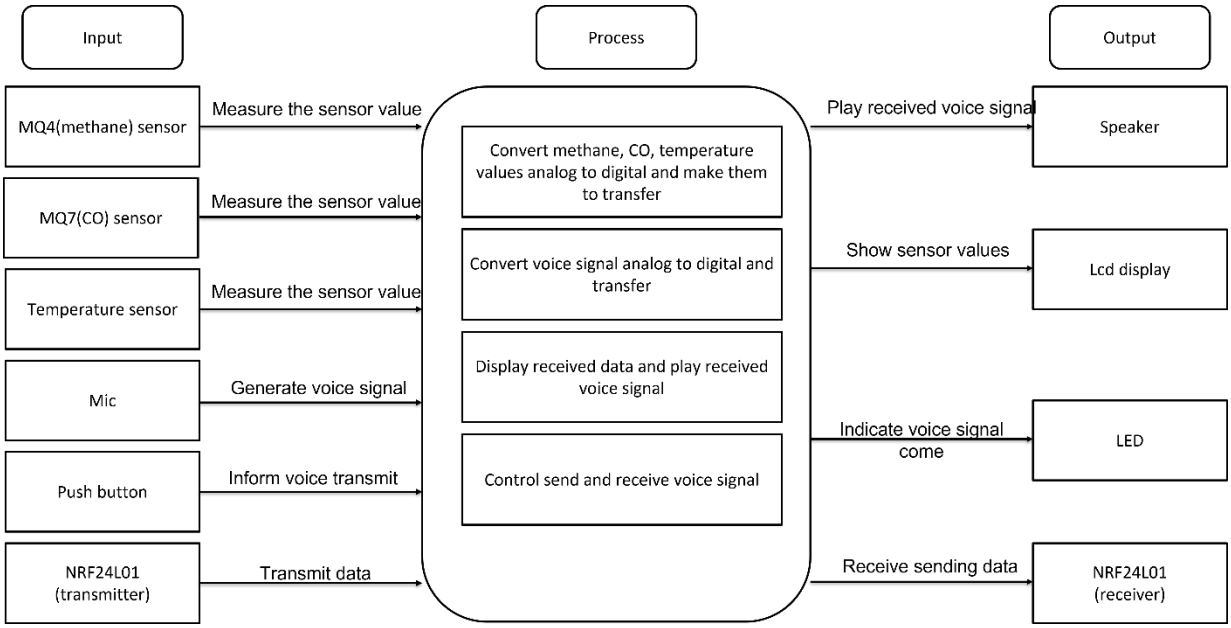

Figure 5.1

Resource Requirements

Requirements	**Quantity**	**Price (LKR)**
ESP32 development board	2	4400.00
NRF24101 module	2	2200.00
NRF 24L01 Base module	2	550.00
Mic module	2	1300.00
Speaker	2	560.00
MQ4 gas sensor	1	350.00
MQ7 gas sensor	1	400.00
Buzzer module	1	150.00
(16 x 2) LCD Display	1	500.00
Other		8000.00
Total		18410.00

The main software we are going to use,

1. Arduino Ide

Reference

https://youtu.be/LhBIRMMAGGE https://www.electronicwings.com
https://scionelectronics.com/Appendix
https://www.electronicwings.com

Action Plan

Index	Task	Duration
214086K	Studying NRF module	01 month
	Programming and testing	02 months
214023R	Studying two way voice communication	01 month
	Programming and testing	02 months
214211R	Studying two way voice communication	01 month
	Programming and testing	02 months
214007X	Studying temperature sensor, ch4 sensor	01 month
	Programming and testing	02 months
214177P	Studying MQ7 Co sensor,lcd display	01 month
	Programing and testing	02 months
All Members	Designing power supply	02 months
	Assembling	
	Error fixing	