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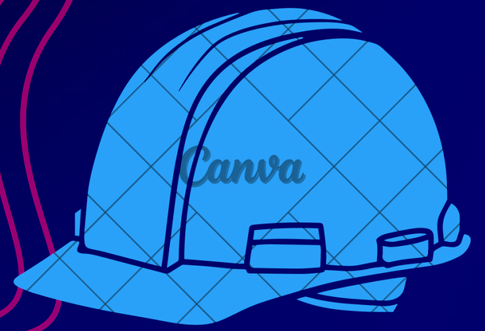
DIY PROJECT

Arduino Smart Helmet



AN OPEN-SOURCE SOLUTION FOR WORKER SAFETY

PRESENTED BY
Team 18

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Team Members

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2. Biplab Kumar Majhi (22MI31007
3. Saket Dhawale (22MI10052
4. Nishant Kumawat (22AG30029

Background & Motivation

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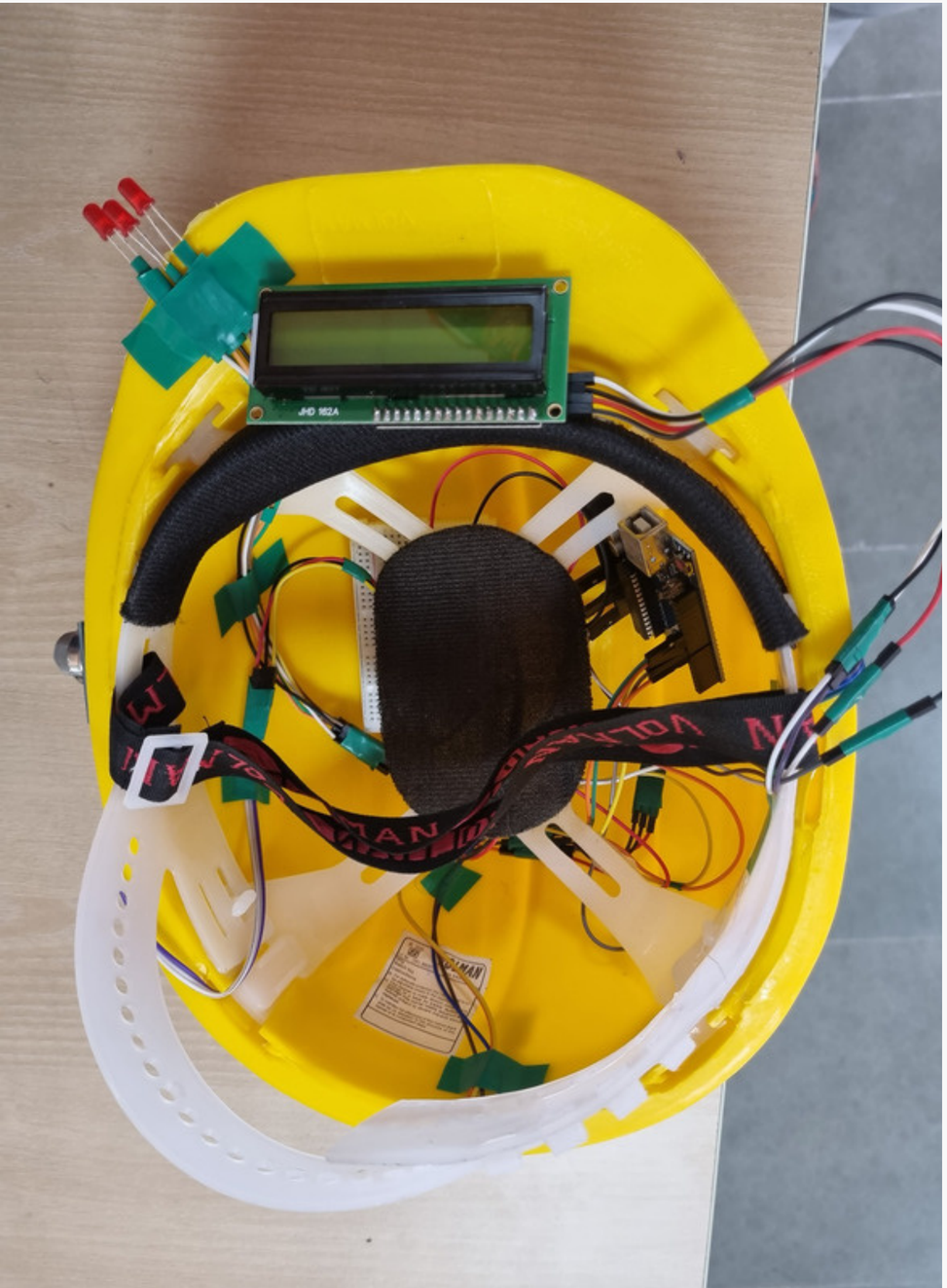
- Death of mine workers due to gas leakage
- Chronic diseases of workers due to inhaling of dangerous gases and smoke
- No visibility to workers in mines during a powercut off



Objectives

- The objective of the project is to design and develop a Smart Working Helmet using Arduino technology, which can help to **improve safety** and **reduce risks** for workers in dangerous working areas such as mines **due to gas leakage**.

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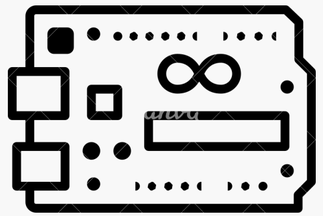
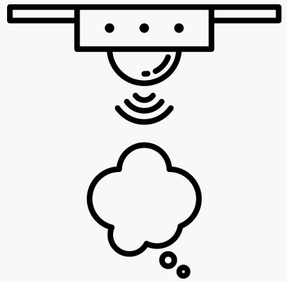
Componenets Required

ARDUINO

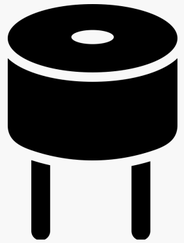


MQ-2 GAS SENSOR

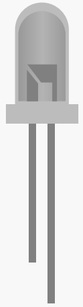


LCD DISPLAY

BUZZER



LEDS



BREADBOARD

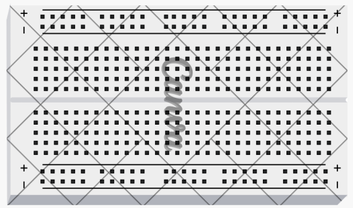
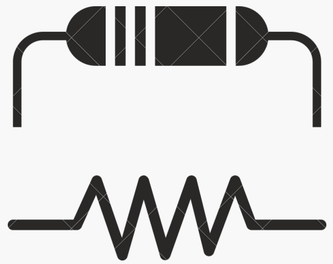


Photo Sensor

RESISTOR



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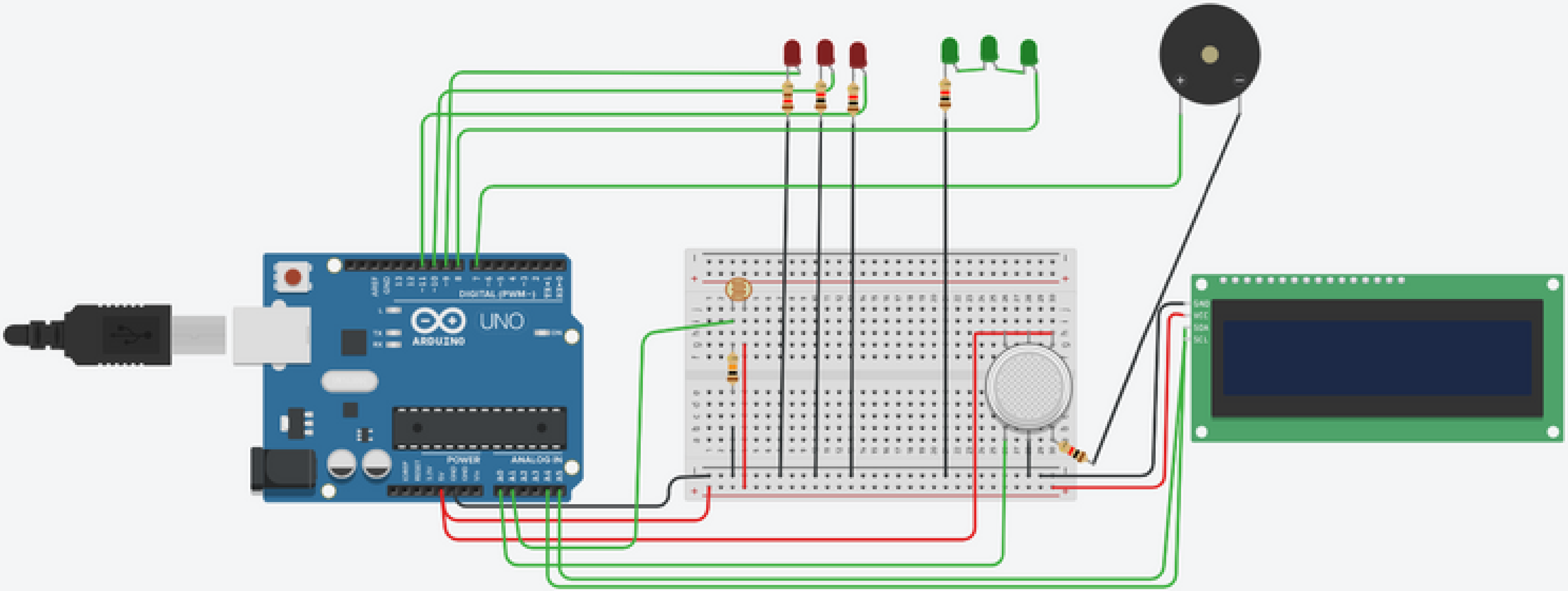
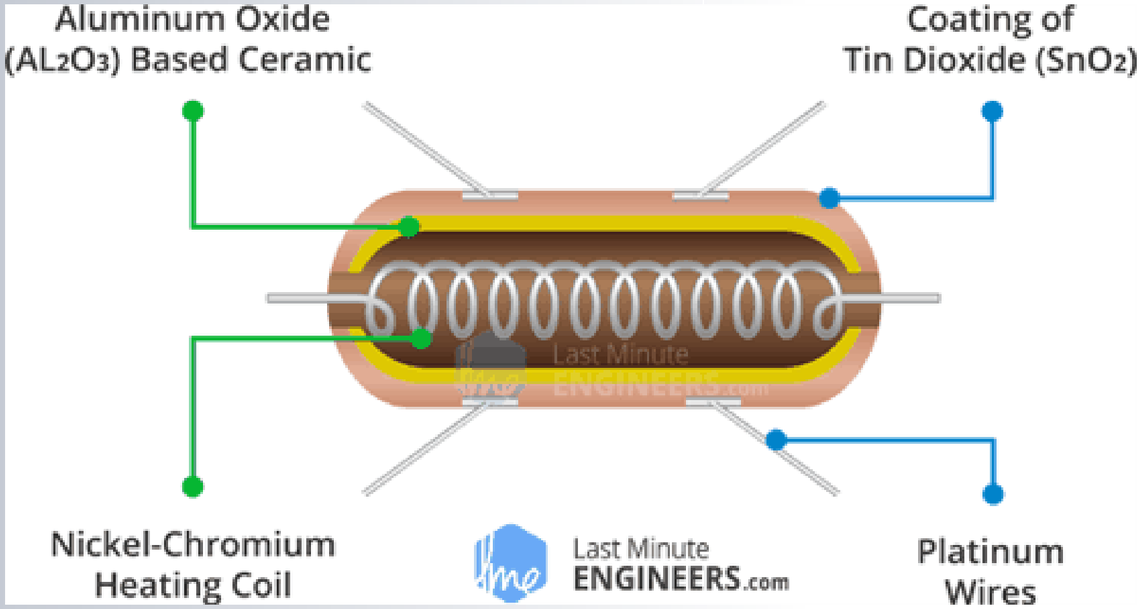
Circuit Diagram



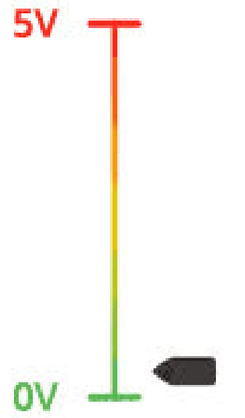
MQ-2 Gas and Smoke Sensor

- Smoke and gas detection
- Detects LPG, Alcohol, Propane, Hydrogen, Methane, and CO.

How does it works?



Clean Air

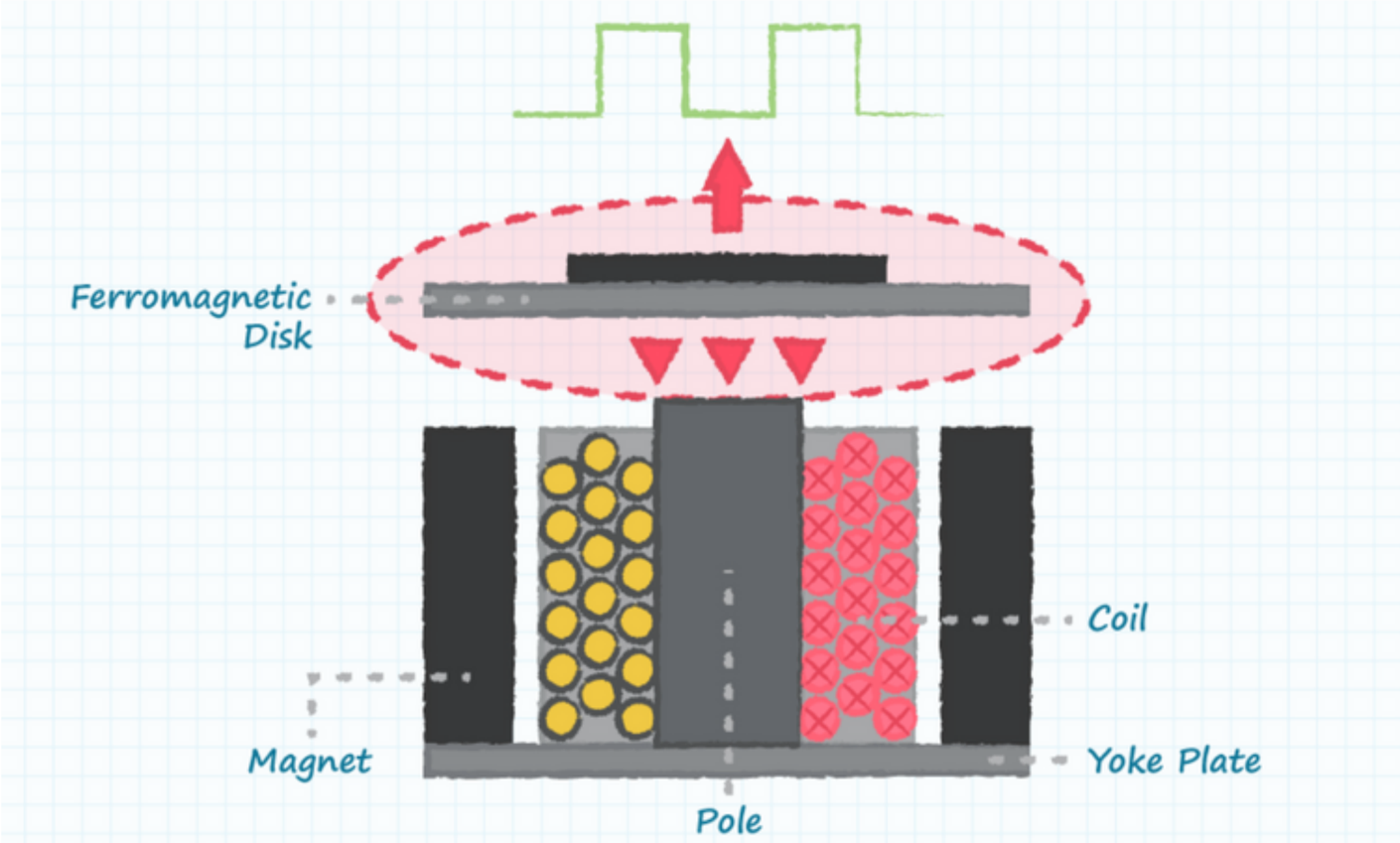


Output Voltage

Magnetic Buzzer

- A magnetic buzzer uses a coil of wire to create a magnetic field. When current flows through the coil, a flexible ferromagnetic disk is attracted to it, producing sound. The current is controlled by the applied voltage and coil impedance.

How does it works?



LDR Light Sensor

- An LDR sensor, made of a light-sensitive material, adjusts its resistance based on the amount of light it receives. This change in resistance enables the sensor to detect and measure light levels in various applications.

How does it works?

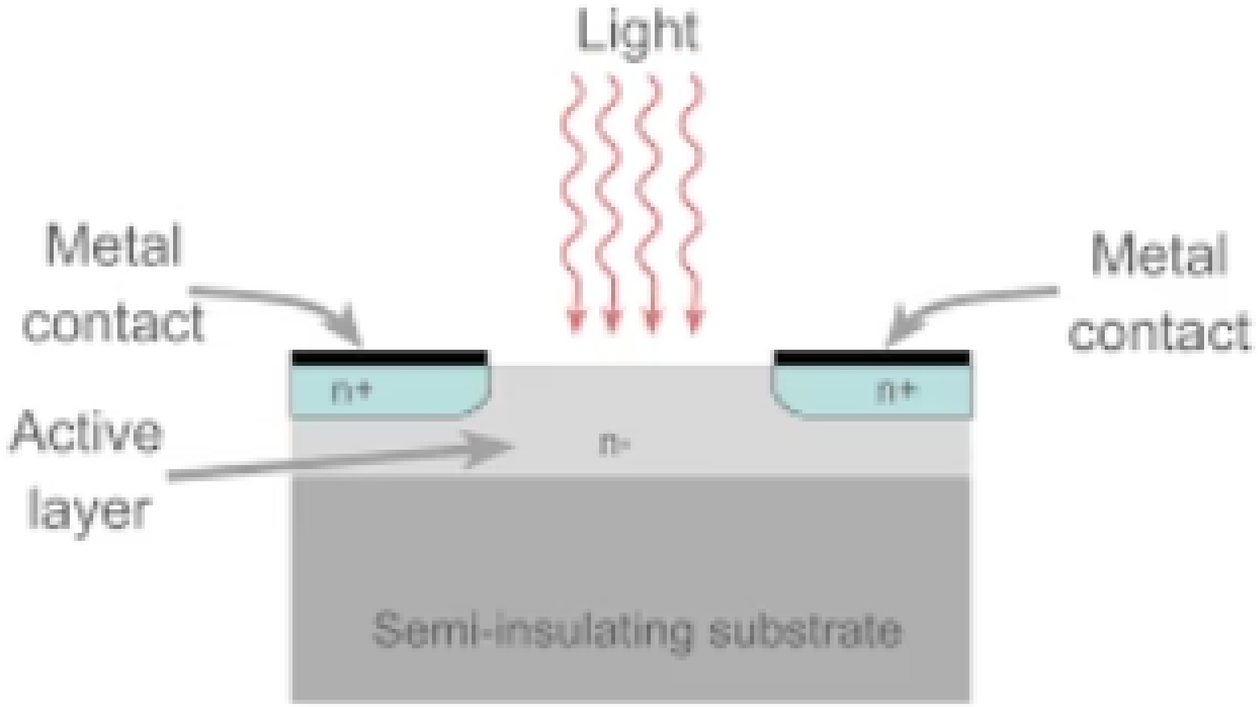


Fig. 3. Operation of photo conductivity

Salient Features of the Code

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Item	Code Input
Gas Sensor	The code utilizes the MQ2 gas sensor (connected to pin A0) to detect and measure various gases such as LPG, CO, and smoke.
Light Sensor	The light sensor (connected to pin A1) is used to measure the ambient light level.
LCD Display	he code integrates an LCD display (I2C interface, address 0x27) to provide real-time information about gas levels and other parameters.
Warning System	The code includes a warning system using a buzzer (connected to pin 7) and red lights (connected to pins 9, 10, and 11). The buzzer and lights provide warnings when the gas levels exceed a dangerous threshold.

Challenges faced and solutions found

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LCD Display Issue

Initial problem - LCD display not showing gas detection values.

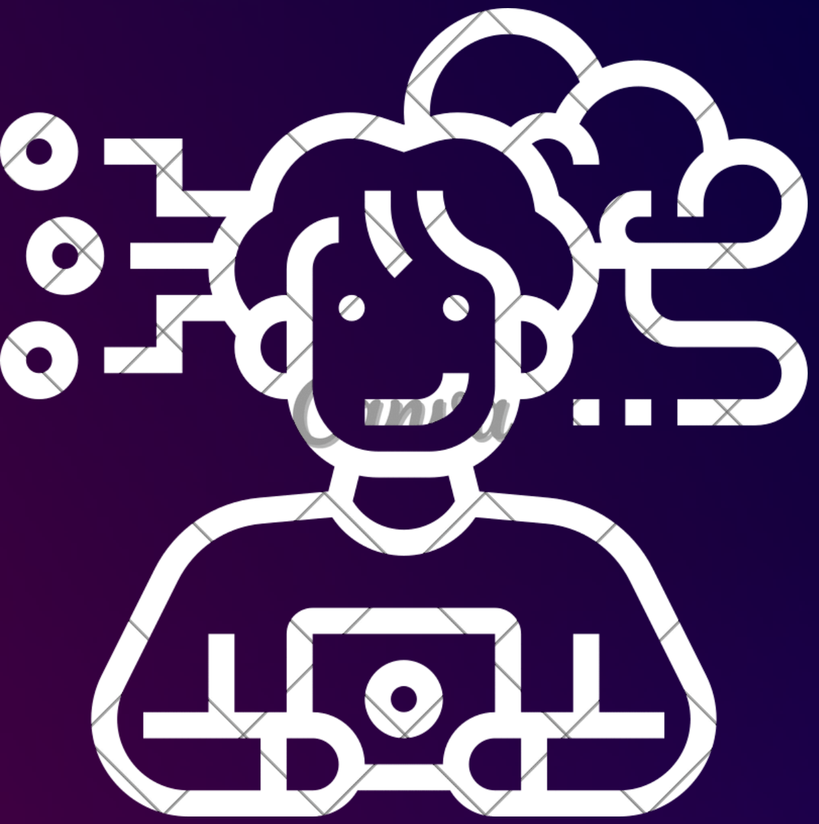
- Solution: Code manipulation and correction of LCD initialization and print statements.
- Outcome: Successfully resolved the LCD display issue, allowing real-time gas level monitoring.

Buzzer Malfunction:

Buzzer not functioning as expected.

- Solution: Identified and rectified wiring and code-related issues affecting the buzzer operation.
- Outcome: Restored proper functionality of the buzzer, ensuring timely auditory warnings for workers.

Learning form the project



1	Practical Arduino Application: Applied Arduino technology to develop a real-world solution for worker safety in hazardous environments.
2	Sensor Data Interpretation: Learned to read and interpret sensor data to monitor gas levels,, and ambient light intensity.your video presentation.
3	Alert System Implementation: Designed visual and auditory alerts using LEDs and a buzzer to warn workers of dangerous conditions.
4	LCD Display Integration: Incorporated an LCD display to provide real-time gas level information to users.
5	Collaboration and Problem-solving: Engaged in teamwork and creative problem-solving to overcome challenges and optimize the smart helmet.

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Work Plan

By Team Tech Miners(18)

Jameel

- *Build and test the circuitry for the base station*
- *Write the code for the base station to receive and display sensor data*
- *Debug any issues with the base station circuitry or programmi*

Saket

- *Assist in programmi ng the Arduino Lilypad boards to read values from the sensors*
- *Write the code to transmit sensor data from the helmets to the base station*

Biplab

- Build and test the circuitry for the helmets
- Assist in programmi ng the Arduino Lilypad boards to read values from the sensors
- Work on The Presesentat ion

Nishant

- *Component Ordering*
- *Assemble and test the sensors and other components for the helmets*
- *Buidling The Circuit and calebrating the sensors*
- *making report.*

Conclusions

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1. **Enhanced Safety**: The Arduino Smart Helmet project has demonstrated the potential to significantly enhance worker safety in hazardous environments through the integration of sensor technology and real-time monitoring.

2. **Timely Warnings**: By utilizing gas, temperature, and light sensors, the smart helmet provides timely warnings to workers, enabling them to take proactive measures and avoid potential risks.

3. **Empowering Workers**: The Arduino Smart Helmet empowers workers by providing them with real-time information and control over their safety, enabling them to make informed decisions and take appropriate actions.

4. **Future Potential:** The success of this project opens doors to further advancements in worker safety technologies, driving continuous improvement and fostering safer working environments.

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References

- https://www.ardumotive.com/smart-working-helmet-en.html
- https://www.instructables.com/Arduino-Smart-Working-Helmet
- https://docs.google.com/document/d/1yu_kepxM-gmwSfzcxkzQJq2OkaqJN_Ej3nNv0Z4mDsM/edit?usp=sharing
- https://youtu.be/Heb5lusbdaM

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Thank You.