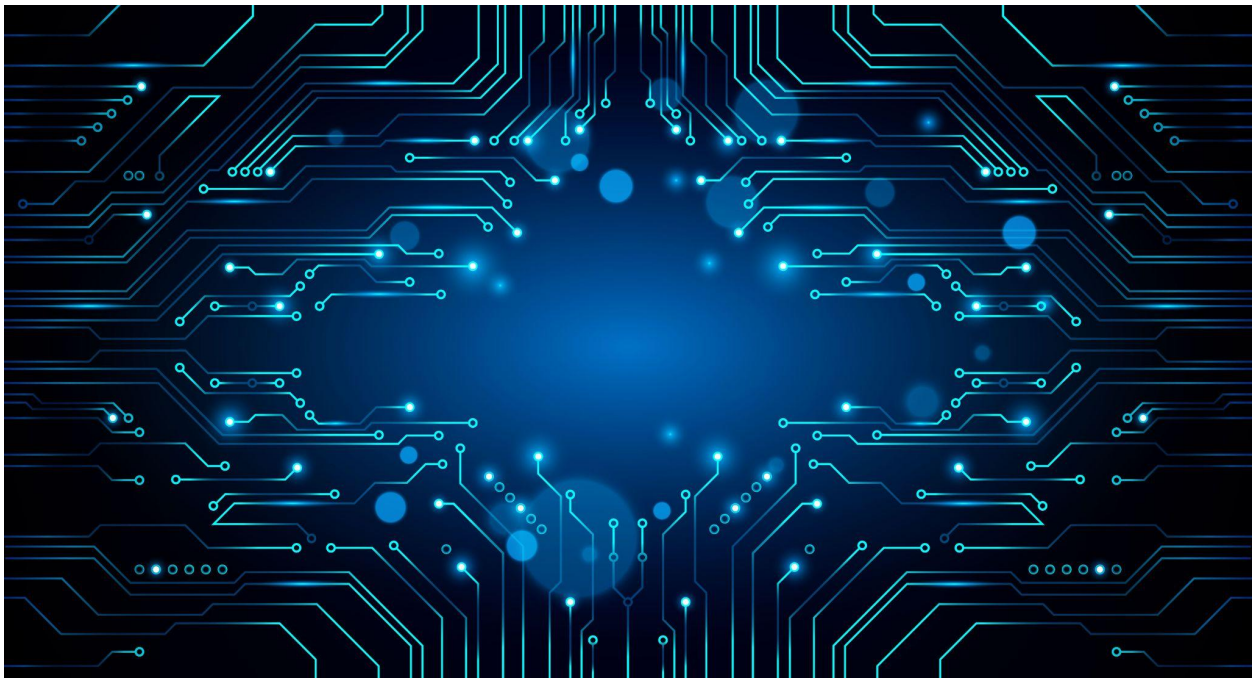

Flammable Gas Detection & Alert System

Swe 4740

Embedded Software Development Lab

Team 14

Zadid Bin Azad - 170042046

Wasif Azmaeen - 170042055

Azad Al Fayed Arnob - 170042075

Motivation

Every year, all over Bangladesh, we see that explosions are happening due to gas leakage from cylinders/containers or because of chemicals that are kept in stores without any protection. Even short-circuits can cause massive fire and explosions. Due to this, a lot of people are killed. The recent **Shezan juice factory fire incident** and **Moghbazar Gas Explosion** took the lives of **52 people** and **7 people** respectively, keeping **hundreds of others injured** and **traumatized** for their whole life.

People from the Fire and Civil defence have often said that the fire mainly originates and spreads quickly due to the presence of chemicals in the open.

Now in our project, we are taking measurements that will warn or alert nearby people of any type of presence of smoke and flammable gas like Methane, Butane, Alcohol in the environment.

Project Goals

- Make the industrial environment safe and check the amount of hazardous gas in the air.

Project Description

In our project, we want to -

- Show the presence of flammable gases in the air and check if it crosses a threshold.
- Detect smoke from any flame-able gas in the air.
- Alert Authority if the presence of flammable gas or smoke crosses a threshold.

Challenges

- Less knowledge about gas detection sensor
- How to connect everything with mobile
- Hardware implementation is difficult and costly

Sensors and Equipments with Functionalities

- **MQ-2 :** To detect the amount of Smoke and Methane gas in the air.
- **MQ-135** : To detect the amount of Alcohol in the air.
- **GSM 800-A :** To send a message to the authority in order to alert them.
- **16x2 LCD :** To show the amount of Gas in the air

Sensors and Components Description

- **MQ-2 :** MQ2 is one of the commonly used gas sensors in the MQ sensor series. It is a Metal Oxide Semiconductor (MOS) type Gas Sensor also known as Chemiresistors as the detection is based upon change of resistance of the sensing material when the Gas comes in contact with the material. MQ-2 Gas sensor works on 5V DC and draws around 800mW. It can detect LPG, Smoke, Propane, Hydrogen, Methane and Carbon Monoxide concentrations anywhere from 200 to 10000ppm.
- **MQ-135** : The MQ-135 Gas sensors are used in air quality control equipment and are suitable for detecting or measuring Alcohol, NH_3 Benzene, Smoke, CO_2. The MQ-135 sensor module comes with a Digital Pin which makes this sensor operate even without a microcontroller and that comes in handy when you are only trying to detect one particular gas. It operates at 5V and consumes around 150mA. It requires some preheating before it could actually give accurate results.

- **GSM 800-A :** GSM 800-A is a quad-band GSM/GPRS module that works on frequencies 850MHz GSM, 900MHz EGSM, 1800MHz DCS, and 1900MHz PCS. It can be used for sending/receiving messages, making calls, sending/receiving data over the internet, etc. This makes it useful for applications such as home automation, Fire Alert, Agriculture Automation, etc.

Workflow

Architecture

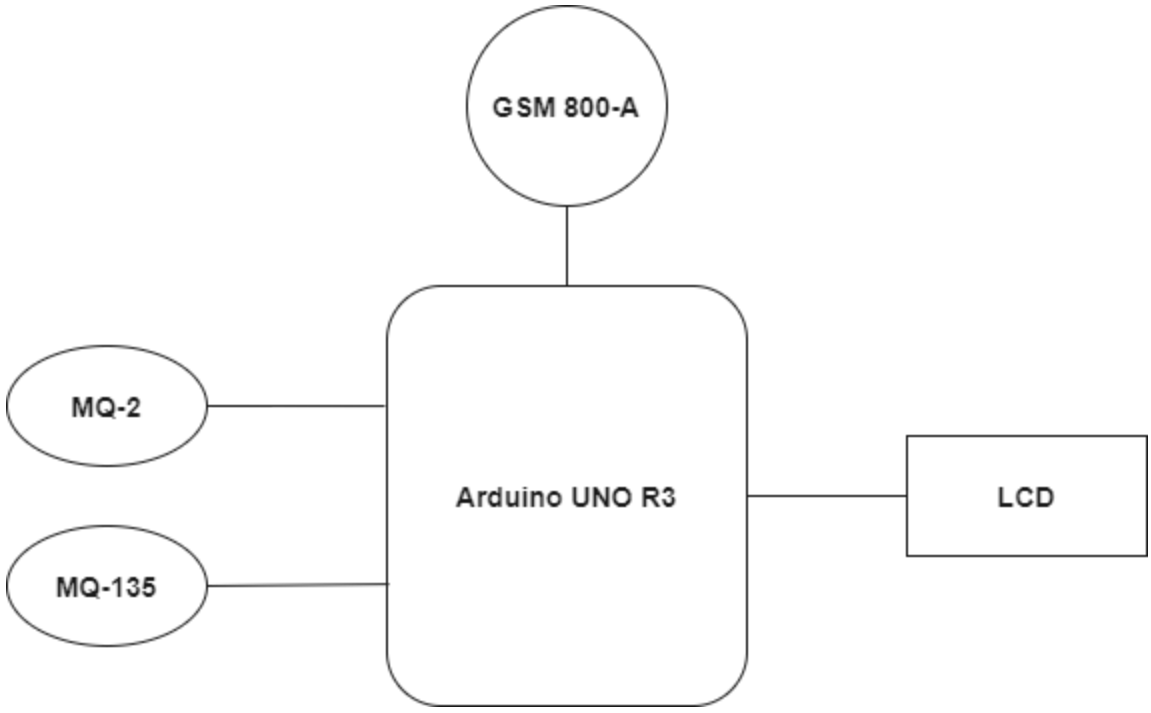

Figure : Architecture of the project

Setup Process and Manual

- Set a Mobile SIM in GSM-800A
- Power Up the device & set the Sensors in a suitable position
- The threshold for both Sensors are set
- If the presence of chemical (MQ-135) and gas (MQ-2) crosses threshold, Buzzer will turn on
- A message will be sent to concerning people whose number was set previously through GSM-800A
- It will continue sending message with an interval until the safety level is reached
- Take necessary steps

Demo

Video Link :

https://drive.google.com/drive/folders/1EAqGnDiG8v0hf9b_UqJeQE2TbzXFWxGp?usp=sharing

Github Link :

Github

Future Work

- Add a pressure sensor to detect the pressure drop of gas cylinders.
- Make the device better by setting everything on PCB.