RAJALAKSHMI ENGINEERING COLLEGE
An AUTONOMOUS Institution
Affiliated to ANNA UNIVERSITY, Chennai

IOT based Gas Leakage Detection System

Supervisor:

Mrs. T. Helan Vidhya, M.E., (Ph.D).,
Assistant professor (S.G)

Batch Members(Reg. No.)

1. Hemanth R (190801064)
2. Manikandan R (190801099)
3. Hariprasad R (190801504)

Problem Statement

- Gas leakage is a serious problem and nowadays it is observed in many places like residences, industries, and vehicles like Compressed Natural Gas (CNG), buses, cars, etc. It is noticed that due to gas leakage, dangerous accidents occur.

- Recently, The Visakhapatnam gas leak, also referred to as the Vizag gas leak, was an industrial accident that occurred at the LG Polymers chemical plant in the R. R. Venkatapuram village of the Gopalapatnam neighborhood.

- As per the National Disaster Response Force (NDRF), the death toll was 11, and more than 1,000 people became sick after being exposed to the gas.

Objectives

- The detection of LPG is done by using Arduino and the alert is given using GSM module. In addition to the existing work, control of the harmful gas leakage is done.

- Some of the safety actions which are the implementation of alarm system to alert users like, an alarm which triggers as soon as the Arduino has shown a positive detection when the leakage of LPG had occurred.

- The stepper motor is also activated to close the LPG cylinder regulator is included. Once the air valve has fully-closed, an alarm will be disabled.

Literature survey

TITLE	YEAR	AUTHOR	TECHNIQUE
Gas Detection System using Arduino	2021	Raeesa Navashree et al	It detects and alert the user via a buzzer, LCD display, and text message sent to a registered phone number.
LPG Gas Leakage Detection and Prevention System using NodeMCU	2019	*S. Karthick et al*	It detects and alerts the user via a buzzer, an LCD display, and an email.
Detection of Liquefied petroleum gas using sensor through Arduino UNO microcontroller	2018	Aastha Singh et al	When a leak is detected, the buzzer will be activated and the GSM module will send a message to the user about the LPG leak.

Literature survey

TITLE	YEAR	AUTHOR	TECHNIQUE
LPG Gas Monitoring System	2015	Arun Raj et al	It detects, alerts, and automatically books the cylinder through SMS to the agent booking number in this system.
Smart LPG Gas Level Detection and Safety System using IoT	2020	Rohith Naidu et al	It displays the percentage of gas left, notifies the user about the gas leak, and turns off the gas valve.
IOT based home safety gas leakage detection and automatic booking system	2021	Suma Christal Mary et al	It detects, alerts, and turns off the electricity if no one is present in a room.

Methodology

“Gas leakage detection system” provides the information such as when a gas leakage is noticed and immediately turns ON the buzzer for the danger indication and an SMS is been send to the responsible person for preparatory safety calculations.

Pros:

- The user can view the message without having to be connected to the internet. because the leaking message would be sent to the user's mobile number.
- Low cost.

Cons:

- Only detection and alarm methods were used. There is no way to stop the gas from leaking.

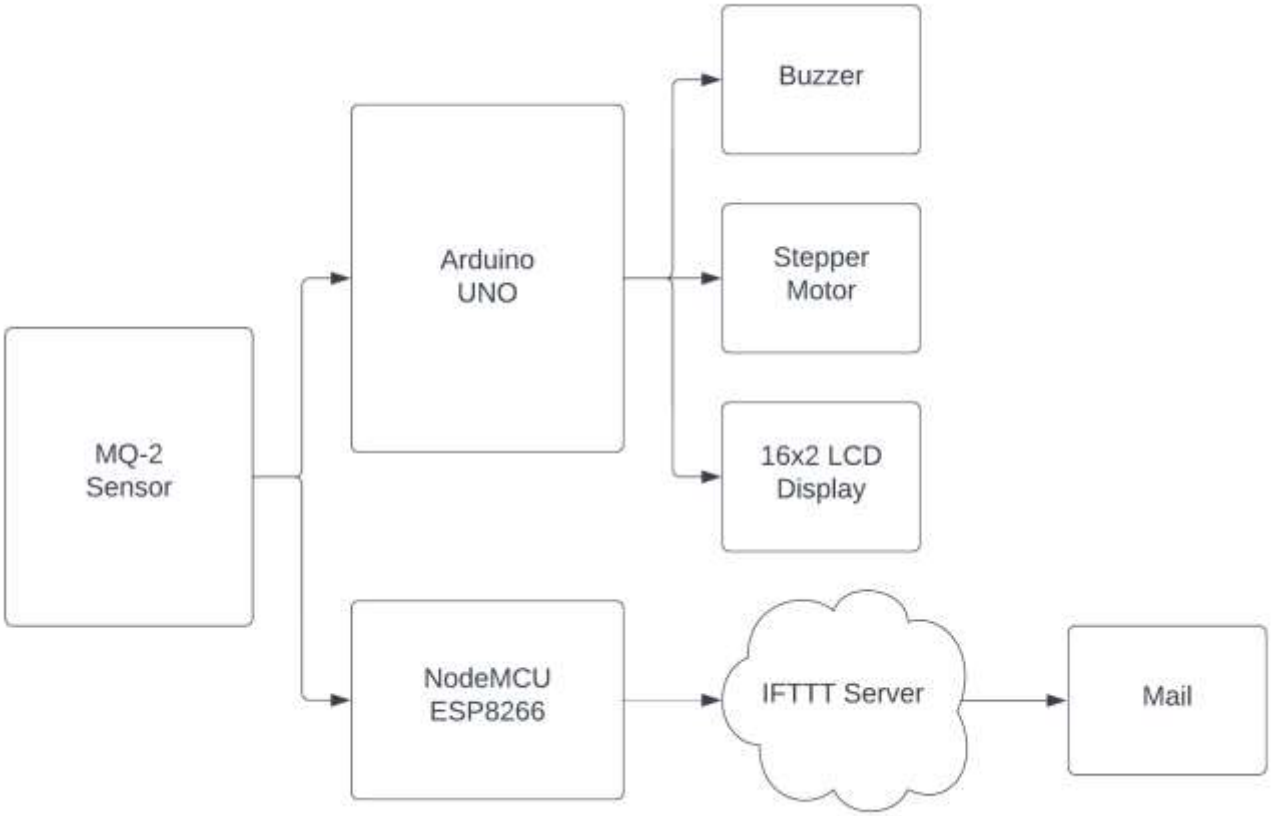
Proposed System

- In the proposed system of gas detection system, the application contains both the detection and control of the gases which are very harmful for the surrounding.
- In the detection of the gas, the sensor which is used to sense many gases is MQ-2 sensor.
- After the detection of leakage in the gas, the sensor sends the signal to the Arduino UNO.
- Through Arduino UNO, it send the signal to the LCD display for displaying the alert message as GAS Detected.
- When the gas/air level in a room exceeds 50, the detecting system's buzzer will activate.

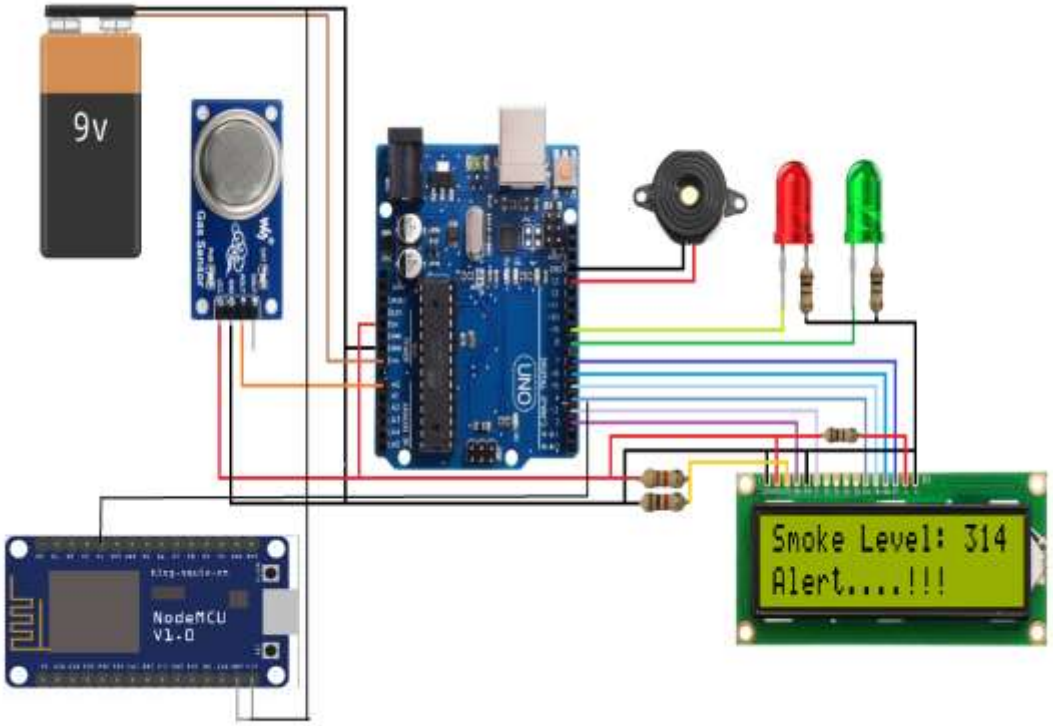
Proposed system (Contd…)

- With the use of the IFTTT (If That Then This) services, owner will receive the message via Node MCU. The MQ-2 Sensor is directly connected to the Node MCU.
- In the control of the gas, When the gas reaches above the threshold level, the detection system's buzzer and servo motor will be activated.
- Servo motor is used to regulate the LPG cylinder regulator as soon as the gas is detected. The Servo motor is connected to the Arduino UNO.
- When the Arduino Digital pin goes high, the servo motor rotates 90 degrees to close the regulator and then returns to its original position.

Block Diagram

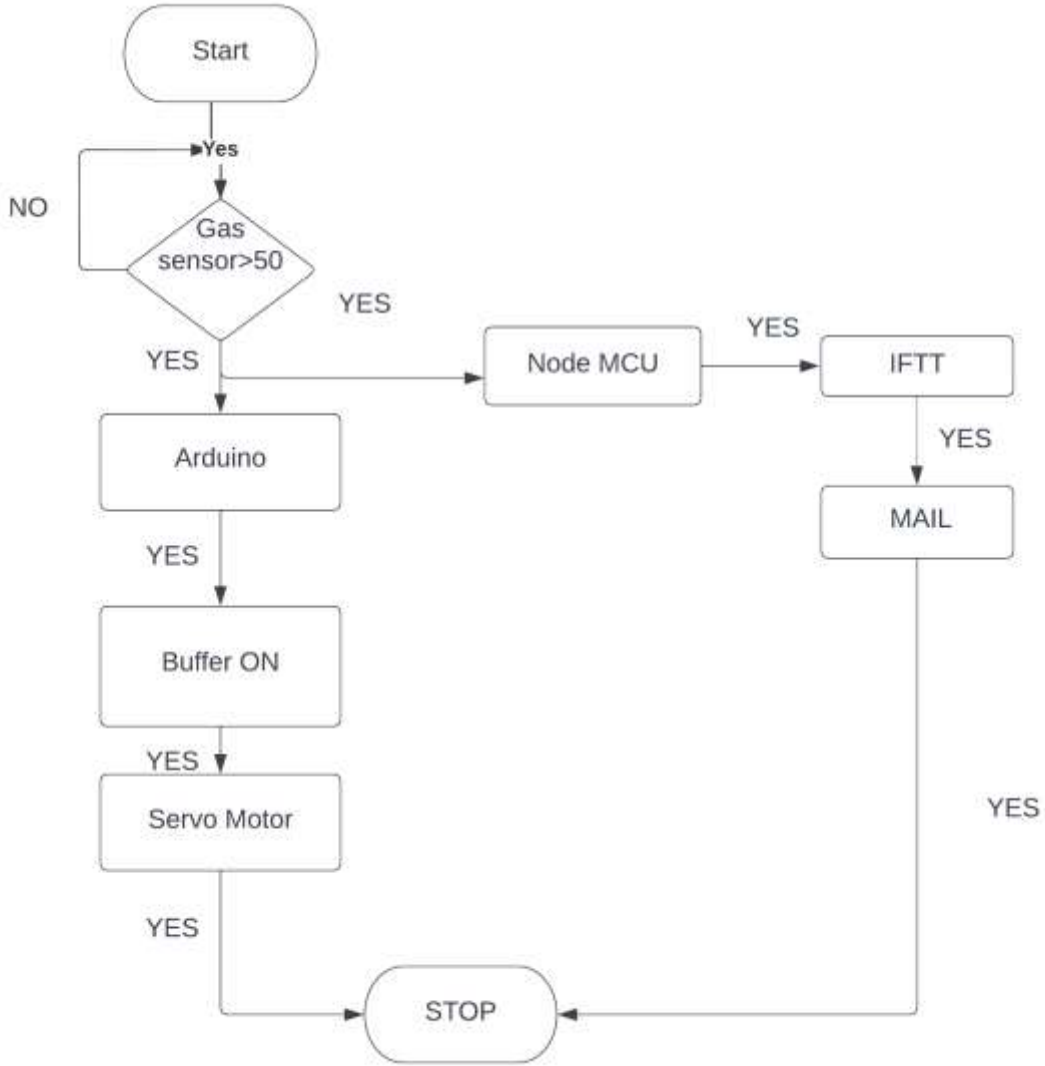


Circuit design



Gas Leakage Detection with NodeMCU

Flow Chart


Start
Yes
NO
Gas sensor>50
YES
YES
Node MCU
YES
IFTT
YES
MAIL
YES
Arduino
YES
Buffer ON
YES
Servo Motor
YES
YES
STOP

Results and Discussion

NodeMCU Results

- The connections of NodeMCU are shown in fig.1

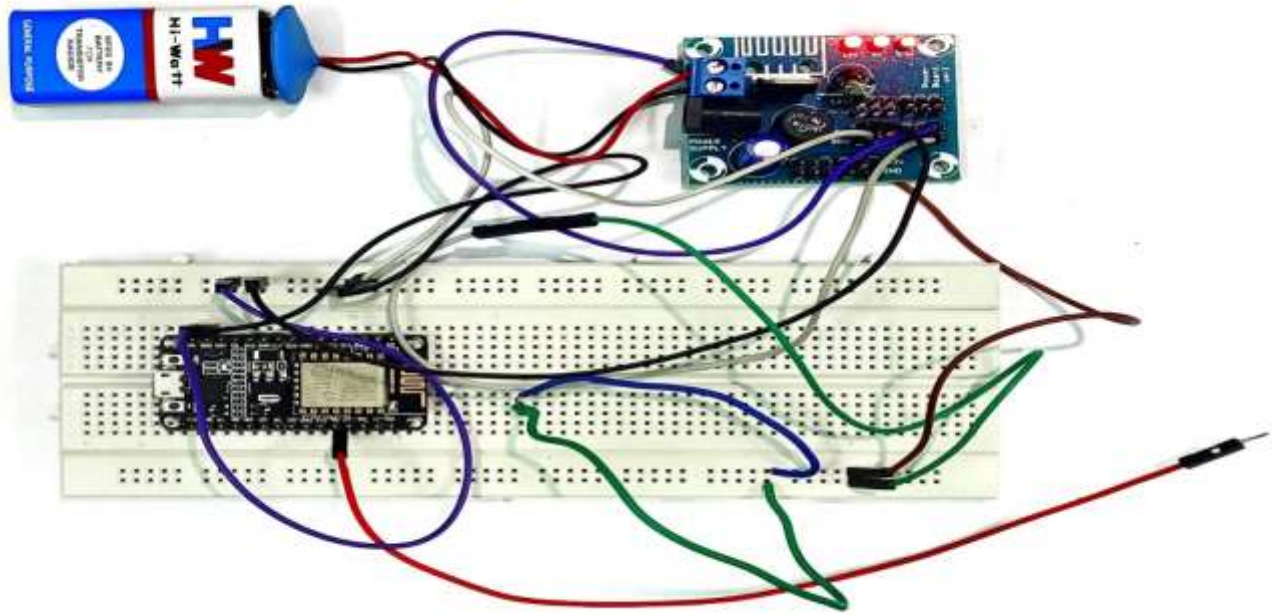


Fig.1 NodeMCU connections

Results and Discussion

- In the Arduino IDE, the "no gas" phrase is in a loop after uploading the code to NodeMCU, as shown in Fig.2.

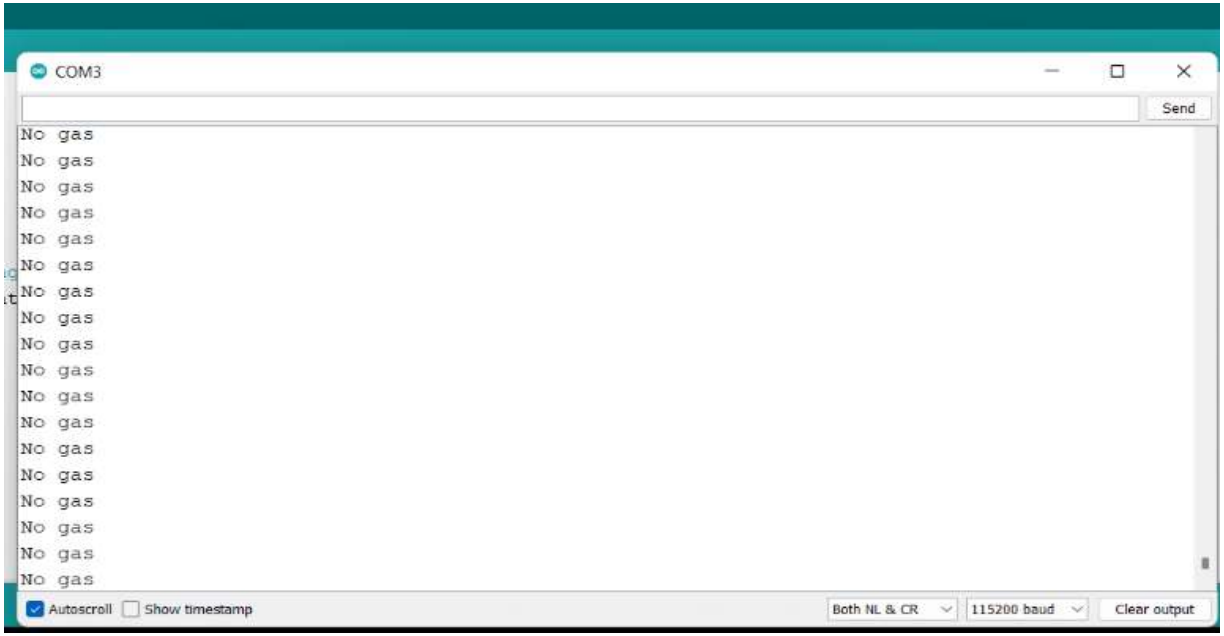


Fig.2. When gas leakage is not detected

Results and Discussion (Contd…)

- The gas sensor sends a signal to NodeMCU when it senses a leak. It then exits the for loop as shown in Fig.3 and sends an email using the IFTTT server.

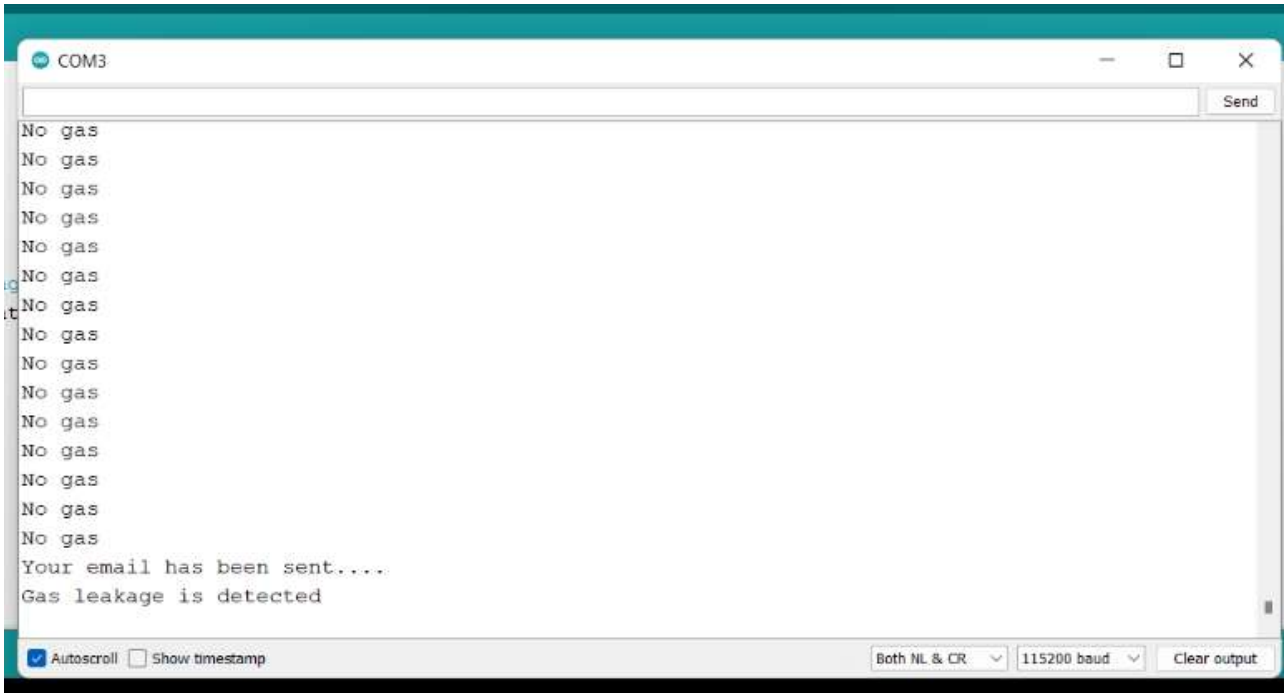


Fig.3. When gas leakage is detected

Results and Discussion (Contd…)

- The IFTTT server will send a Gmail message.

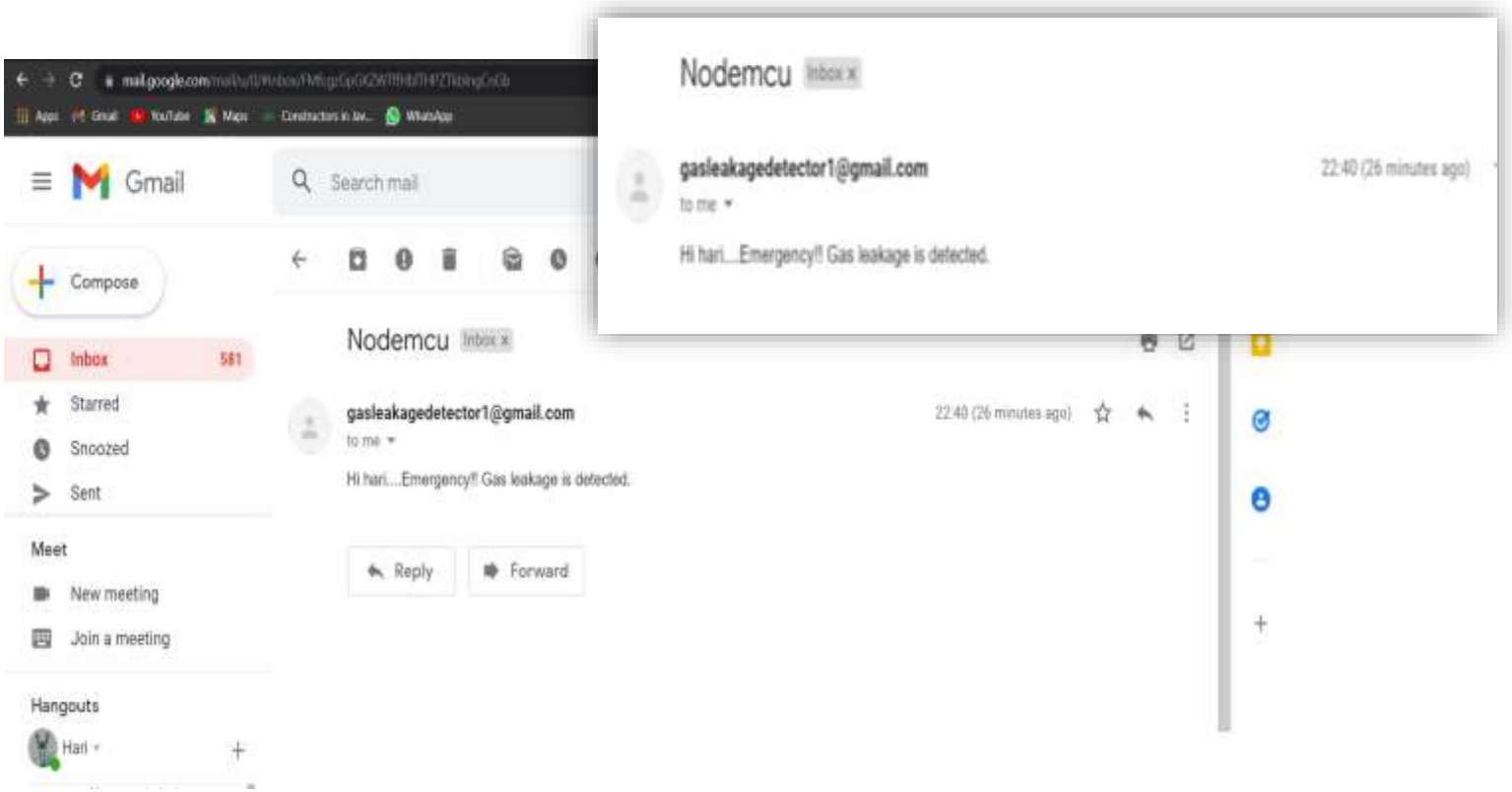


Fig.4 Output of NodeMCU

Results and Discussion (Contd…)

Arduino UNO Results

- When the read value from the gas sensor gets over the value 50, the buzzer will be activated and a message will be displayed in the LCD as shown in the Fig.6.

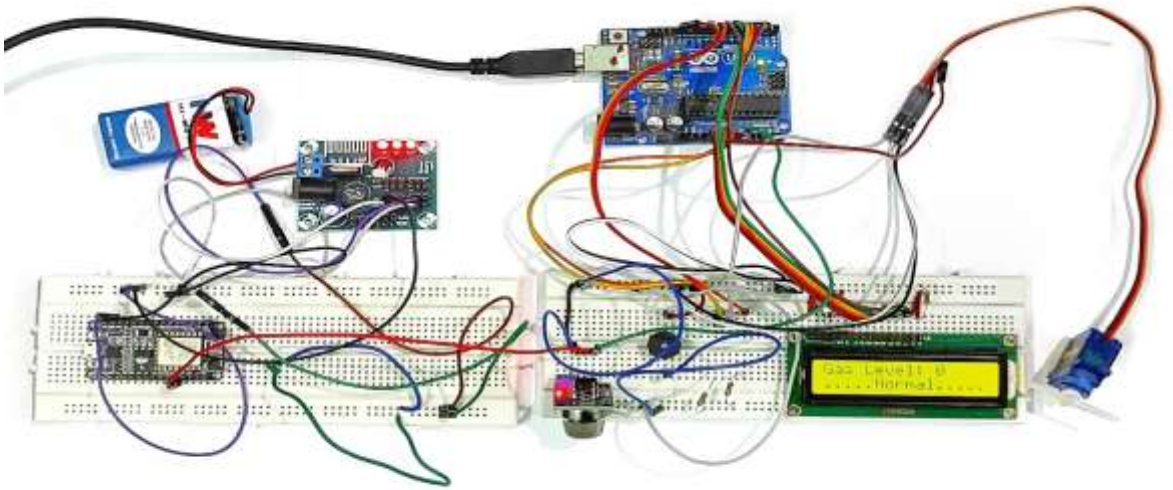


Fig.5. Gas leakage Detection system using Arduino UNO and NodeMCU

Results and Discussion (Contd…)

Arduino UNO Results

- And also the Servo motor will be triggered, and it will rotate to 90 degrees.

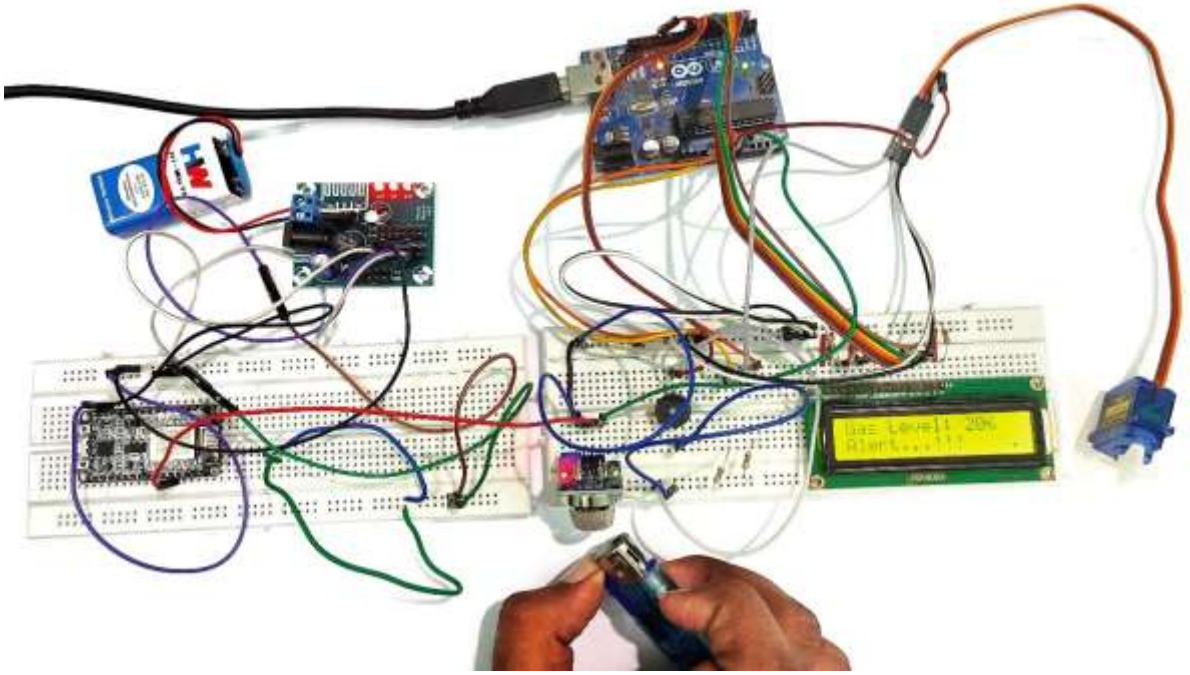


Fig.6 Gas leakage detected

Timeline

SI.NO	WORK	WEEKS
1	CIRCUIT DESIGN	1
2	ARDUINO AND NODEMCU PROGRAMMING	1
3	PROTOTYPING	2
4	FINAL PRODUCT	2

Conclusion

- Therefore, it can be concluded that the proposed Gas leakage detection system using Arduino and NodeMCU outperforms other models with its leakage control system.

- The sensor used in this model can sense and detect the leakage of the gas and the user gets notification regarding gas leakage and can also control the LPG regulator automatically.

- This proposed system can be useful in marketing sectors like hotels, shop etc. The main intention of this work is to ensure safe and easier way for leakage detection and control method to avoid disasters that may occur due to negligence.

References

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