MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

A PROJECT PROPOSAL ON

"REAL TIME GAS MONITORING SYSTEM"

UNDER THE GUIDANCE OF

"Ms. S. J. Patil"

DEPARTMENT OF COMPUTER ENGINEERING

DR.D.Y.PATIL POLYTECHNIC, KASABA BAWADA, KOLHAPUR

SEMESTER V YEAR: 2024-2025

SUBMITTED BY: G2

- Vaishnavi Ramesh Powar :- Roll no. 3104
- Asawari Bhanudas Pawar :- Roll no. 3105
- Swarali Sachin Patil :- Roll no. 3106
- Piyusha Hindurao Kesare :- Roll no. 3107

D Y PATIL
POLYTECHNIC
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CERTIFICATE

THIS IS TO CERTIFY THAT **G2** FROM DR. D. Y. PATIL POLYTECHNIC HAVING ENROLLMENT NO. **2205390242, 2205390073, 2205390216, 2205390127** HAS SUCCESSFULLY COMPLETED 'PROJECT PROPOSAL' HAVING TITLE **"REAL TIME GAS MONITORING SYSTEM"** IN A GROUP CONSISTING OF 4 PEOPLE UNDER THE GUIDANCE OF MS. S. J. PATIL

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Project guide **Head of Department** **Principal**

SEAL OF INSTITUTION

ACKNOWLEDGEMENT

We like to share our sincere gratitude to all those who helped us in completion of this Capstone Project Planning (CPP) Project Proposal. During the work, we faced many challenges due to our lack of knowledge and experience but our guides helped us to get over from all the difficulties and in final completion of our idea to a shaped sculpture.

We would like to thank **Ms. S. J. Patil**, her governance and guidance, because of which we were able to learn the minute aspects of Computer Engineering.

We would also like to show our gratitude to our Head of Computer Department **Dr. P. K. Shinde** for their continuous help and monitoring during the work. I am thankful to the supporting staff of our Department, for their help and support towards our project.

In the last we would like to thank the management of Dr. D. Y. Patil Polytechnic for providing us such an opportunity to learn from these experiences. We are also thankful to our whole class and most of all to our parents who have inspired us to face all the challenges and win all the hurdles in life.

D Y PATIL
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DEPARTMENT OF COMPUTER ENGINEERING

ACADEMIC YEAR

2024-2025

DECLARATION

I, hereby declare that the Project Proposal entitled **"REAL TIME GAS MONITORING SYSTEM"** being submitted by us towards the partial fulfillment of the Diploma in Engineering, in the Department of **Computer Engineering** in Capstone project work carried by our team under the supervision of **Ms. S. J. Patil**.

We will be solely responsible if any kind of plagiarism is found.

Enrollment No.	Name of Student
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1. RATIONALE:-

Gas cylinders are widely used for cooking and heating in households, as well as in various commercial and industrial applications. Despite their widespread usage, managing gas cylinders can be inconvenient and risky. Users often have no reliable way to gauge the remaining gas in the cylinder, leading to unexpected run-outs that can disrupt daily activities or business operations. Additionally, gas leaks, if undetected, pose serious safety hazards, including the risk of fires or explosions.

The "Real-Time Gas Cylinder Monitoring System Using Arduino" is designed to address these challenges by automating the monitoring of gas levels and detecting potential gas leaks. This system employs a combination of weight sensors to monitor gas usage and gas sensors to detect leaks, providing real-time data and notifications to users. The system's goal is to offer a practical, affordable solution that enhances user convenience and safety by alerting them when the gas is nearly depleted or when a leak is detected.

With advances in the Internet of Things (IoT) and microcontroller technology, there is a growing trend toward automating various household and industrial processes. Arduino, an open-source microcontroller platform, has emerged as a popular choice for developing affordable and customizable automation solutions. This project takes advantage of Arduino’s versatility to create a real-time gas cylinder monitoring system that integrates weight-based and gas-leak detection sensors.

Current solutions available in the market for gas monitoring are either cost-prohibitive or lack integration of multiple safety features. Our project leverages the reliability and affordability of Arduino components, along with gas and weight sensors, to create a holistic system that continuously monitors the gas level and gas leak status.

2. LITERATURE SURVEY:-

Several studies and projects have focused on gas leak detection systems, gas level measurement systems, and IoT-based automation.

- Kalyani Bhagwat, Sanket Yende, Namrata Damare, Bhavesh Shah, and Prof. V.M. Umale (2023). 'Smart LPG Gas Level Monitoring and Leakage Detection System using IoT'. Project Report submitted to Sant Gadge Baba Amravati University, Shri Sant Gajanan Maharaj College of Engineering, Shegaon, Maharashtra, India.

  The "Smart LPG Gas Level Monitoring and Leakage Detection System using IoT" addresses safety and convenience issues in LPG usage by integrating IoT technologies. It employs sensors to monitor gas levels and detect leaks, notifying users via a mobile app and automated alarms. The system includes features like real-time gas level updates, automatic cylinder booking through the Blynk IoT platform, and safety alerts for leaks. It enhances independence and safety, particularly for elderly users, while being cost-effective and user-friendly. Future enhancements include voice alerts, Wi-Fi connectivity, and predictive analytics using machine learning.

- For instance, a study by "L. K. S. Rohan Chandra Pandey, Manish Verma, "Internet of things (IOT) based gas leakage monitoring and alerting system with MQ-2 sensor," International Journal of Engineering Development and Research, Vol. 5, 2017."

  This paper by Rohan Chandra Pandey and Manish Verma discusses an IoT-based gas leakage monitoring and alerting system designed to improve safety by detecting and reporting gas leaks. Using the MQ-2 sensor, which is sensitive to gases like methane and LPG, the system continuously monitors the environment for potential leaks. When a leak is detected, the system triggers an alarm and sends alerts to users to prevent accidents and ensure quick response.

- P. M. Vidya, S. Abinaya, G. G. Rajeswari, and N. Guna, "Automatic lpg leakage detection and hazard prevention for home security," in Proceeding of 5th National Conference on VLSI, Embedded and Communication & Networks on April, vol. 7, 2014.Research, Vol. 5, 2017.

  The paper by Vidya, Abinaya, Rajeswari, and Guna presents a system for automatic LPG leakage detection aimed at enhancing home safety by quickly identifying gas leaks and initiating hazard prevention measures. The system is designed to detect leaks through sensors and immediately

trigger an alarm to alert residents. Additionally, it includes mechanisms to shut off gas supply valves to prevent further leakage and reduce the risk of explosion or fire.This system leverages VLSI and embedded technology to enable efficient and responsive monitoring suitable for home environments. The research emphasizes the critical role of automation in home security, particularly for managing hazardous situations like gas leaks, and showcases how embedded systems can contribute to creating safer residential settings by responding quickly to potential threats.

We also referred to the following papers:

a. Ravindra R. Hiwase, Priya K. Kewate, Sushmita P. Tajane, JitendraWaghmare "Automatic LPG Cylinder Booking and Leakage Detection using Arduino UNO" IJESC
b. Mr. Akshay D. Prabhu, Mr. Ashwin D. Pathak, "Gas Leak Detector using Arduino UNO Microcontroller", International Journal for Research in Applied Science & Engineering Technology (IJRASET), Volume 5, July 2017

3. PROBLEM DEFINITION:-

1.Unreliable Gas Monitoring: By using a load cell, the system can monitor the gas level in real-time, ensuring timely notifications for refills.

2.Gas Leak Detection: With the MQ-2 sensor, the system provides real-time leak monitoring, improving safety by alerting users of potential hazards

EXISTING SYSTEM:

- Existing systems for gas cylinder monitoring are mostly manual or require costly, specialized equipment. The most common approach is a manual "shake test," where users shake the cylinder to estimate how much gas is left based on its weight. However, this approach is highly inaccurate and can lead to users being caught off-guard when the gas suddenly runs out.
- High-end automated systems, often found in industrial settings, provide accurate gas level readings and can detect leaks, but they are not affordable for the average consumer.
- These systems usually require a more complex setup, including industrial-grade sensors, centralized monitoring software, and skilled personnel for maintenance.

PROPOSED SYSTEM :

- **Inaccuracy of Manual Methods:** Manual checks are unreliable, and users often run out of gas without prior warning.
- **Limited Accessibility:** Automated systems for gas monitoring are generally expensive, restricting their usage to industrial applications.
- **Single-Functionality:** Most systems are either dedicated to gas level measurement or leak detection, with few integrating both functions.
- **Complex Installation:** Industrial systems may require professional installation and maintenance, making them impractical for everyday household use.

4. PROPOSED METHODOLOGY:-

The system is based on an Arduino microcontroller, which serves as the core processing unit. Two main types of sensors are employed and also we will take help of Blynk App:

1. Load Cell with HX711 Module: The load cell is used to measure the weight of the gas cylinder, providing real-time data on the remaining gas level. The data from the load cell is amplified by the HX711 module, which is calibrated to calculate gas levels accurately. When the weight falls below a certain threshold, a low-gas alert is triggered.

2. MQ-2 Gas Sensor: The MQ-2 sensor detects the presence of combustible gases in the air. The sensor is calibrated to detect gases like propane and butane, commonly used in cooking. If the gas concentration exceeds a safe limit, the system triggers a leak alert.

The Arduino collects data from both sensors and processes it according to predefined thresholds. Notifications can be sent to users through a GSM module (for SMS alerts) or a buzzer (for on-site alerts), providing both remote and immediate alerts.

3. Blynk App: The Blink app enhances the real-time gas cylinder monitoring system by providing instant notifications for low gas levels, leak detections, and booking reminders. Users receive alerts when the gas is almost empty or if a leak is detected, allowing for prompt action. The app's user-friendly interface also enables convenient real-time monitoring of gas status, ensuring safety and ease in managing gas supply.

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5. PRODUCT FLOW:

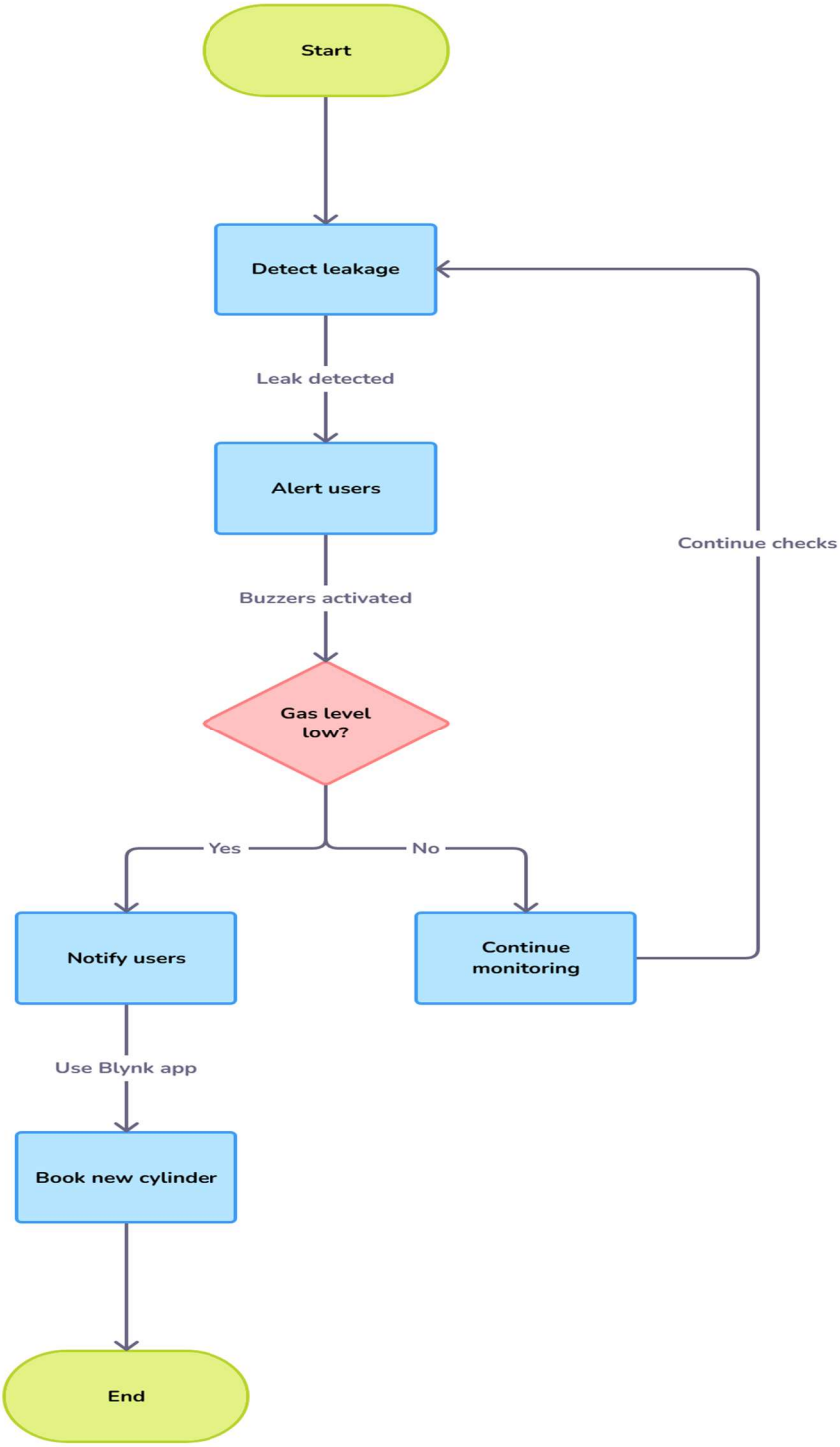

Fig. Product Flow

6. RESOURCES AND CONSUMBLES REQUIRED:-

- **Hardware Resources:**

  - **Arduino:** Microcontroller for data processing and control.
  - **Load Cell with HX711 Amplifier:** Measures weight to determine gas levels.
  - **MQ-2 Gas Sensor:** Detects gas leaks.
  - **Buzzer and LED:** Provides on-site alerts.
  - **Power Supply:** Powers the components.

- **Software Resources:**

  - **Arduino IDE:** For coding and uploading programs.
  - **Libraries:** Includes HX711, MQ-2 sensor libraries for interfacing sensors and modules.
  - **Blynk App:** For sending SMS and notifications.

7. ACTION PLAN:-

Sr. No.	Details of Activity	Start Date	Finish Date
1.	Started gathering information about multiple topics as information given By our guide.	15 July 2024	19 July 2024
2.	Started gathering information about the 5 topics that we selected as Information given by our guide.	22 July 2024	26 July 2024
3.	Finalize our topic name that is" REAL TIME GAS MONITORING SYSTEM".	29 July 2024	2 August 2024
4.	We gathered details from our project guide and started working on it.	5 August 2024	9 August 2024
5.	Searched for many reference links	12 August 2024	16 August 2024
6.	Distributed task like searching about gas leak sensor and gas weight Measurement sensor.	19 August 2024	23 August 2024
7.	Started planning to choose which components other than sensors are used While making gas monitoring system.	26 August 2024	30 August 2024
8.	Started to collect information about which microcontroller is used and Collecting the information about various microcontrollers.	2 September 2024	6 September 2024
9.	Decided Arduino as the microcontroller being used.	9 September 2024	13 September 2024
10.	Searched information of how we can use sensors with Arduino and How to program it.	16 September 2024	20 September 2024
11.	Gathered all the required hardware and software that are needed in our Project.	23 September 2024	27 September 2024
12.	Started searching for a platform for displaying details of our iot device and Selected Blynk App.	30 September 2024	4 October 2024

13.	Built a virtual model of how we will arrange our components.	7 October 2024	11 October 2024
14.	Started searching information about the language that we can use for our Ardunio.	14 October 2024	18 October 2024
15.	Started working on the programming of our Arduino using C++.	21 October 2024	25 October 2024
16.	Started working on the model of our real time gas monitoring system.	28 October 2024	30 October 2024

8. REFERENCES:-

[1]. Kalyani Bhagwat, Sanket Yende, Namrata Damare, Bhavesh Shah, and Prof. V.M. Umale (2023). 'Smart LPG Gas Level Monitoring and Leakage Detection System using IoT'. Project Report submitted to Sant Gadge Baba Amravati University, Shri Sant Gajanan Maharaj College of Engineering, Shegaon, Maharashtra, India.

[2]. P. M. Vidya, S. Abinaya, G. G. Rajeswari, and N. Guna, "Automatic lpg leakage detection and hazard prevention for home security," in Proceeding of 5th National Conference on VLSI, Embedded and Communication & Networks on April, vol. 7, 2014.Research, Vol. 5, 2017.

[3]. L. K. S. Rohan Chandra Pandey, Manish Verma, "Internet of things (IOT) based gas leakage monitoring and alerting system with MQ-2 sensor," International Journal of Engineering Development and Research, Vol. 5, 2017.

[4]. Ravindra R. Hiwase, Priya K. Kewate, Sushmita P. Tajane, JitendraWaghmare "Automatic LPG Cylinder Booking and Leakage Detection using Arduino UNO" IJESC

[5]. Mr. Akshay D. Prabhu, Mr. Ashwin D. Pathak, "Gas Leak Detector using Arduino UNO Microcontroller", International Journal for Research in Applied Science & Engineering Technology (IJRASET), Volume 5, July 2017