



IMPLEMENTATION OF SMART GAS MANAGEMENT

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Abstract: The project introduces “ Implementation of Smart Gas Management ”. The problem of gas leakage and fire is often encountered in our day-to-day life. Leakage of this gas raises the risk of building fire, suffocation or an explosion. As soon as gas leakage will be detected, user will be notified by using LCD display and turn off gas valve automatically. The buzzer starts beeping whenever gas is detected. The issue of fire at kitchen can be monitored with the help of flame sensor, user will be notified by using LCD display and turn off gas valve automatically. The buzzer starts beeping whenever fire is detected. When the milk spills on stove, the liquid sensor detects and the stove knob will be turn off. The Sound Sensor will detect the whistle count after completion of the whistle the stove knob will turn off automatically. In addition to these, it is often found that a person forgets to book gas cylinder due to his/her busy schedule. With the help of load sensor, the gas cylinder weight can be monitored and when the cylinder gets empty, they can book a gas cylinder.

Keyword-Flame Sensor, Gas Sensor, Sound Sensor, Load Sensor

I. INTRODUCTION

Liquefied Petroleum Gas (LPG) is a mixture of Propene, butene, and butane are volatile hydrocarbons. It was first used as a portable fuel source in 1860, and its production and use for both domestic and industrial purposes have grown steadily since then. Ethane and ethylene, as well as a volatile mercaptan, an odorant added as a safety measure have been present in the cylinder.

According to a National Statistical Office (NSO) survey, nearly 61 percent of households in India use liquefied petroleum gas (LPG) for cooking. But many people use gas stove very carelessly and because of this many accidents occur. We see a lot of wastage of gas and there are some hazardous accidents taking place too due to the wastage of gas. As of today, LPG is the most commonly used fuel in our Indian households. LPG is highly inflammable which may be very dangerous in case there is a leakage. This has resulted in high number of deaths in the recent years. The usage of Liquefied Petroleum Gas for cooking purposes in diverse residential properties like individual houses, huge massive apartments in the urban locality, and several other culinary industries like Hotels, restaurants, and fast-food chains has been increasing immensely as LPG is the only source that could be used as fuel in gas stoves with minimal hazards at the time of direct contact. As the consumption of LPG is highly increasing, the demand for LPG gas from the users to retail dealers also increasing rapidly.

Despite the fact that LPG is generally utilized by the household, yet the people are unaware of the daily consumption and time span when he/she needs to book a new cylinder. This may lead to disappointment to the consumer when the LPG cylinder is empty unexpectedly. Furthermore, now and again it impacts the LPG cylinder logistics because of unexpected demand. As per the reports given by the Ministry of Service of Petroleum and Natural Gas, Government of India the absolute number of accidental deaths due to leakage of cooking gas cylinder has increased. The danger of leakages is due to cracks in the pipe connecting the LPG cylinder, defective cylinder and also caused due to human carelessness. In this period, where every apparatus is fuelled by electricity, a little spark near the gas cylinder leakage could possibly lead to a blast. Therefore, the users should be aware and safeguard during gas leakage.

The many gas industries pipeline to be leaked and emitting toxic gas that harms the people living in the society, and many other situations depicting the consequences when the gas to be leaked outside. When you take normal case such as a gas cylinder, the user is more negligent about it, although the user is cautious about the usage of gas in the kitchen, because the user frequently needs to on the stove whenever relatives or friends came to the home at unpredicted times. The user who is in the kitchen loses patience and will not care about the usage of the stove and requires using the stove frequently. At many instances in India, we are observing a few cases about someone who is injured or died because of exposure to gas in the kitchen. In this scenario, suppose one IoT sensor to be designed in such a way that will alert the user through voice and text alert to the registered mobile.



If any resource is sorted, that resource to be automatically filled to the setup of the gas stove. It is an automatic system that takes care of monitoring of the gas and controls it. There is another scenario where many gas industries are developing and generating the toxic gases that are to be used in many other products and are generating revenue because of those gases.

1.1 OBJECTIVES

- ❖ Detection of gas leakage prevents the accidents and explosion.
- ❖ Alerts the user of gas cylinder empty, helps the user in their busy schedule.
- ❖ The buzzer is activated to prevent the people in vicinity.
- ❖ Whistle count is used to keep a track of domestic cooking.

1.2 PROBLEM STATEMENT

In this proposed model we have implemented the “Smart Gas Management “ to prevent from the gas leakage, fire accident and explosion. The spillage of the water or milk is sensed and the gas valve get turned off automatically. The gas cylinder will be monitored when there is a shortage of the gas in gas cylinder and alerts the user. The sound sensor will detect the whistle count of the pressure cooker.

II. METHODOLOGY

The primary task is to identify the hardware components which are suitable for this project. The above figure [Fig 3.1] consists of hardware components which are interconnected with each other to perform specific task. It consists of the Sensor’s, Bluetooth module, Arduino, Relay, Power supply, load Cell, Buzzer, Servo Motor.

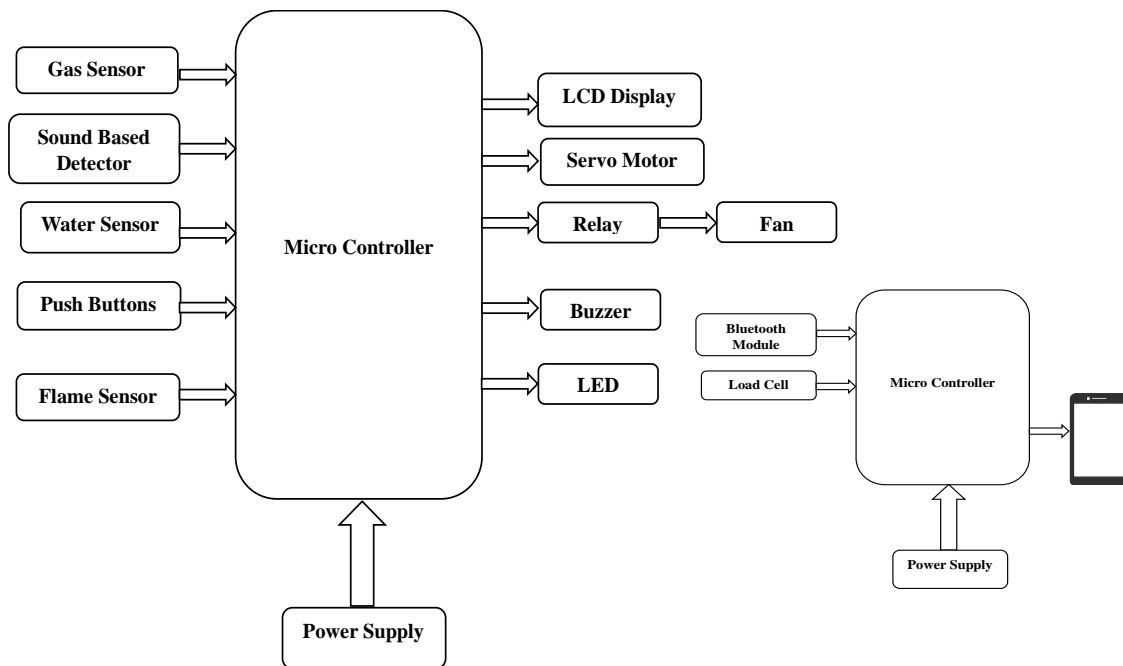


Fig: 1 Block Diagram of Smart Gas Management

The Gas Sensor will detect the gas leakage in the gas stove and gas cylinder and the sensed digital signal is sent to the micro-controller and the signal is received by the micro-controller will send the command signal to the motor to rotate the gas knob and display the gas leakage is detected by this the bust of the gas cylinder and environment hazards, that can be controlled by this method.

The Fire Sensor will detect the fire leakage in the kitchen and the sensed analog signal is sent to the micro-controller and the signal is received by the micro-controller will send the command signal to the motor to rotate the gas knob, the gas supply will be made off, so that fire can be turned off and display the fire leakage is detected by this the environment hazards, that can be controlled by this method.



The Water Sensor will detect the liquid detected in the gas stove and the sensed analog signal is sent to the micro-controller and the signal is received by the micro-controller will send the command signal to the motor to rotate the stove knob, the stove knob is off by this the gas supply will be made off, by this the fire related accident can be overcome by this method.

The Sound Sensor will detect the whistles of the pressure cooker, after completion of the whistle count, the sensed analog signal is sent to the micro-controller and the signal is received by the micro-controller will send the command signal to the motor to rotate the stove knob, the stove knob is off by this the over cooking of food, the burst of cooker, spoilage of the food related problems can be overcome by this method.

The Load Cell will continuously monitor the weight of the gas cylinder and send the readings to the user to monitor the gas cylinder, with the help of bluetooth module when the gas gets empty the user will get the notification that the gas is getting empty so they can book a cylinder. This help to book a cylinder in their busy schedule by this the gas shortage can be overcome by this method.

III. IMPLEMENTATION

The “Implementation of Smart Gas Management” has the safety feature like fire sensor is used to detects the fire and send the signal to the microcontroller that the fire is detected and turn off the gas nob. Gas sensor is used to detects the gas leakage and sends the signal to the microcontroller that the gas leakage is detected. Sound sensor is used to count the whistle. Load cell will detect the level of gas cylinder and sends the signal to the microcontroller to monitoring of gas cylinder. Water sensor detects the overflow of milk, water on the gas stove, and sends the information to microcontroller to switch off the stove. Motor is used to automatic switch on and off of the stove. LCD display is used to display the message. Spark plug is used to ignite the gas stove. Buzzer alerts the people in vicinity. Relay is used for switching purpose. Push buttons are used for advance features.

All these features make the gas stove smart. The components used are LCD display, power supply, motor, gas sensor, etc. While operating a gas stove and for igniting a stove we have provided a spark plug. We have also used power supply that provide supply to the spark plug. The Spark Plug in unison with the battery takes little time to ignite once we give command from the start push button. For displaying information, LCD Display is used.

IV. RESULTS AND CONCLUSION

Testing the functioning model yields the output of all sensors and advanced features, which are then shown in this part of the fig 2



Fig: 2 Prototype of Model

Whenever gas leakage is detected the gas knob is rotated and displays gas detected the buzzer gets triggered, which is shown in fig 3



Fig: 3 LCD Displaying Gas Detected

Whenever fire leakage is detected the gas knob is rotated and displays fire detected the buzzer gets triggered, which is shown in fig 4



Fig: 4 LCD Displaying Fire Detected

When the milk spills from the vessel the sensor will detect the liquid and displays liquid detected the buzzer gets triggered, which is shown in fig 5



Fig: 5 LCD Displaying Liquid Detected

When the pressure cooker, cooks the food with the whistle the sound sensor will detects the whistle and starts counting of the whistle after completion of the counts the stove knob will automatically turns off and the counts will be display as shown in the fig 6.5



Fig: 6 LCD Displaying Whistle Count



Fig: 7 LCD Displaying Whistles Completed

For the elderly and children who might find it challenging to cook, this function would be quite helpful. We thus conserve time, energy, and gas. For certain meals, such as Maggi we also have used push buttons.



Fig: 8 LCD Displaying instructions for Maggi Recipe



Fig: 9 Take a Pack of Maggi



Fig: 10 Take a Cup of water



Fig: 11 Wait till Water gets Boiled



Fig: 12 Add the Maggi Masala



Fig: 13 Add the Vegetables (Optional)



Fig: 14 Maggi Recipe is ready



When the gas cylinder weight will reduce the user will get the display that the gas is empty, the continues monitoring of the gas cylinder is done by using the load cell as shown in the fig 15



Fig: 15 Cylinder Weight

V. CONCLUSION

The development and successful **“Implementation of Smart Gas Management”** that adds smartness gas management that is discussed in the paper. This device automatically prevents accidents by advanced detection of gas leakage, fire detection, milk spillage, count the whistle count of the cooker, it will track the gas cylinder weight so the user can book a cylinder easy by this method they will be no delay in the booking of the gas cylinder in their busy schedule.

Furthermore, the device has the functionality of adding various dishes with their corresponding cooking time and instructions. The device is simple, cost effective, smart and can be used effortlessly in real time which is proved by the results presented. The project will help not only in preventing accidents but also in saving time and people life for our future generation.



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