



# MY-SR NEXT GEN AUTOMATED GAS SAFETY SYSTEM USING IOT

<sup>1</sup>Dr. Komala C R, <sup>2</sup>Yashashwini S, <sup>3</sup>Rashmi Nayak, <sup>4</sup>Sharanya S, <sup>5</sup>Megha P

<sup>1</sup>Associate Professor, <sup>2,3,4,5</sup> Student, Department of Information Science and Engineering, HKBK College of Engineering, Nagawara, Bengaluru, India

Email Id: [lhk18is103@hbk.edu.in](mailto:lhk18is103@hbk.edu.in), [komalac.is@hbk.edu.in](mailto:komalac.is@hbk.edu.in)

**Abstract:** — Smart embedded systems have become a core component in the latest technologies, and IoT based smart embedded system is the trendiest field in the research area. In our research, we are proposing an IoT based smart stove. Any accident might occur at any time from a stove. So we are designing a two-way safety enabled stove with a child lock system and gas leakage detection feature open the door or window. The intelligent stove will try to ensure safety and will detect age from real-time video streaming. Our main focus is a child would not be able to turn the stove on. As well as, the stove can entitle safety via gas detection alarm. Automatic gas booking system once read the load cell has less value. We are using a Arduino Uno and Gas Detection Module with a buzzer for the hardware implementation. Also, we are applying a Machine Learning object detection algorithm (Haar Cascade) and a deep learning architecture (CNN) for the system execution. Since our stove is IoT-based, the stove is ensuring safety remotely as well as manually which will try to prevent accidental occurrences.

**Keywords—** Arduino Uno , CNN, child lock system ,gas leakage detection, alert through SMS

## I. INTRODUCTION

Two quickly developing fields that have the potential to change people's daily lives are embedded systems and the internet. The creation of a unique computing system is the aim of embedded devices. An embedded system is often controlled by one action. On the other hand, these embedded internet-connected gadgets can talk to other network devices. These devices also provide flexibility and features that enhance the living space. People may remotely manage and monitor their equipment thanks to IoT (Internet of Things) features. In this work, they offer an IoT-based smart stove that is a smart embedded equipment. The stove will provide us with two different sorts of protection: protection from gas leaks and real-time age recognition for child locks. The perception of Bangladesh is the main topic of this study. There will be a manual and an electric stove. The system is controlled by an Arduino Uno microprocessor. Other necessary sensors, modules, and equipment are interfaced with by the Arduino Uno.

Smaller than a credit card, the Arduino Uno is an affordable computer that can be used with a normal console and mouse to connect to a PC or TV. People of all ages can utilize this clever little gadget. It has all the features of a standard personal computer, including the ability to browse the web, stream high-definition video, edit documents, play games and create spreadsheets. Additionally, a variety of digital maker projects have utilized the Arduino Uno, from music machines and weather stations to parent detectors. As a safety measure, we have a child lock built into our system. In order to prevent a youngster under the age of 12 from turning on the stove, we included an age detection method. To establish age, we're using a laptop and a webcam. For the software implementation, Python programmes containing algorithms and trained datasets we also employed Open CV (a library). The fact that Python supports both object-oriented programming and procedure-oriented is one of its most crucial characteristics. Python combines extraordinary strength with straightforward simplicity. Modules, classes, and exceptions are just a few examples of the dynamic information types and dynamic composition found in Python. Interfaces are provided for numerous windowing frameworks framework calls and libraries.

## II. LITERATURE SURVEY

For our research, we suggest an Internet of Things-based smart stove. Anytime an accident occurs, a stove could be to blame. We are now developing a two-way safety stove that has a child lock and a gas leak detection feature as a consequence. The smart stove will make an effort to ensure safety and will age-check by using real-time video streaming. Our main worry is that a young child wouldn't be able to turn on the burner. Modern technology has evolved to rely heavily on smart embedded systems, with IoT based systems being the most extensively researched. Modern industrial stoves come equipped with switches, temperature sensors, and temperature controllers. The home stove, in contrast, has only slightly increased in sophistication over the past century or so, integrating a mechanism for automatic lighting but few other features. With the burners now on the market, gas leakage is a major concern. Is it possible for a home burner to have some of the more sophisticated features that are only found in commercial burners? The complexity of domestic stoves can be significantly increased to keep up with the complexity increase and microcontroller incorporation in the majority of household and electrical equipment. We naturally incorporate components that will limit the flow of gas if there isn't a flame present because gas and

fossil fuels are becoming increasingly scarce. A potentially explosive gas-air mixture cannot build up in a confined place thanks to this safety feature. Unwary residents could be killed or rendered unconscious by the gas.

### III. EXISTING SYSTEM

We frequently see that we ask the LPG gas provider's office for a new cylinder when our LPG cylinder runs empty. Due to a lack of LPG gas cylinders, there is frequently a delay in the distribution of gas cylinders. The main factor is a delay in calling or booking the gas company. When the LPG gas in the gas cutters runs out, the storage department receives a request for a new gas cylinder; if there aren't enough gas cylinders there, the delivery of LPG gas cylinders is postponed. LPG gas is used for cutting and welding in industry, as well as for cooking in homes and restaurants. To find any LPG leaks from the cylinder, a gas sensor called the MQ-135 is used. The user is given the same metric via SMS and an LCD display. By dialing a phone number and selecting the proper digit, LPG vendors provide a booking application that may be used to reserve a new cylinder. After placing a purchase over the phone, an LPG cylinder will be delivered in 2 to 3 days. The user starts this action when there is less than 97 percent of the cylinder's total LPG present. Gas leaks could cause catastrophic incidents and even fatalities because there are now no precautions in place to detect them. Every home, business, restaurant, and other establishment needs to have an appropriate or efficient strategy in place to prevent such scenarios.

### IV. PROPOSED SYSTEM

The system focuses on tracking the weight level of the LPG cylinder continuously and looking for any cylinder leaks. A load cell sensor and a MQ-135 gas sensor are used in the recommended system as two monitoring sensors. The Microcontroller, which controls the entire system's processing, is coupled to both the MQ-135 gas sensor and the load cell sensor. Using a block diagram, the Proposed System is shown. When an object is placed on top of the load cell sensor, an electronic device that measures weight, it does so. An electrical device that can find any alcoholic substance suspended in the atmosphere is the MQ135 gas sensor. The measured parameters from the load cell and the MQ-135 gas sensor can be used through a variety of integrations. Included are a 16X2 LCD, two LEDs, a mobile app, and a web app.

The user can keep track of the metrics recorded by the sensors in real time using a mobile application or an HTML-coded web application. The weight of the cylinder and how much LPG is still inside it until it empties are shown on the 16x2 LCD. Additionally, the LPG cylinder regulator knob is connected to a DC geared motor with 15 rpm, which turns the position to the OFF State when the MQ135 gas sensor detects any LPG leakage..

#### 4.1 System Architecture

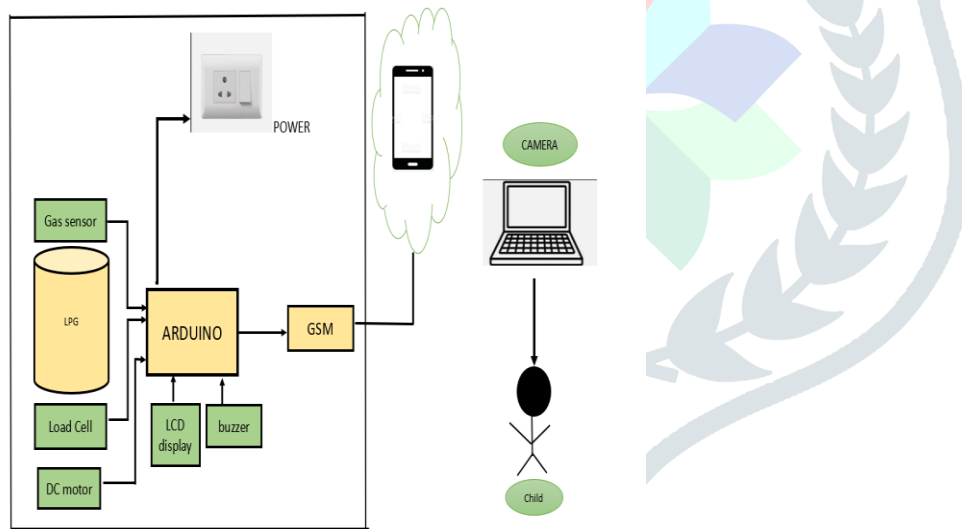


Fig 1 system architecture of the gas safety system

#### 4.3 Block Diagram

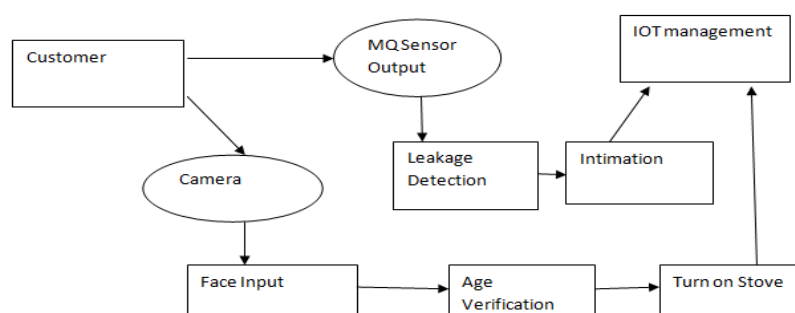


Fig 2: System Flow

Following are the components and software used for this system

Sl.No	Components	Specification
1	Microcontroller	Ardino Uno
2	Sensor	Gas sensor MQ-135
3	Force sensor	Load Cell
4	Electric switch	Relay
5	Motor	12V DC Motor 100 RPM
6	Circuit	H-Bridge
7	Power supply	

Table 1 Hardware Requirement Specifications

Sl.No	Software	Description
1	Language Used	Python, Embedded C
2	Python Library	OpenCv
3	IDE	Arduino IDE

Table 2 Software Requirement Specifications

## V. IMPLEMENTATION

### 5.1 Age Verification:

Picture editing is the technique of enhancing photos created from camera sources and photos taken in daily life. Images that are produced digitally require careful preparation and investigation. Various techniques and computations are used to process the image dependent on the study. Image processing consists of two basic phases, then simple steps. Picture upgrades are modifications made to a photo with the aim of creating more beautiful photos that can be used by other programmes. The other process is the most widely used method for extracting data from a photograph. Segmentation is the splitting of an image into distinct pieces. The placement of the data in the images is incredibly helpful data. The information of the photograph will be altered and modified for the goal of discovery. The eradication of the problem is just one of many measures that must be taken. What you should do in a facial recognition strategy is: A lot of information may be gleaned from the facial articulations. Many thoughts are shared when two people first meet.

A source image is processed using CNN image classifications before being divided into various groups. One of the most popular forms of neural networks used to recognize and categorizes images is the convolutional neural network. Each input image will be placed through a series of convolution layers using filters (Kernels), Pooling, fully connected layers (FC), and the use of an Activation function in order to train and assess deep learning CNN models. Convolutional Neural Networks are the top models for image processing tasks like object detection, object segmentation, and classification. To increase the precision of CNN models, a number of architectures, including VGGNet, Inception Net, Alex Net, and ResNet, have been developed.

### 5.2 Algorithms Employed:

The content is organised into four sections, each of which provides detailed information on what happens throughout each stage of the implementation process.

- **Sequential:**

As the name implies, we'll be building our own model layer by layer, step by step. Three convolutional layers and two pooling layers make up the sequential CNN model that we implemented. An innovative and effective end-to-end learning model for automatic modulation categorization is proposed for wireless spectrum monitoring applications. This model automatically learns from time domain in-phase and quadrature data without necessitating the creation of manually crafted expert features. Based on the intuition of convolutional layers with pooling playing the role of front-end feature distillation and dimensionality reduction, sequential convolutional recurrent neural networks are developed to take advantage of the parallel computing capability of convolutional neural networks and the temporal sensitivity of recurrent neural networks.

- **RESNET:**

Remaining neural networks employ skip connections or shortcuts to skip over particular levels. A particular kind of artificial neural network is known as a residual neural network (ResNet). The bulk of ResNet models employ batch normalisation in addition to double- or triple-layer skips with nonlinearities (ReLU). An additional weight matrix can be used to learn the skip weights; these models are referred to as HighwayNets. Models with several parallel skips are called DenseNets. In the context of residual neural networks, a non-residual network is referred to as a plain network.

- **VGG:**

The Convolutional Neural Network (CNN) architecture known as VGG, or Visual Geometry Group, has multiple deep layers. In VGG-16 or VGG-19, which have 16 or 19 convolutional layers, respectively, the term "deep" refers to the number of layers. Along with ImageNet, the VGGNet, which was developed as a deep neural network, beats baselines on numerous tasks and datasets. Modern object identification models are built on top of the VGG architecture. VGGNets are constructed using the key characteristics of convolutional neural networks (CNN).

**5.3 Working:**

The load cell (SEN 102445) is a pressure sensor that checks the cylinder's weight and displays it on the LCD. If the cylinder weight falls below a pre-determined threshold, an SMS will be sent to the user informing them of the situation. The threshold value is set for the weight of the cylinder, that is 3 which indicates the cylinder's weight. The consumer is then given the option to confirm the booking of a new cylinder. If the user does not respond to the received message or does not wish to book the refill, the user will receive the same message the next day, and the cycle will resume until the booking is made. When the user confirms the booking of gas, an automatic booking notification is issued to the gas agency. The message is sent and received using a GSM module (SIM800).

When the LPG gas sensor (MQ135) detects a gas leak, it sends a electric signal to the Arduino Uno, which causes the main power supply to be turned off, the exhaust fans to be turned on, and the consumer to be notified about the problem. The LPG gas leak status is displayed on the LCD display, which reads "gas leakage detected."

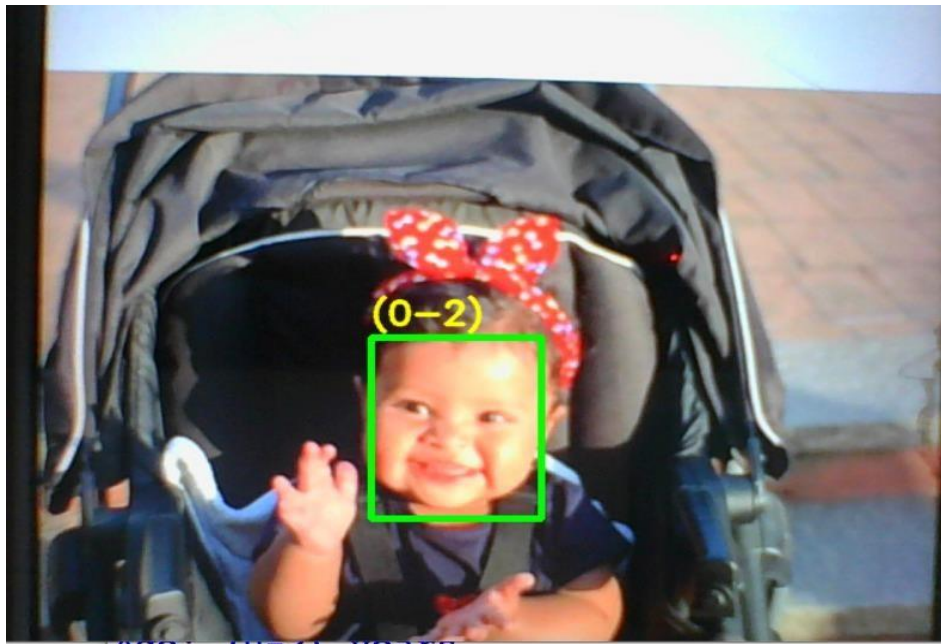


Fig 3 Face Detection

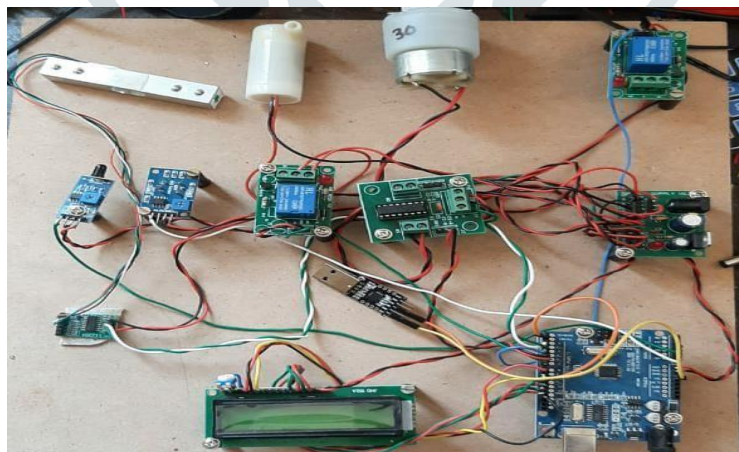


Fig 4 Complete Setup

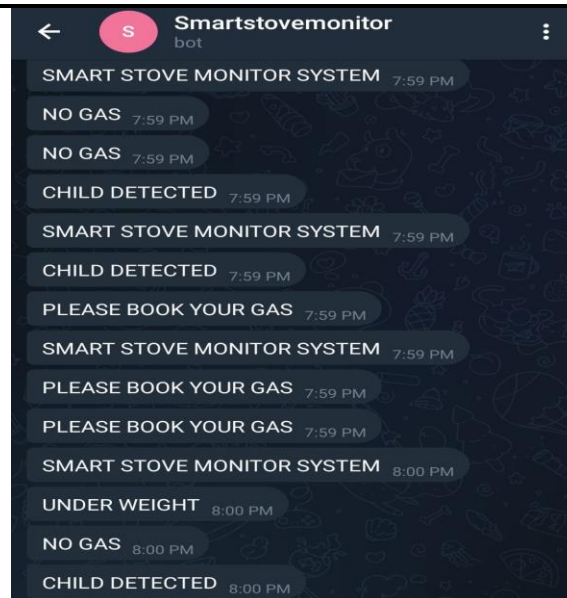


Fig 5: Telegram Alert message

## VI. CONCLUSION

Despite the fact that there have been many earlier studies relating detecting of age and gas leak independently, we have proposed the system that not only detects the gas leak it also detects the age of the kid that is ranged from 0 to 12. In our smart stove, we've enabled two-way safety measures, such as a kid lock mechanism. Another advantage is that if there is an unintentional gas leak, our smart stove will alert the user with the beep sound from the buzzer. Furthermore, Bangladesh's perception of our system has been established. The smart stove's mechanism is IoT-based, to ensure its safety the user can keep an eye on it from anywhere. A GSM module, we are using telegram which allows user to not only monitor but also can receive notifications via telegram. By adopting this service, we are assisting people in saving time by allowing them to book gas automatically. It can offer individuals with security by detecting gas leaks. It can be used for both residential and industrial purposes. Because we utilized the C programming language, the programming for this project is quite straightforward and easy to understand. This system's ease of use makes the project user-friendly.

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