Annexure1b- Complete filing

INVENTION DISCLOSURE FORM

1 Title: LPG Stove Control Based on Object Detection (LPGCOD) -

The main purpose of **LPG Stove Control Based on Object Detection** is to reduce accidents which happens during object (body parts or clothes) falls on the burner while stove is on.in order to reduce such kind of hazard, we designed a gas stove using sensor and image processing to control the gas flame. The use of modern AI powered system will help to minimize the accident related to LPG.

2. INTERNAL INVENTOR(S)/ STUDENT(S):

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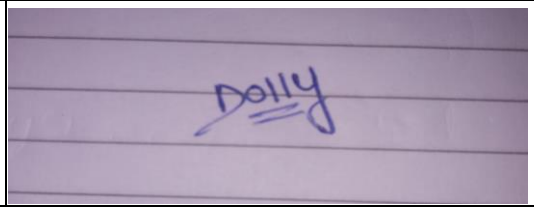
Signature (Mandatory)	

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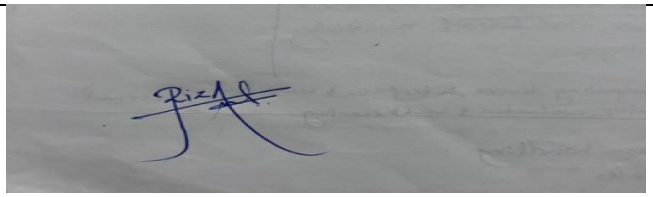
Signature	

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2. DESCRIPTION OF THE INVENTION

A. PROBLEM ADDRESSED BY THE INVENTION:

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Traditional LPG gas control have no inbuilt intelligence for object detection and flame control which leads to fire and burn to hands. Your innovative use of object detection technology in LPG gas stoves make them more intelligent for controlling flames in order to reduce the hazard related to LPG. This technology has the potential to make kitchens safer and more inclusive for everyone. For parents with young children, the peace of mind that comes with knowing gas stoves can automatically react to object contact is invaluable. Similarly, those with elderly family members or disabilities can find comfort in this extra layer of protection. For individuals with limited dexterity or motor skills, the ability to cook without worrying about accidental burns could increase their independence and comfort in the kitchen.

This groundbreaking approach promises to redefine the gas burner technology experience across a wide range of applications.

B. STATE OF THE ART/ RESEARCH GAP:

Patent Number	Description	Gap
CN101625132A China	The automatic gas stove is controlled automatically according to the change of the weight of the heated cooking utensil, without being controlled manually, thereby being protected against dry heating, flameout and waste, and the automatic gas stove is convenient to use and simple in structure.	There is no object detection and flame control technology in this invention.
CN203190466U China	The intelligent gas stove comprises a stove body, wherein a program controller, a gas flow proportion control valve and an acousto-optic alarm are arranged in the stove body; a touch screen is arranged in an operation area of the stove body; an infrared pan bottom temperature detector is arranged in a cooking area of the stove body; the output end of an infrared temperature sensor is connected with the input end of the program controller; the output and input ends of the touch screen are respectively connected with the input and output ends of the program controller; the output end of the program controller is connected to the gas flow control valve and the acousto-optic alarm. The intelligent gas stove has the characteristics of energy conservation, environmental friendliness, cooking process optimization and safety.	There is no decision made based on image processing to control the gas valve
EP2199683	technical solution of the present invention used to solve the technical problem is described as follows. The gas stove includes a panel, a burner,	There is no decision made based on image processing to control the gas valve

	a thermocouple and an ignition needle disposed near the burner, and at least one control switch disposed on the panel to control and set gas supply at the corresponding burner. The gas stove further includes a main switch. When the main switch is turned on, a working status of the gas stove is suspended and/or locked. When the main switch is turned off, the suspended and/or locked working status of the gas stove is automatically restored. Regarding the gas stove in the technical solution of the present invention, the working status of the whole gas stove can be suspended and restored rapidly and all the settings of the working status are reserved during the period of suspension.	
IPR-219187	This work switches off the L.P.G Gas stove automatically in two modes (1) Whistle Mode, (2) Timer Mode. In the whistle mode, after the required number of whistle is reached, the gas supply to the stove is switched off by a solenoid valve. The required number can be set by the user. In timer mode user have to set the off time of the stove. After the set time is reached, the stove is switched off automatically	This Gas Stove cannot make AI based decision.
CN102032602A	Purposed work C is mainly focused upon a Microprocessor-controlled system detects flame and pot temperature irregularities using sensors. Automatic shutoff via electromagnetic valve ensures safety, while the system adjusts flame strength and alerts users with sounds and a real-time	But in our purposed system, is fully based upon smart technology implementation with features like hand and cloth detection.

	display for enhanced kitchen safety and gas leak prevention.	

B. DETAILED DESCRIPTION:

There are Various gas stove safety features, none currently exist that automatically minimizes the gas flame solely based on hand or clothes near stove. Existing patents for gas stove safety focus on mechanisms like flame failure detectors, which sense if the flame has extinguished and cut off the gas supply. Others may involve timers that automatically shut off the gas after a specific period. Currently, there is no commercially available gas stoves equipped with sensors that can detect object in proximity of the flame. The present solution will provide intelligent gas input control based on image processing and decision based on object differentiation for controlling gas input flow to burner. the optical sensor used to detect the objects around the gas burner. the data from sensor is transmitted to inbuilt processing module where prediction about the things is done using inbuilt image processing module. control signal is transmitted to gas flow control system for controlling the gas flow to burner. Accordingly, gas flame can be controlled.

HARDWARE

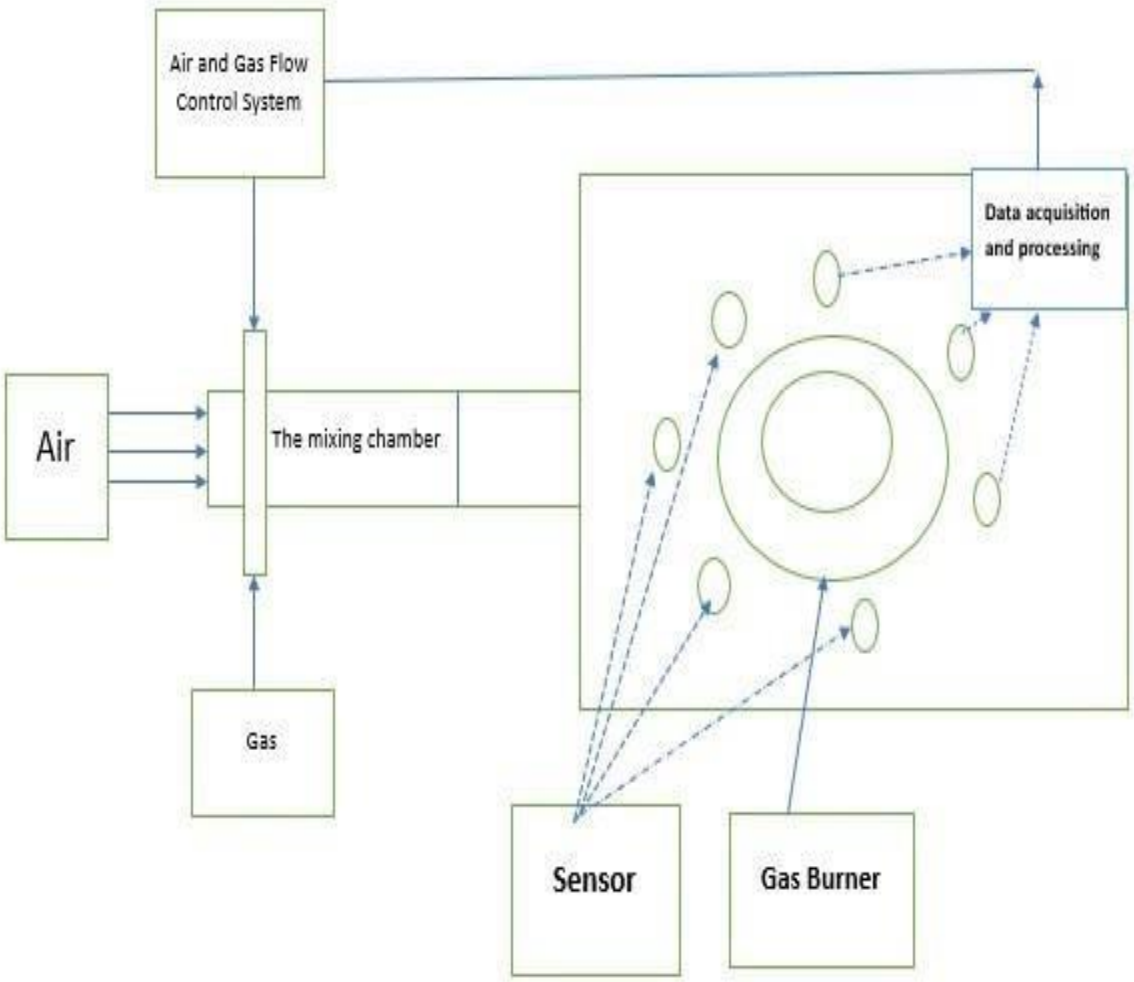
Image Sensor: These Sensor capture the visual information over the gas stove.

Ignition System: The electric spark is generated to ignite the gas when control system is turned on.

Digital Gas flow Controller: Used to adjust the control valve in real time based on feedback from sensor in order to maintain the desired flow rate.

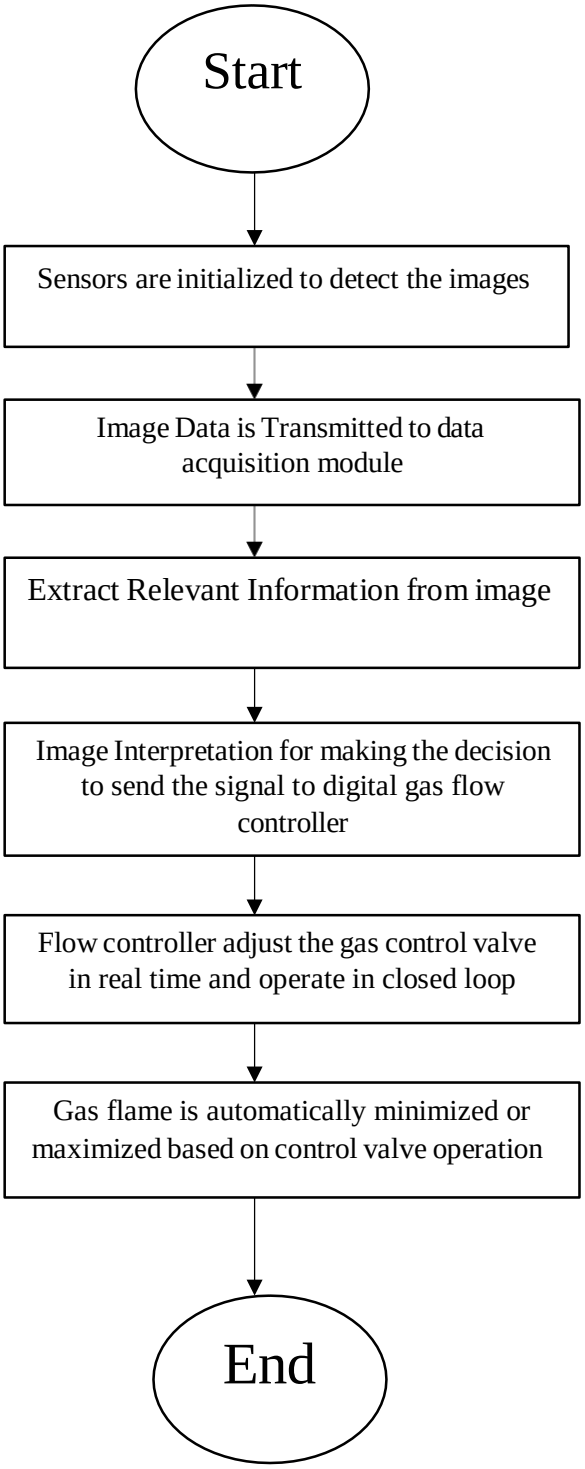
Gas Mixing Chamber: It is used to ensure that the LPG-air mixture is within the flammable limits for efficient and safe combustion.

Data Acquisition and Image Processing Module: It is designed to capture, process and analyze the image data from sensors installed over the gas stove.


Air and Gas Flow Control System
Data acquisition and processing
Air
The mixing chamber
Gas
Sensor
Gas Burner

Design

Flow chart


Start
Sensors are initialized to detect the images
Image Data is Transmitted to data acquisition module
Extract Relevant Information from image
Image Interpretation for making the decision to send the signal to digital gas flow controller
Flow controller adjust the gas control valve in real time and operate in closed loop
Gas flame is automatically minimized or maximized based on control valve operation
End

C. RESULTS AND ADVANTAGES:

Safety Features:

- Compared to traditional LPG gas stove, your approach for automation of stoves makes them more intelligent for controlling flames in order to reduce the hazard related to LPG.

Remote Monitoring and Control:

- Users can monitor and control the gas stove remotely using a mobile app or a web interface, these additional features can be added by using internet connectivity to stove. This allows for convenient control even when not physically present in the kitchen.

Additional Advantages:

- **Scalability:** additional features by using advanced IOT innovation can be incorporated in this design.
- **Energy Efficient Design:** By optimizing the gas control through automation can make this design energy efficient.
- **Future-proof design:** This technology aligns with the trend towards faster and more efficient appliances for home automation.

E. ALTERNATIVES/ EXPANSION: Any variables which are necessary for your invention to be covered? (150 words)

F. WORKING PROTOTYPE/ FORMULATION/ DESIGN/COMPOSITION: Within 6 months.

G. DATA: No other data required in this invention.

3. USE AND DISCLOSURE (IMPORTANT): Please answer the following questions:

A. Have you described or shown your invention/ design to anyone or in any conference?	YES ( )	NO (✓)
B. Have you made any attempts to commercialize your invention (for example, have you approached any companies about purchasing or manufacturing your invention)?	YES ( )	NO (✓)
C. Has your invention been described in any printed publication, or any other form of media, such as the Internet?	YES ( )	NO (✓)
D. Do you have any collaboration with any other institute or organization on the same? Provide name and other details	YES ( )	NO (✓)

E. Name of Regulatory body or any other approvals if required.	YES ( )	NO (✓)

4. Provide links and dates of such activities if you have disclosed the information in public before sharing with us. – Not Applicable.

5. Provide the terms and conditions of the MOU also if the work is done in collaboration within or outside university. – Not Applicable.

6. Potential Chances of Commercialization. – computer chip manufacturing/ computer hardware industry.

7. List of companies which can be contacted for commercialization along with the website link. – Under development.

8. Market potential of the invention. - Not yet determined.

9. Any basic patent which has been used and we need to pay royalty to them. – None.

10. FILING OPTIONS: Please indicate the level of your work which can be considered for provisional/ complete/ PCT filings.

11. KEYWORDS: Image Sensor, Gas Burner, Ignition System, Mixing Chamber, Image Processing, Image classification and analysis, Gas Control Valve.

12. LOG BOOKS AND NOTEBOOKS: Please provide log books and note books with date when the idea was discussed with your team.