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AoT Based Modern LPG Stove

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ABSTRACT: Liquefied Petroleum Gas (LPG) has greatest access to Indian households. LPG is a flammable gas, if leaked it can cause major damage to life and property. So, it should be used in safe handling manner and additional care has to be taken in order to prevent any leakage possible. The main features of LPG is that being heavier than air, it do not disperse easily and may lead to suffocation when inhaled. The leaked gases when ignited may lead to explosion.The smart gas system which provides home safety, automatic ON/OFF of gas supply and database of day to day usage of gas by a notification by an android app through Android of Things (AoT). Consumer can turn off the gas valve from anywhere in the world. The additional advantage of the system is that it continuously monitors the level of the LPG present in the cylinder using load cell. While cooking, if the users accidently forget to turn off the gas burner within the elapsed time, the system will inform by activating an alarm which is done through the timer circuit. So, the cooking gas can be saved from being wasted.

KEYWORDS: Gas leakage,level detection, IR sensor, Android of Things.

I.INTRODUCTION

Liquefied Petroleum Gas (LPG) has greatest access to Indian households. LPG is a flammable gas, if leaked it can cause major damage to life and property. So, it should be used in safe handling manner and additional care has to be taken in order to prevent any leakage possible. The main features of LPG is that being heavier than air, it do not disperse easily and may lead to suffocation when inhaled. The leaked gases when ignited may lead to explosion. The number of deaths due to the explosion of gas cylinders has been increasing in recent years. Nowadays, Indian households have an access to LPG stove. Since LPG emits less carbon dioxide. It is economically reliable and more efficient than other cooking fuels. A major amount of gas is being wasted due to the carelessness of consumer. Sometimes they forget to turn off the burner which may also could lead to damages.

Leakage of gas is also one of the problem with current LPG cooking system. There is need to reduce the number of deaths by alerting the people and turn off the stove when there is a leakage. In this busy world it is difficult to track entire cooking process but it is unavoidable since there is no option to set the working period of the stove so that we can do other work during cooking process. One of the major challenge at this moment is to improve the current cooking system in urban areas where LPG is installed and to install LPG stoves with smartness in rural areas where LPG is less known.

The smart gas system which provides home safety, automatic ON/OFF of gas supply and database of day to day usage of gas by a notification by an android app through Android of Things (AoT). Consumer can turn off the gas valve from anywhere in the world. The additional advantage of the system is that it continuously monitors the level of the LPG present in the cylinder using load cell. While cooking, if the users accidently forget to turn off the gas burner within the elapsed time, the system will inform by activating an alarm which is done through the timer circuit. So, the cooking gas can be saved from being wasted.

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II.ANDROID OF THINGS

Android Things (codenamed Brillo) is an Android-based embedded operating system platform by Google, announced at Google I/O . It is aimed to be used with low-power and memory constrained Internet of Things (IoT) devices, which are usually built from different MCU platforms. AoT it is designed to work as low as 32–64 MB of RAM. It will support Bluetooth Low Energy and Wi-Fi. Along with Brillo, Google also introduced the Weave protocol, which these devices can use to communicate with other compatible devices.

Google provides OEM implementations of Android of Things designed for the production of Google Assistant-powered smart speakers and displays running one of two Qualcomm "Home Hub" systems-on-chip. Products have been developed by JBL, Lenovo, and LG Electronics.

Android Things provides a turnkey hardware platform to build on top of. Our certified development boards based on System on Module (SoM) architecture give you the following benefits to get you started quickly:

Integrated Parts - SoMs integrate the SoC (System on Chip), RAM, flash storage, WiFi, Bluetooth and other components onto a single board and come with all of the necessary FCC certifications. When you want to mass produce your device, you can optimize your board design by flattening existing modules onto a PCB to save costs and space.

A Google BSP - The Board Support Package (BSP) is managed by Google, so that means you don't have to do kernel or firmware development. This gives you a trusted platform to develop on with standard updates and fixes from Google.

Differentiated hardware - Our partners provide development boards with different SoMs and form factors to suit your needs, giving you choice and flexibility. And when you're ready, take your prototypes to products by customizing them to fit a specific form-factor, all while running the same software.

III.PROPOSED SYSTEM

It is expected that “Modern LPG Stove” gives user friendly and efficient output by turning ON/OFF the flame according to the placement of vessel. The IR sensor detects the presence of vessel and turns ON/OFF the knob to maintain the gas supply. Most of the people miss timing to turn off the gas supply which leads to excessive usage of gas. Here, it can be eliminated. It enables the user to set time period for which gas should be in on state. It is the profitable method since it reduces the wastage of cooking gas fuel while cooking and gives information about the remaining gas in the cylinder through a load cell. The IR sensor and load cell is connected to the ARDUINO UNO ATmega328 which will send the data to the mobile through an app. Finally, we are reducing the LPG gas usage and introducing the features of an induction stove in conventional gas stove.The efficient cooking gas is the need of today’s user. Generally, multitasking humans commit several mistakes which leads to accidents. It is essential to prevent the user from the hazards caused by leakage of LPG gas.
The proposed idea of my project is mainly focused on reducing the waste of LPG (Cooking gas). This Modern LPG stove inbuilt for timer and IRsensor,valve control device, the considered for different foods and milk and boiled water and here analysed for weighting of cooking items with metal container. Every cooking item (liquid or solid) is reach particular preset value of temperature automatically gas valve is closed and alarms will indicate the consumers and some of the basic cooking item is set the timer and reach that time level automatically turn-off the gas indicate the consumers. Finally all the days of usage gas is measure and linked with AoT. The Information data send to the consumer and this data helped to the awareness of consumers and vacant of remaining gas. The expecting for the above proposal is implemented mainly 30 to 40 % wastage of LPG (Cooking Gas) is saving and economically consumers are benefited.The entire system is powered by solar panel.

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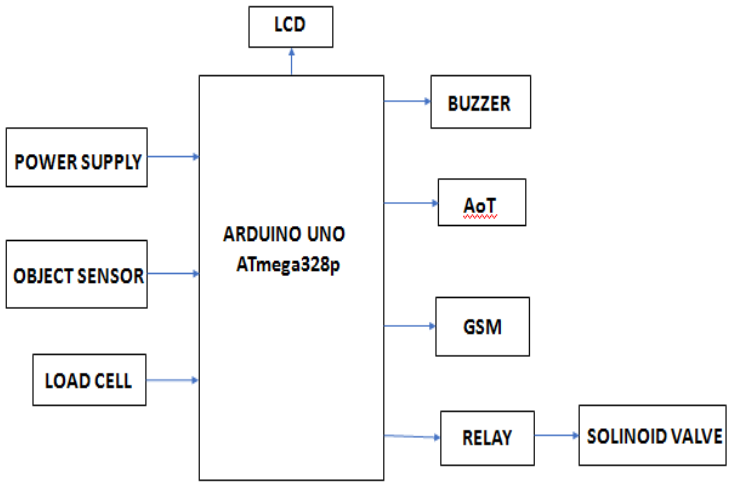

Fig.1:Block Diagram of AoT Based Modern LPG Stove

IV.MODULES WITH WORKING PRINCIPLES

ARDUINO UNO(ATmega328p)

The Arduino/Genuino Uno board can be powered via the USB connection or with an external power supply. The power source is selected automatically.Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.The tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.
"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

LOAD CELL

Load cell is a transducer that is used to convert a weight into an electrical signal. This conversion is indirect and happens in two stages. Through a mechanical arrangement, the force being sensed deforms a strain gauge.
The strain gauge measures the deformation (strain) as an electrical signal, because the strain changes the effective electrical resistance of the wire. Load cells of one strain gauge (quarter bridge) or two strain gauges (half bridge) are also available. The electrical signal output is typically in the order of a few millivolts and requires amplification by an instrumentation amplifier before it can be used. The output of the transducer can be scaled to calculate the force applied to the transducer.

INFRARED SENSOR

Infrared sensor is an electronic instrument that is used to sense certain characteristics of its surroundings.It does this by either emitting or detecting infrared radiation.Infrared sensors are also capable of measuring the heat being emitted by

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an object and detecting motion. These sensors are good for detection between 100cm-500cm (1-5 meters / 3-15 feet).DC power supply:+/- 12V Output voltage:10VFrequency response: DC 5KHz.

SOLENOID VALVE

Solenoid valve is an electromechanical device in which the solenoid uses an electric current to generatea magnetic field and thereby operate a mechanism which regulates the opening of fluid flow in a valve.The solenoid converts electrical energy into mechanical energy which in turn, opens or closes the valve mechanically.The magnetic field exerts a force on the plunger. Solenoid valve differs in the characteristics of the electric current they use ,the strength of the magnetic field they generate and characteristics of fluid they use. Valve type: 2 way normally closed ; Operating temp: 14 to 176 deg F; Material : stainless steel Operating pressure:0 to 150 PSI(220AC coil), 0 to 120 (24V AC coil); Power: 20W and 40W.

V. RESULT AND DISCUSSION

As shown in figure 2, run the simulation click the run button on the left bottom corner which will open the virtual terminal screenand gas level is indicated on the LCD display.

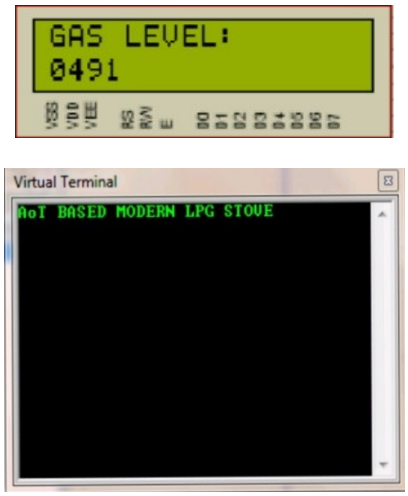

Fig.2 Measuring of gas level

As shown in figure 3, When the timer input is given as 3, the IR sensor will detect the presence of vessel and activate the gas supply if there is vessel in the stove and turn OFF the stove if there is no vessel. As like the induction stove there is a preset timer in this stove which indicates the cooking period for different dishes. Time should be set in the timer. After the preset time the stove will be turned OFF and indicates the user by the buzzer alarm.

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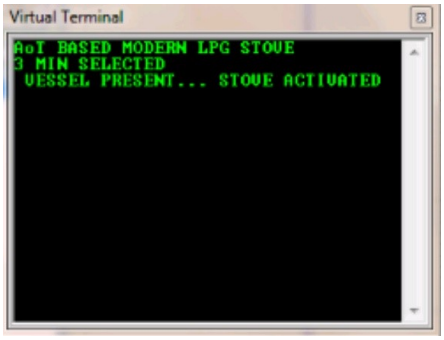

Fig.3 Presence of vessel activated

VI.CONCLUSION

It is expected that the "AoT Based Modern LPG Stove" gives user friendly and efficient output by turning ON/OFF the gas supply automatically. Also enables user to set time period for which gas should be in on state and gives information about amount of remaining gas in cylinder. The application of "AoT Based Modern LPG Stove" is in domestic purpose and in hotels. The system is expected to prevent hazardous caused by leakage of LPG gas. IR sensor detects the presence of vessel which will introduce one of the features of induction stove in conventional stove. Since LPG gas emits less carbon dioxide than other cooking fuel it is more economical and efficient.

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