



# GAS STOVE WITH EMBEDDED SYSTEM TO SAVE LPG AND HARVESTING ENERGY FROM WASTE HEAT

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**ABSTRACT-** In India, gas stove is used for cooking in almost every house. After the “Pradhanmantri Ujjwala Yojana” Indian government aims to target every house to be the consumer of LPG and clean energy. To achieve this target we not only have to replace the old, inefficient ways of energy generation but also need to use the energy more effectively and precisely, so that we can minimize the loss of energy. In this article we discussed the replacement for conventional gas stove by the conventional one.

**Keywords-**LPG, Arduino mega 2560, Embedded system, Servo motor.

## I. INTRODUCTION

INDIA became largest LPG Consumer by support of Pradhanmantri Ujjwala Yojana. Efficient use of natural gas is very essential. According to BP Energy Outlook 2019, India's energy consumption will jump from current 6% to 11% in 2040. India's gas request intonation highlight ascend by 66% in 5 years. Along these lines, in forthcoming years India will deal with a major issue identified with petroleum gas. Thus it is important to stop the abuse of flammable gas. Along these lines, we could supplant ordinary LPG oven with Embedded System worked for forestalling wastage of LPG and reaping the energy from squander heat. In India, gas oven is used for cooking in pretty much every house. Appropriate use of gas is truly fundamental for the



government assistance of country. Implementation of this model will ensure the right of every citizen of India. We proposed a embedded based LPG stove system which efficiently stop the misuse with economic benefits. Cooking gas stoves on LPG are used everywhere, resulting in increased demand system from. To forestall the unreasonable utilization of LPG, we planned the implanted framework based keen cooking oven. Likewise, Energy collecting cooking oven is created based on See beck Effect. Likewise the over the top warmth energy as warmth blazes is additionally used by utilizing TEG plates. The TEG plate will convert heat in to voltage, but the voltage from the TEG plates is not sufficient to charge the battery hence we uses DC-DC boost convertor module to step up the voltage so that waste heat energy get harvested. This will lead to minimize the misuse of the LPG and also successively tries to reduce the increasing demand of excessive energy on the government.

## II. LITERATURE SURVEY

Every year Government Of INDIA publish data of domestic consumption of LPG. According to secretary of Ministry Of Petroleum and Natural Gas Active LPG consumers have grown at a compounded annual growth rate of 15 per cent - from 14.8 crore in 2014-15 to 22.4 crore in 2017-18 [1]. As the rapid increase in population combined with LPG penetration in rural areas has resulted in an average growth of 8.4 per cent in LPG consumption, making India the second-largest consumer of LPG in the world at 22.5 million tons. As the corona pandemic is going on and LPG prices are on all time hike still Indian market has shown as rapid increment in India's consumption. During our survey we found that In traditional method we use of solid fuels for cooking which includes biomass, wood, crop residues, animal dung, and charcoal and coal. Indoor air pollution (IAP) is one of the world's major environmental problems. World Health Organization (WHO) estimates that about 3 billion people use open fire or traditional stoves that are fuelled by kerosene and solid fuels, globally. People from low socio-economic background are forced to use solid fuels as these are available easily in rural areas at a lower cost. According to The Energy Progress Report 2018, if the current pattern continues, 2.3 billion people would be still using biomass in 2030 globally. Approximately 64% of the households use solid fuels. There is a contrast between the rural and urban areas with 81% of the rural households using solid fuels as compared to only 26% of their urban counterparts. However, according to the National Family Health Survey-IV (NFHS-IV) conducted between 2015 and 2016, the total number of households using clean fuel has doubled to 43.8% compared to the mere 25.5% in the previous survey conducted between 2005 and 2006 . This trend confirms the energy ladder pattern where biomass is used in lower-income families and a shift towards cleaner fuels is observed with increasing income of the families.

## III. CONSTRUCTION OF THE SYSTEM

We placed the TEG plates on the top of the stove and then the output generated by the generator is fed to the boost convertor so that it can step up the voltage so it can charge the battery. This will help us to power up the Arduino mega for the operation.

The Arduino mega 2560 is used to set the précised timer operation and to set the servo motor angle . The client input is given by the console module and the sound sensor module. Our regulator permits us to choose method of information , and relying upon the information Timer or counter mode for the servo engine is get chosen. This system will helps user to get maximum efficient use of the LPG stove with time saving operations.



Fig1. System Prototype

### 3.1 Block diagram and flow chart of the system

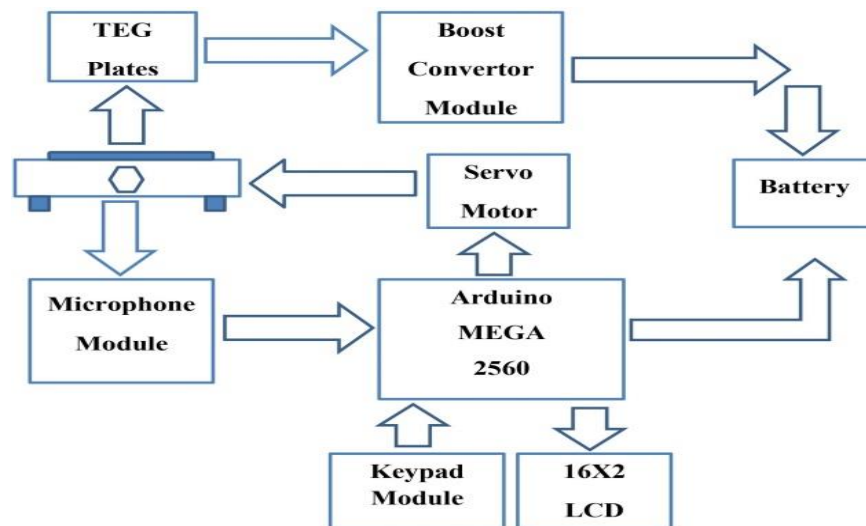


Fig 2- System Block Diagram

The system block diagram demonstrates that how the input modes are selected either from keypad or from the sound sensor module. It shows the flow of the signals for the system operations. Arduino microcontroller plays the role of system controlling unit for the prototype. TEG plates will harvest the waste heat in to supply voltage for the battery. Flow of the system is given in the following flow chart.

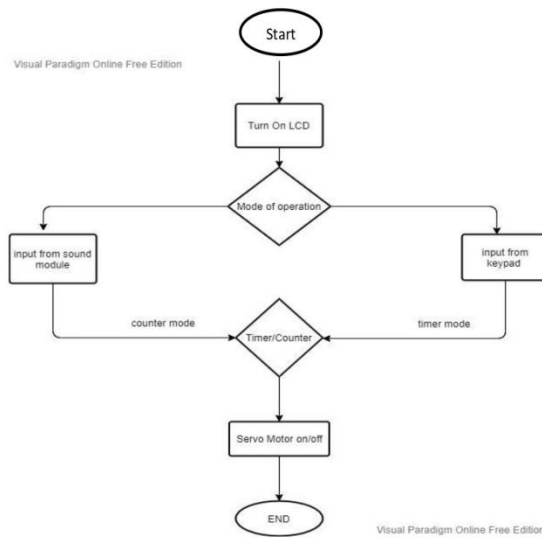


Fig 3- System flow chart

The system flow chart shows the actual program flow that controls the input and output operations of the system. First we turn on the LCD module and the microcontroller. At the time of the turning on the microcontroller, the shaft of the rotor of the motor must be at 0 degree angle position. So that when we turn on the operation it must perform with perfection.

At the point when we select the contribution from console then we should realize that the activity takes places between 0 to 180 degree points. To turn on the oven, handle of the stove set at 45 degree point then the handle point will set at position given by the console inputs. At the hour of turn on we again set handle at least situation for 30 seconds and afterward move back to 0 degree point position.. The sound sensor module uses to check the whistles of the pressing factor cooker and as indicated by that set the situation of the rotor. At the point when the tally completes the regulator sets the situation at least and following 30 seconds turns of the handle.

#### IV. RESULT

This system prototype will lead to time and user friendly operation of the domestic gas stove. This microcontroller based embedded system can stops the misuse of the natural gas at some amount. Also it shows an idea of utilization of the waste heat with easy and cost effective way. By the use of this system and saving small amount of energy from each stove will going to



results in to provision of thousands of new LPG connections, which might also result in to reduction of subsidy burden on the government.

## V. CONCLUSION

Proper utilization of natural gas is indeed a need of today's world. In different projects different methods are proposed for to stop the misuse of the LPG gas but our proposed system will more effectively helps to efficient use with the help of embedded system. So the implementation of these kind of project is necessary. Further research can be done on smoke and gas detection features.

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