THANJAVUR,TAMILNADU,INDIA –613401

FINAL DESIGN PROJECT

GAS STOVE (AUTOMATIC VERSION)

MEC 102 : INTRODUCTION TO ENGINEERING DESIGN
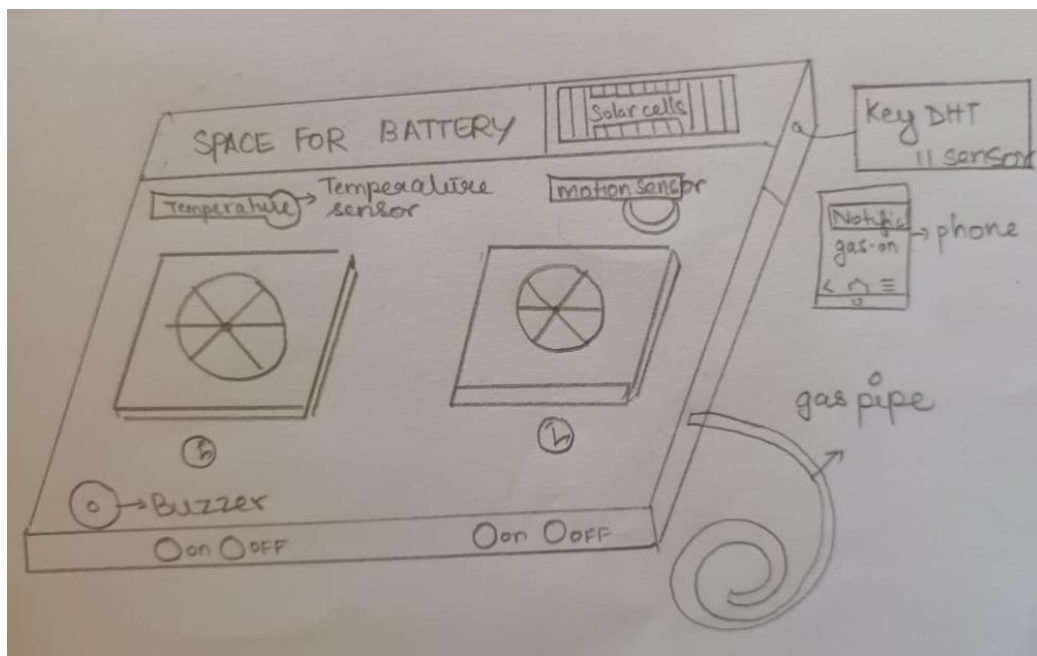
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OVERALL ANALYSIS AND REPORT ON AUTOMATED GAS STOVE

Conceptual design

CONTENTS

Title   **Page no.**

1.NEED STATEMENT AND IDENTIFICATION

A need statement is the first step that defines our product's necessity in the present market world, to design it. It is defined and identified on the basis of discussions made on the prevailing current situation.

a) Identification

Most of the households in India use gas stoves for everyday cooking purposes. Kitchen may be the least safe place in your home. The number of deaths caused by cooking gas cylinder and stove bursts in the state last year have been pegged as the second highest in the country, after Gujarat. The latest statistics of National Crime Records Bureau (NCRB) show that 586 people died in Tamil Nadu because of the explosion of cooking gas cylinders. Gujarat registered 735 such deaths. In Tamil Nadu tops the southern states in the category, far above Andhra Pradesh (426), Karnataka (386) and Kerala (52). This means more than 10 people in Tamil Nadu die every week because of gas cylinder explosions.

b) Overall need statement

At most of the times gas stoves end up bursting although sufficient measures are taken by the gas stove companies to ensure the safety of clients. This is due to the gas leakage or the stoves left turned on over a long time with utensils on it causing it to burst.

Wastage of gas is also a major concern.

2.PROBLEM FORMULATION,OBJECTIVES AND CONSTRAINTS

a) Problem statement

It prioritizes the need statement put together by jumping up to design. It identifies the possible ones fitting into all of them at a time meeting the standard and formats to design a product efficiently. So, the problem statement for the product is **"To design a gas stove that stops automatically when utensils are left in it and to bring up alert using a buzzer sensor and also to give out accurate and optimized data about gas left and gas leakage in surroundings"**

b) Objectives

The product must be safe and reliable to use, it should be easy to operate, have a hassle-free setup and an easy installation procedure. It should be portable, compact and the air sensor should be present so that we can know about the gas leak. Motion sensor should be present so that the utensils are not left in the burning stove for a long time. It should be inexpensive and efficient.

c)Constraints

The constraints are a part and parcel of every design development and we have to consider making the product. The major constraints are listed down.

- Weight of gas stove should be less
- Technical glitches should be solved
- Cost of gas stove should be less
- False alerts should not be created

Objective Tree

1 — **FUNCTIONING**
It should be easily accesible and user friendly

2 — **EFFICIENCY**
Shows accurate data about gas leakage

3 — **PORTABILITY**
It should be light in weight

4 — **COST EFFECTIVENESS**
Inexpensible and easy instalation services

AUTOMATED GAS STOVE

3.FUNCTIONS AND SPECIFICATIONS

a) Function structure

The function of an automated gas stove is to detect whether the utensils are left in the stove for a long time and turn it off automatically. The turning off of the stove is done by motion sensor which detects the surroundings and turns the stove off.

_____Motion sensor_____

b) Design brief

      The air quality sensor initially detects the amount of gas leakage in the kitchen and alerts accordingly. The stove is connected to our mobile phones with the help of the respective sensors we are able to know about the gas leakage and about the utensils that are left on the flame. Data can be viewed using an app connected with Bluetooth and the data can be shared using any platform like email, SMS or even in the WhatsApp Family Group.

c)Target specifications

      LEAK PROOF TUBES: Tubes that are 100% leak proof must be used so that we can ensure safety from basic level.

MOTION AND TEMPERATURE SENSORS: The temperature sensor used here is a KEYES DHT 11 sensor of temperature range from 0 degree Celsius to 50 degree Celsius in dimensions of 15.5mm x 12mm x 5mm operating on a voltage of 5V and current drawn during usage is 2.5 mA.

LPG GAS SENSOR: An LPG gas sensor is a one kind of device which is used to sense the presence of a hazardous LPG gas leak in service stations, cars, storage tanks and homes. This sensor is attached to a Cylinder Gas Pipe and Stove to give an alert to the smartphone..

BATTERY SOURCE: A small battery source 5V is needed for the sensors and transmitter so it can work accordingly.

Gas Pipe	Battery	KEYES DHT 11 SENSOR

FUNCTION
TREE

LEAK PROOF TUBES

MOTION AND TEMPERATURE SENSORS

LPG GAS SENSOR

BATTERY SOURCE

4.MORPHOLOGICAL CHARTS AND ALTERNATE CONCEPTS

a) **Alternate concepts:** There could be more than 1 possible solution to a particular need statement and some of them are listed down.

<u>Automated gas stove that runs on solar power</u>: The above setup can be connected to a solar cell instead of battery source.

<u>Automated gas stove that runs on rechargeable battery</u>: The above setup can be connected to a rechargeable battery instead of a battery source that dies earlier.

b) MORPHOLOGICAL CHART

MEANS FUNCTION	MEAN 1	MEAN 2	MEAN 3
Temperature	Celsius	Fahrenheit	Kelvin
Battery type	Normal	Rechargeable	Solar cell
Alert type	Buzzer in stove	Smartphone notification	Smart phone alert call

KANO MODEL

(Sketched on tab using scale and crayon feature to represent the automated gas stove.)
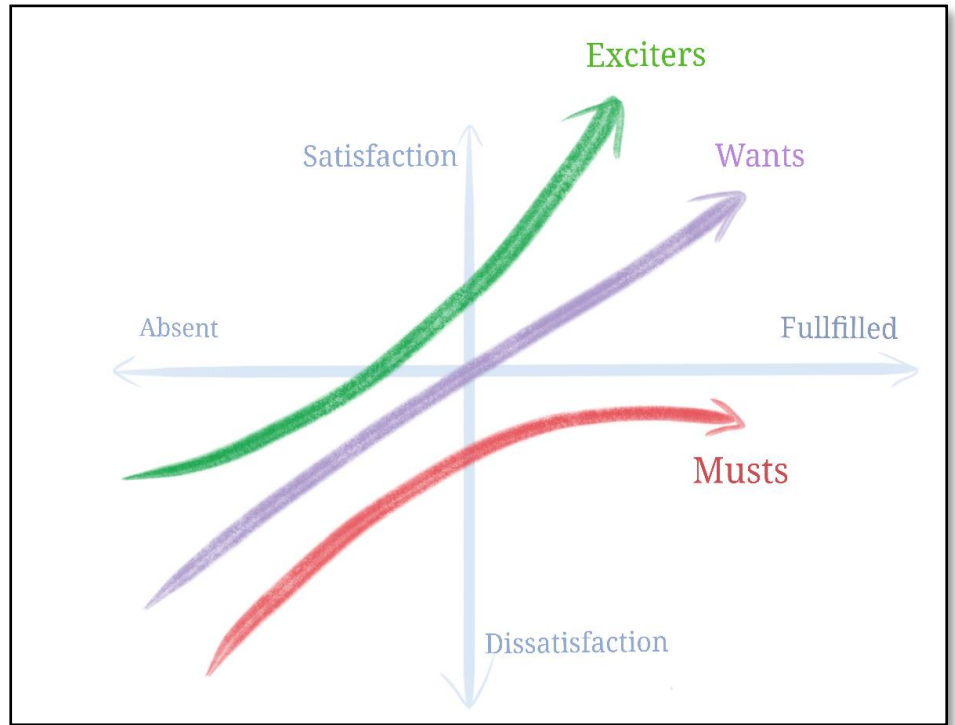
INITIAL SPECIFICATION

- Style
- Dimensions
- Framework

Musts as sensor

Its absence leads to dissatisfaction while Cooking.

WANTS

Performance is proportional to wants to get fulfilled.

- Build Material
- Operating should be user friendly

EXCITER

Excitement leads to delight

- Temperature sensor
- Gas sensor

5.FINAL CONCEPT

The stove works on the basis of sensor recognition and response. In most of the houses there is a problem where people forget to turn off the stove thereby leaving the utensils in the flame for a long time . Even though there is a problem of busting and cracking of utensils there are other problems like food wastage etc. In this type of gas stove if the stove is left on for time longer than 6 minutes the buzzer starts to play and to no response of buzzer the sensor transmits signal to our smart phone so that we can move accordingly, this recognition of utensils left for a long time is done by the temperature sensor and motion sensor is to detect whether the stove is left on under users' surveillance. Another important aspect of this stove is that it can sense the gas leakage in the kitchen surroundings and alert us accordingly. This is done by LPG gas sensor that is attached with the stove if the amount of LPG in the kitchen atmosphere exceeds a certain limit it gives a alter call with the help of transmitter used in it. The power source for the sensors and transmitter are provided by batteries or solar cells depending upon user's specifications.

THANK YOU