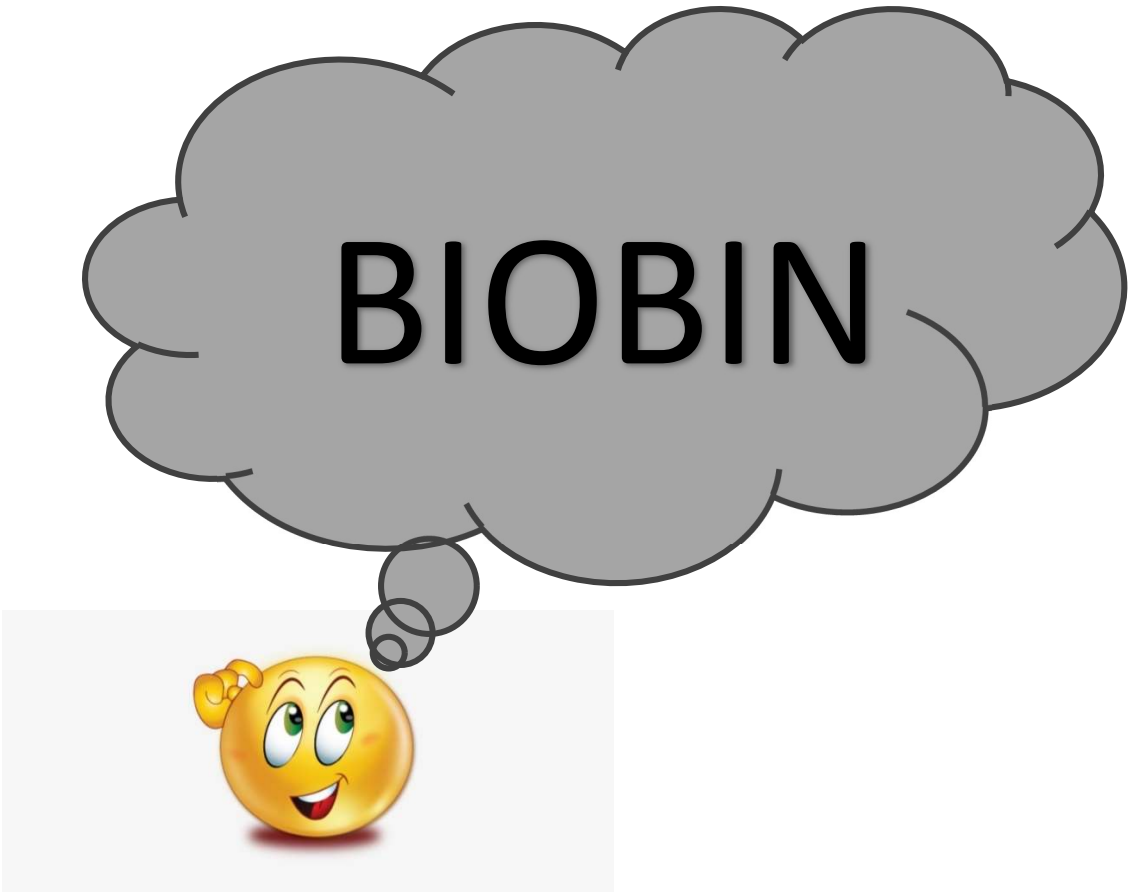
ENGINEERING DESIGN

(END SEMESTER PROJECT)



DESIGNED BY

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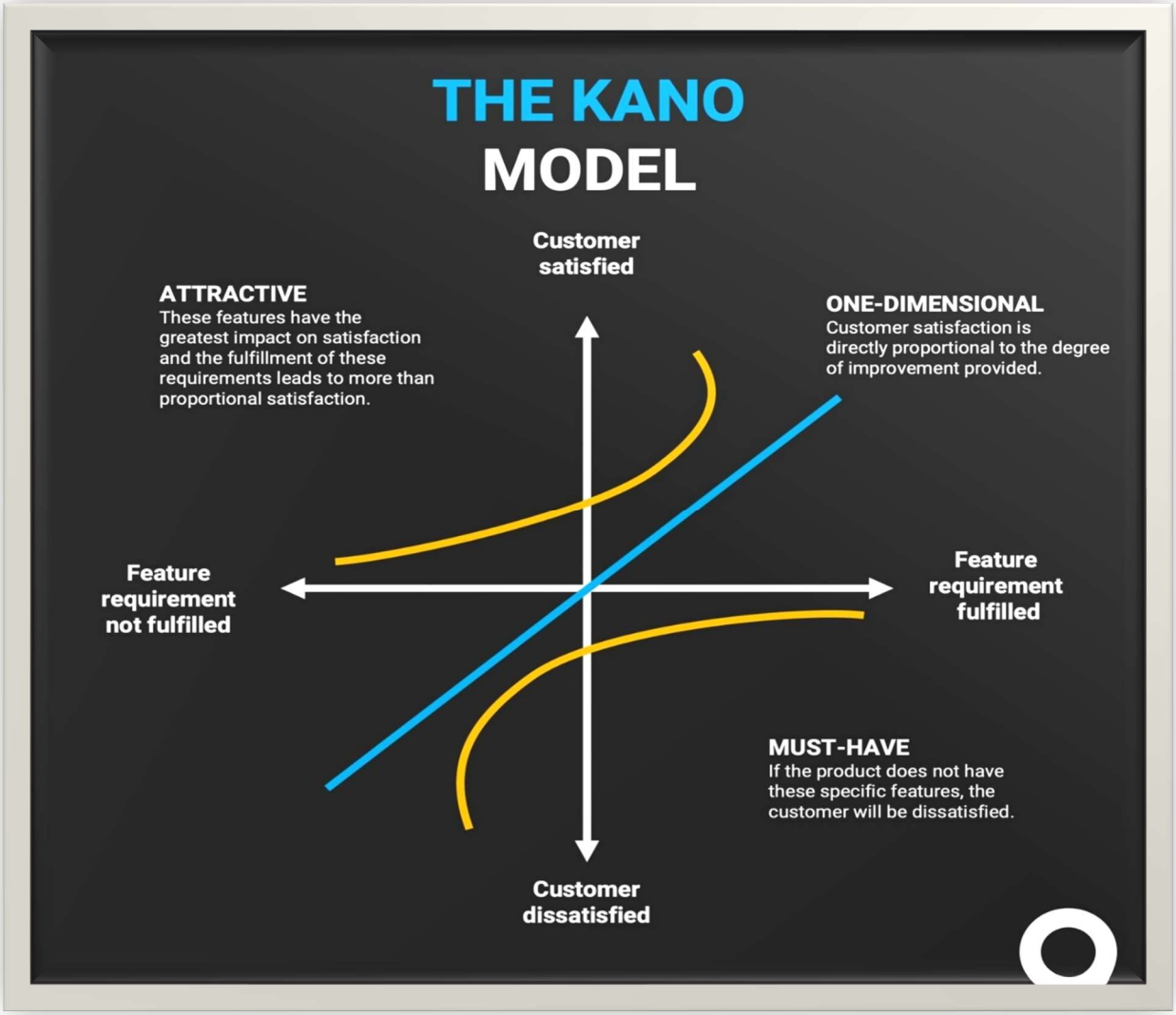
INTRODUCTION:

TRASH BIN – It is common storage container used to store waste material such as Biodegradable (vegetable wastes) and Non-Biodegradable (plastics).

This is used to store the waste materials for a short span of time. It is made up different kind of materials like plastics, wood, metal etc. They are mostly used in residential and public areas to store wastes temporarily. Now we have come up with our newly developed idea called “BIOBIN” which makes the environment pollution free and green.

PROBLEM DEFINITON:

Those days rate of population is quite low, but now in India; the population is increased in the rate of 1.0% annually. So there is excessive use of resources in our day to day life which tends to produce more wastes, these waste materials are dumped in the barren lands and finally been incinerated. The smoke released from the incineration will mixed with the fresh air and releases toxic gases which pollutes the Biodiversity; and causes respiratory problems(lung cancer) in human beings . By introducing our “BIOBIN” which is eco-friendly helps in many ways like segregation of waste, decompose to produce bio-gas and recycling waste.



Threshold Attributes (Musts)

>To separate bio and non bio waste materials.

Performance Attributes (Wants)

>To produce biogas as a fuel for cooking.

Delight Attributes (Exciters)

>Compress non bio waste and send to recycling.

USER REQUIREMENTS:

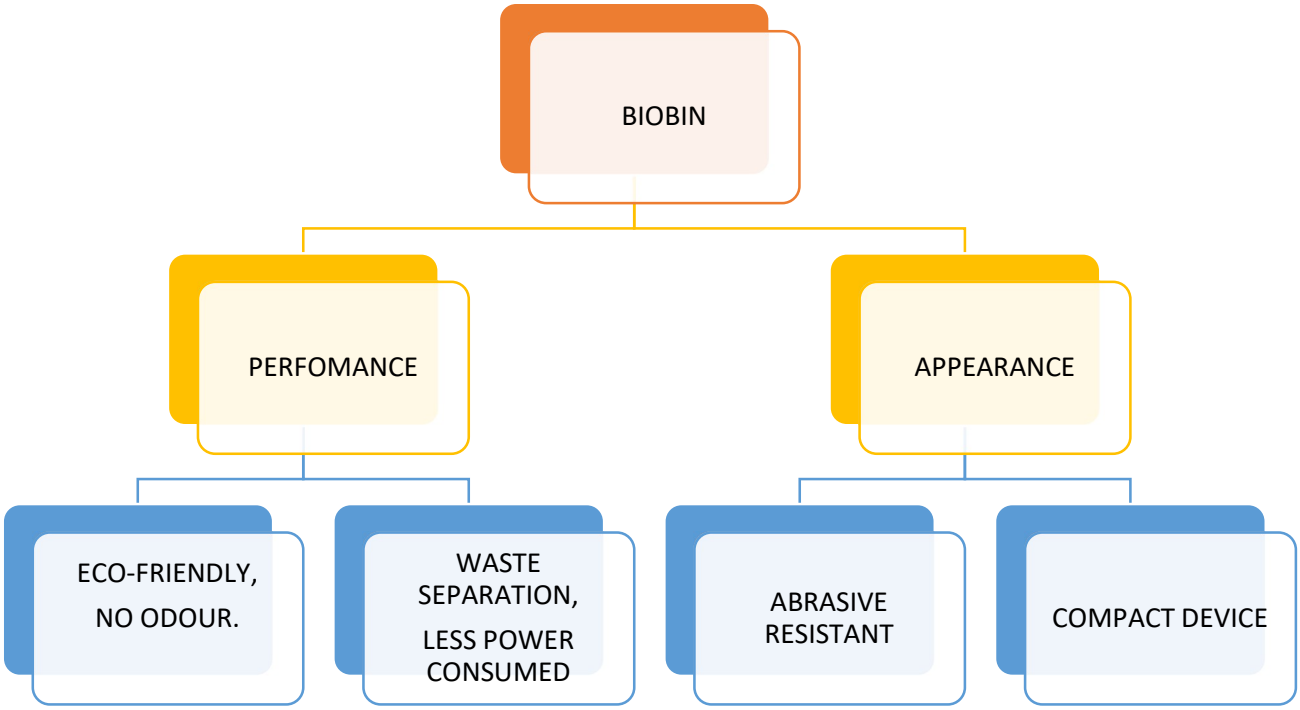
The product should be,

- Easily accessible
- Low maintenance cost
- Long term investment and durability
- Eco friendly in environment
- Eliminate transportation

OBJECTIVES:

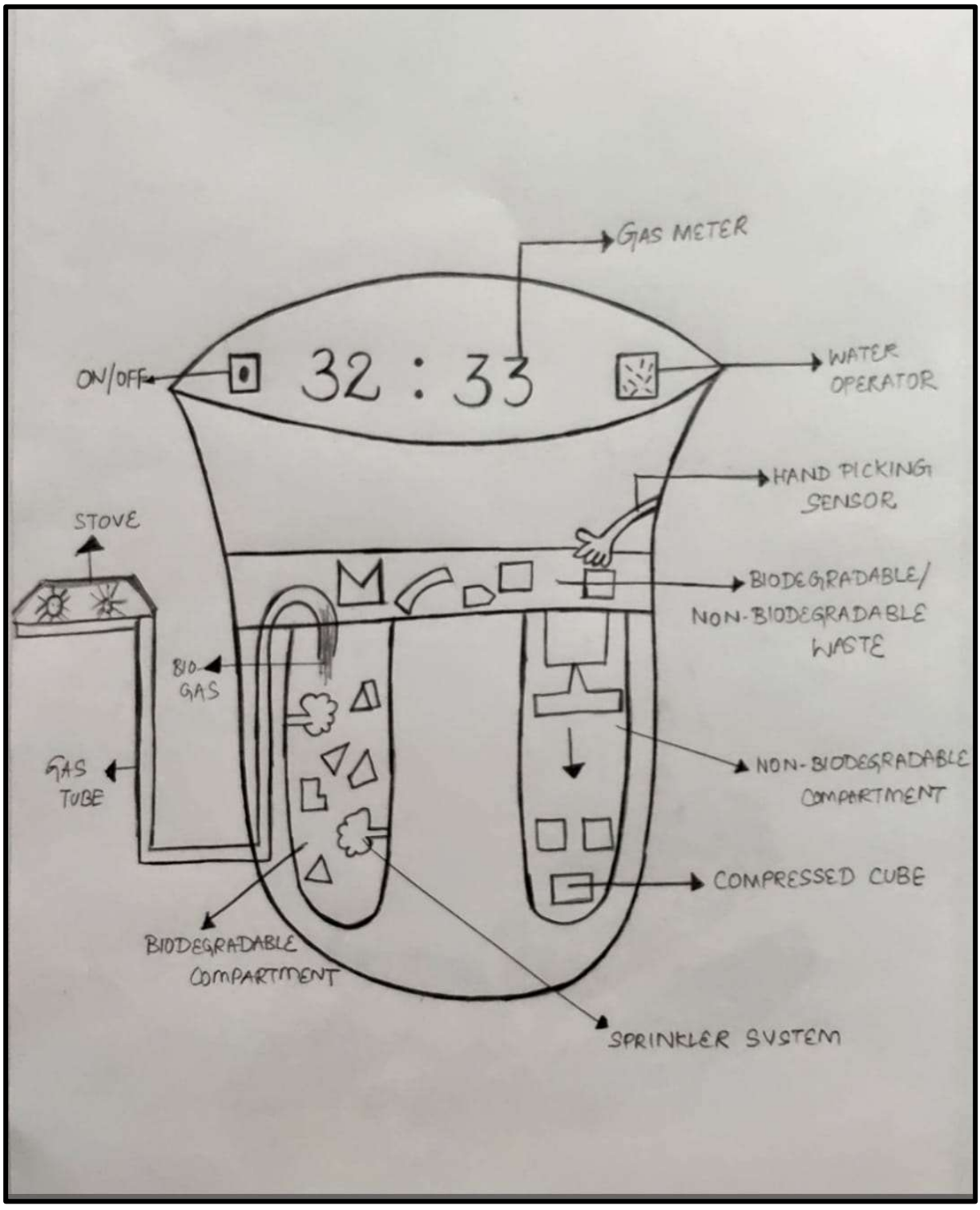
Our objective is to design a “BIOBIN” which provides modernized electronic utilities and also a basic needs of a trash bin. It is a durable device with one time investment, which helps to separate bio and non-degradable material automatically by the use of sensor. It stores and decompose the biodegradable wastes to produce natural fuel which used for cooking purposes and non-biodegradable wastes are compressed which further taken for recycling.

OBJECTIVE TREE:


BIOBIN
PERFOMANCE
APPEARANCE
ECO-FRIENDLY,
NO ODOUR.
WASTE
SEPARATION,
LESS POWER
CONSUMED
ABRASIVE
RESISTANT
COMPACT DEVICE


DON'T
BE A
GARBAGE
HUMAN

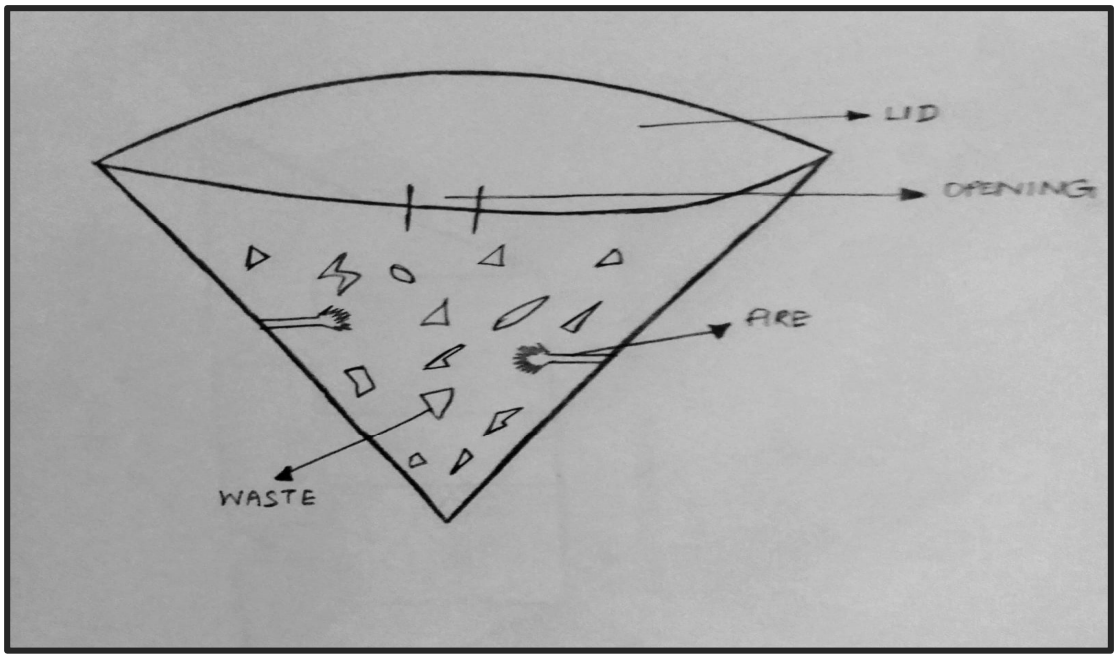
MAIN DESIGN :


GAS METER
32 : 33
ON/OFF
WATER OPERATOR
HAND PICKING SENSOR
STOVE
BIODEGRADABLE/ NON-BIODEGRADABLE WASTE
BIO GAS
GAS TUBE
NON-BIODEGRADABLE COMPARTMENT
COMPRESSED CUBE
BIODEGRADABLE COMPARTMENT
SPRINKLER SYSTEM

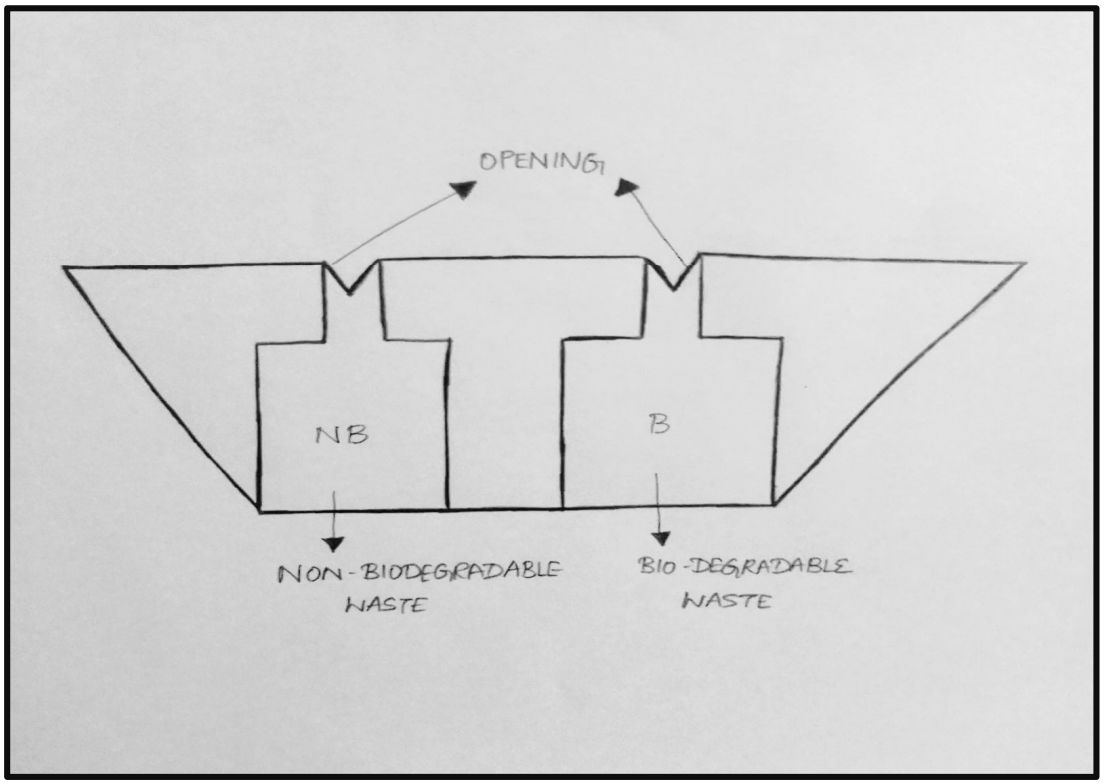
WORKING PRINCIPLE:

- ✓ All waste materials are put inside the opening of the lid.
- ✓ At next, handpicking sensor will detect the waste materials.
- ✓ This handpicking device will separate the waste into two compartments namely bio-degradable and non-biodegradable.
- ✓ We need to put the bacteria cubes inside the compartment along with the waste material and need to replaced yearly once when shortage occurs, which is indicated by the sensor kept inside the compartment.
- ✓ In biodegradable waste compartment, water mechanism is used to sprinkle the water to activate the bacteria which helps to decompose the waste and produce the biogas.
- ✓ That biogas is passed through the pipe fitting installed in compartment, whose end is connected to the stove which produce smokeless fire and used for cooking purpose.
- ✓ Next in non-biodegradable compartment, the waste materials are compressed with help of compressor kept inside and made into small cubes which is stored and given for recycling.

CONCEPTUAL DESIGN 1:



CONCEPTUAL DESIGN 2:



FUNCTIONS:

- To produce biogas for kitchen purposes.
- To produce recyclable materials.
- To segregate the waste materials without any human effort.

SUBFUNCTION:

- When there is a shortage of bacteria, it is indicated by an alarm system.
- It shows amount of biogas produced on digital meter which is provided on top of lid.
- Automatic water suction mechanism is used.

MORPHOLOGICAL CHART

	FUNCTIONS	MEAN - 1	MEAN - 2	MEAN - 3
1.	SHAPE	Cylindrical	Oval	Square
2.	MATERIAL	Wood	Stainless Steel	Spider silk
3.	WEIGHT	50 kg	45 kg	35 kg
4.	ENERGY SOURCE	Dc terminal	Battery	Solar power
5.	OPENING OF THE LID	touch Screen	handle	Sensor
6.	DISPOSING SYSTEM	Bacteria	Burning System	-
7.	ALARM SYSTEM	Device alarm	phone bluetooth alarm	-

CONSTRAINTS:

- Initial cost is more.
- Needs continuous power supply.
- Bacteria cubes need to be replaced for certain period of time.

DECISION MATRIX:

	FUNCTIONS	MEAN - 1	MEAN - 2	MEAN - 3
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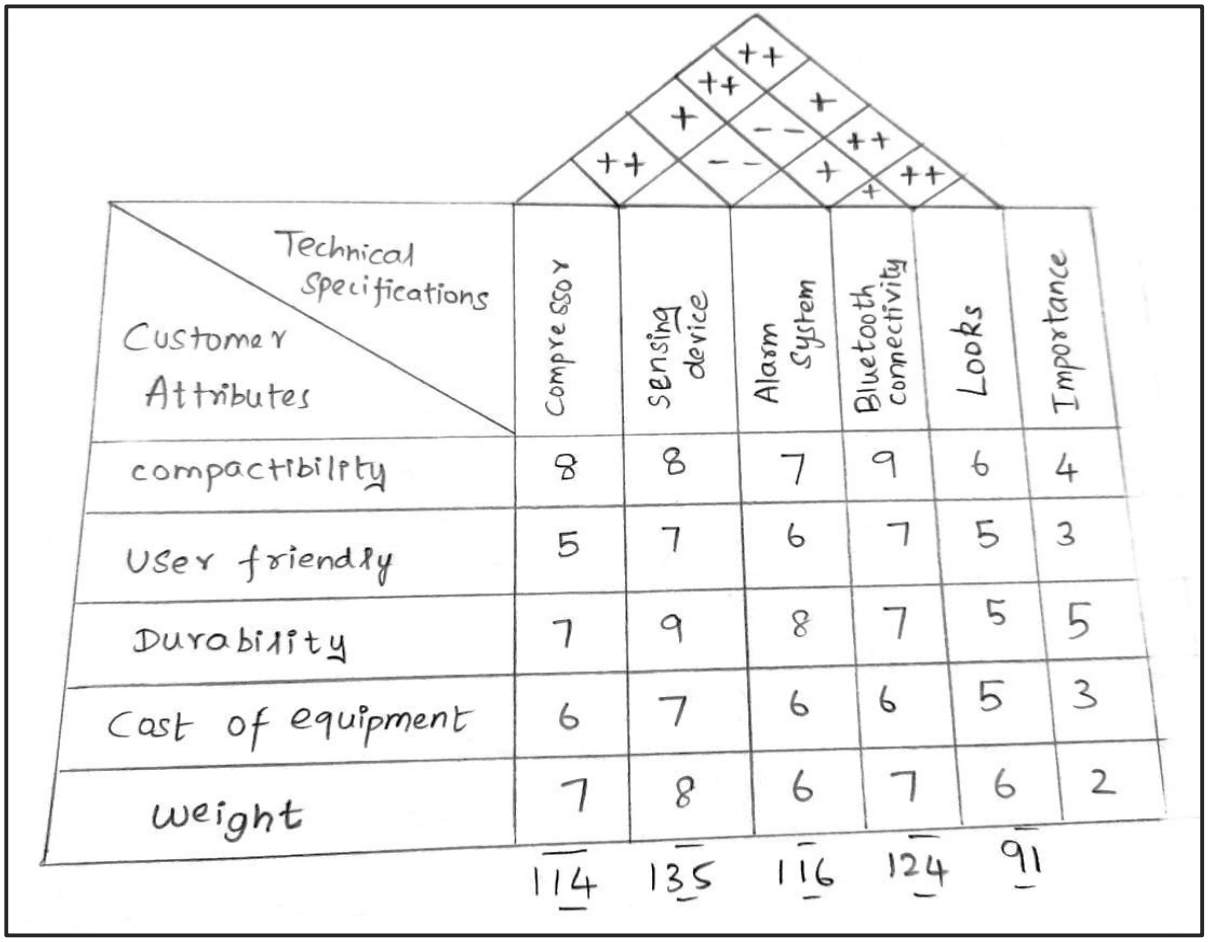
7.	ALARM SYSTEM	Device alarm	phone bluetooth alarm	-

List of criteria for selecting this design:

- Cylindrical shape is chosen to accommodate more waste.
- Stainless steel is chosen as material as it is rust free.
- Having continuous power supply, the device is kept on to produce the biogas uninterruptedly.
- The sensor is given to the lid to open it without human effort.
- Bacteria cubes are selected because they remain operational for longer time.
- Providing device alarm will helps to check the insufficient biodegradable wastes

HOUSE OF QUALITY



Technical Specifications / Customer Attributes	Compressor	Sensing device	Alarm system	Bluetooth connectivity	Looks	Importance
compactibility	8	8	7	9	6	4
User friendly	5	7	6	7	5	3
Durability	7	9	8	7	5	5
Cost of equipment	6	7	6	6	5	3
weight	7	8	6	7	6	2
	114	135	116	124	91	

CONCLUSIONS:

Our final design which was made better than three designs. It is eco-friendly, durable and meet the user requirements. It looks better and trendy.

Many features are developed in this BIOBIN, which is designed smartly. So it gives a good experience to work with the maximum benefits and the user will be satisfied for the initial payment he puts for this device.

The device has good inbuilt infrastructure such as compressing system (helps to compress the non-biodegradable materials and sends to recycling), sprinkler system (to decompose bio degradable waste and produce biofuel) which can be used for cooking purpose. So by this we can say that the design which we made for an BIOBIN is very useful in saving the land for dumping the waste, avoid the release of toxic gas by burning the waste in open area and finally it helps to segregate the waste materials into two different compartments with the help of hand picking sensor with no user effort.