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WRO
WORLD ROBOT OLYMPIAD™

SMART ORGANIC SUPPORT

By Arul Singh, Kunal Deepak

Problems Statement

1. Few Technological Advancements

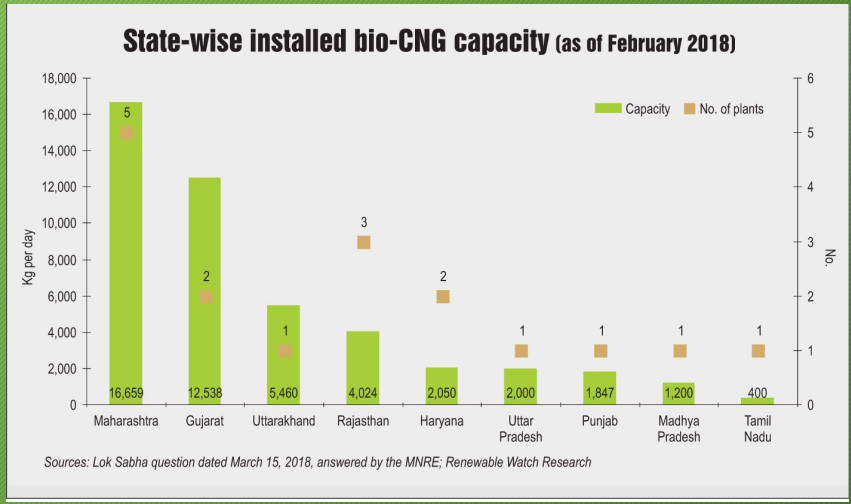
A disadvantage of biogas today is that the systems used in the production of biogas are not efficient. There are no new technologies yet to simplify the process and make it accessible and at low cost. This means large scale production to supply for a large population is still not possible. Also, since use of Biogas is only able to meet some energy needs, governments are not ready to invest in this sector.

2. Effect of Temperature on Biogas Production

It requires a optimal 37 degree maintained temperature.

3. Less Suitable For Dense Metropolitan Areas

Due to lack of infrastructure and raw materials



Food waste in the cities

- **Nearly 40 per cent of the food produced** in India is wasted every year due to fragmented food systems and inefficient supply chains — a figure estimated by the Food and Agricultural Organisation (FAO).
- This is the loss that occurs even before the food reaches the consumer.
- **According to Brihanmumbai Municipal Corporation (BMC)'s latest Environment Status Report (ESR), of the 9,400 tonnes of trash in the dumping grounds, 73 percent comprises of food, vegetable, and fruit waste.**

Statistics and Importance

Mumbai generates about 6862 metric tonnes of organic waste every day. In a year, that amounts to about 2.5 million tonnes of organic waste.

To put that into perspective, that much organic waste can generate 300 billion litres of Biogas.

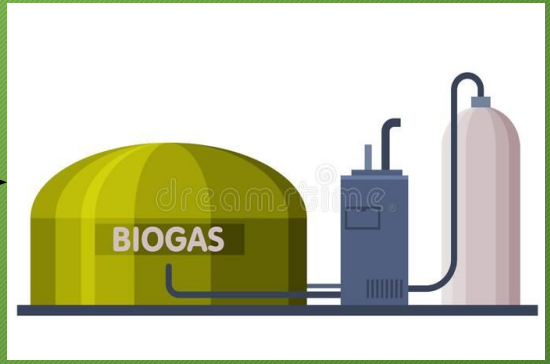
This much biogas can produce 15000000000 watts 15 GW of electricity.

This is enough to cover the entire electricity requirement of Mumbai 4 times over!

CONCEPT

Our concept is to make a smart support system that connects the market authorities with the biogas plants.

Cloud Network



Using this system biogas plants can directly access the waste food from the market and use it as a biomass to produce BIOGAS

Our Solution - Smart Organic Support

Smart organic support has 2 parts

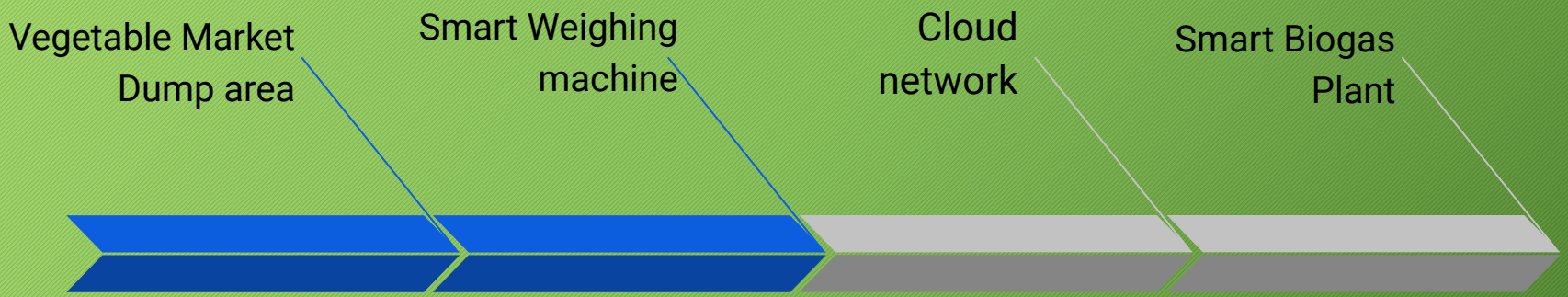
1. **Market Dump weighing machine**

   This device has a smart weight measuring system that is connected to cloud using arduino circuit and uploads the daily waste generated on the cloud storage

2. **Smart Isolated Bio-gas Plant**

   It gets the total amount of waste available from cloud and then keeps track of total biogas generated and uploads it on the cloud using an mobile app.

Working



Food waste collection

All the waste food of the day will be collected in the Dump area

Checking the quantity

All the waste food gets measured and the quantity gets uploaded on the cloud system

Connects markets with Biogas plant

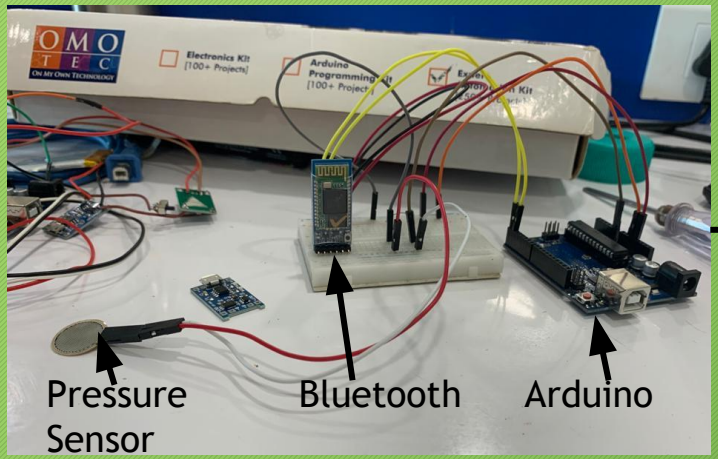
It connects various markets with the biogas plant so that biogas plant authority can send the transportation accordingly

Isolated Biogas Production

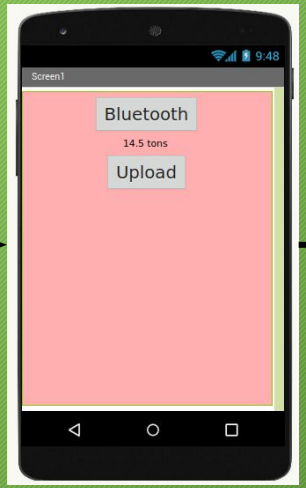
It is sensor controlled plant that generates biogas at maximum efficiency

Market Dump Weighing Machine

We have designed a smart weighing machine which has a pressure sensor connected to the arduino circuit and a bluetooth module that sends the data to a mobile app which further upload the data on the cloud.



Circuit



Mobile App

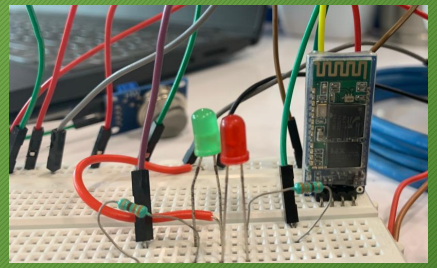
A	B	C
location	datetiming	quantityKG
Dadar	25,april,2021/18:25	10000
Dadar	26,april,2021/18:25	13400
Dadar	27,april,2021/18:25	11232
Dadar	28,april,2021/18:25	15400
Dadar	29,april,2021/18:25	9342

Storage on cloud

Smart Isolated Bio-Gas Plant

- Fully Isolated to maintain 37 degree temperature for maximum temperature
- Integrated with temperature sensor and a temperature controlling device
- Gas sensor to check the concentration of the biogas.

Temp. Control



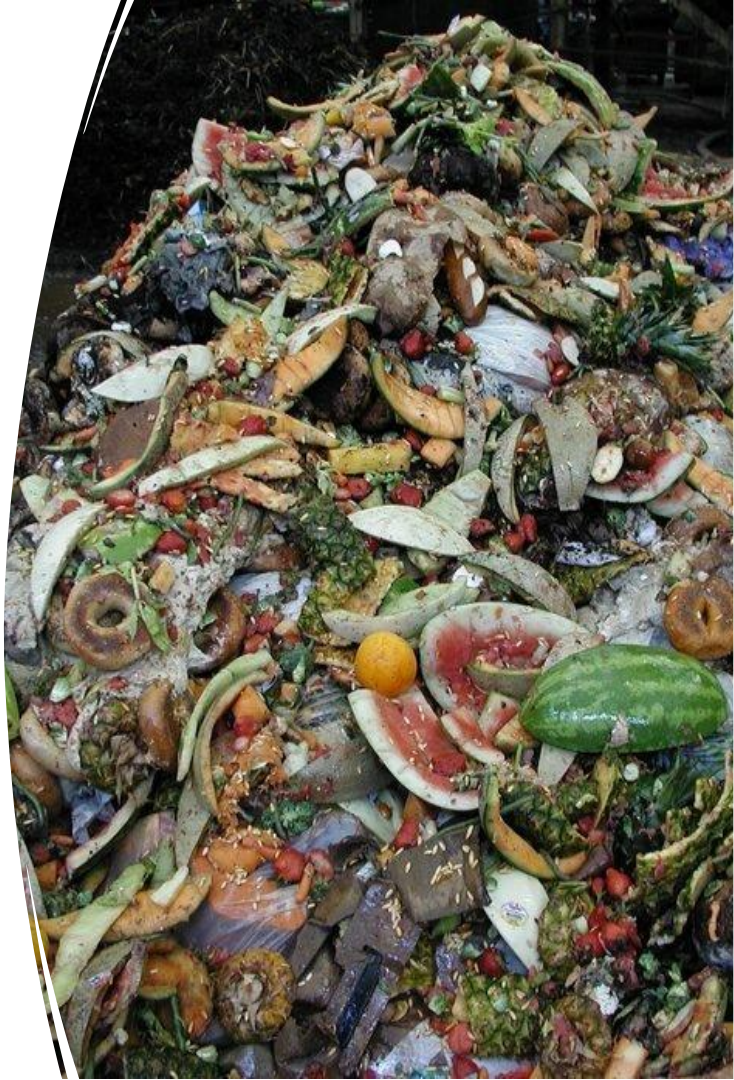
Gas Indicator Circuit

Easy to use app (accessible to all but mainly built for Food Retailers)

Easy communication to and from biomass companies

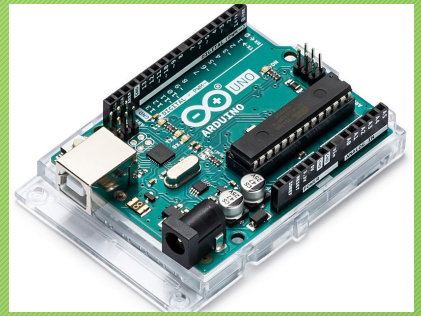
Accurate output calculation alongside profit calculation

Ordered listing of places in need of biogas and places in excess of bio waste to recycle.



Building and Testing

Circuit and components



Arduino

+

FSR Pressure Sensor

+

Bluetooth
HC05

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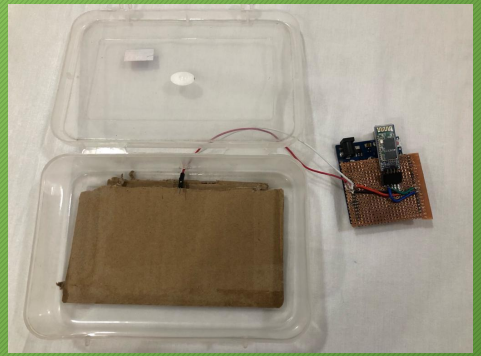
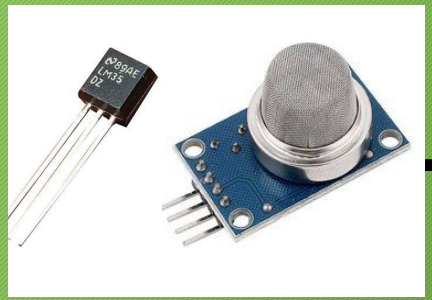


Market Dump
Weighing machine

Arduino

+



Temp and gas sensor

+

Bluetooth
HC05

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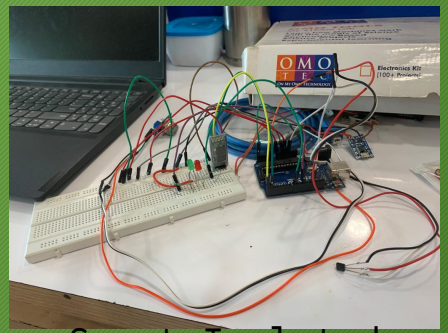
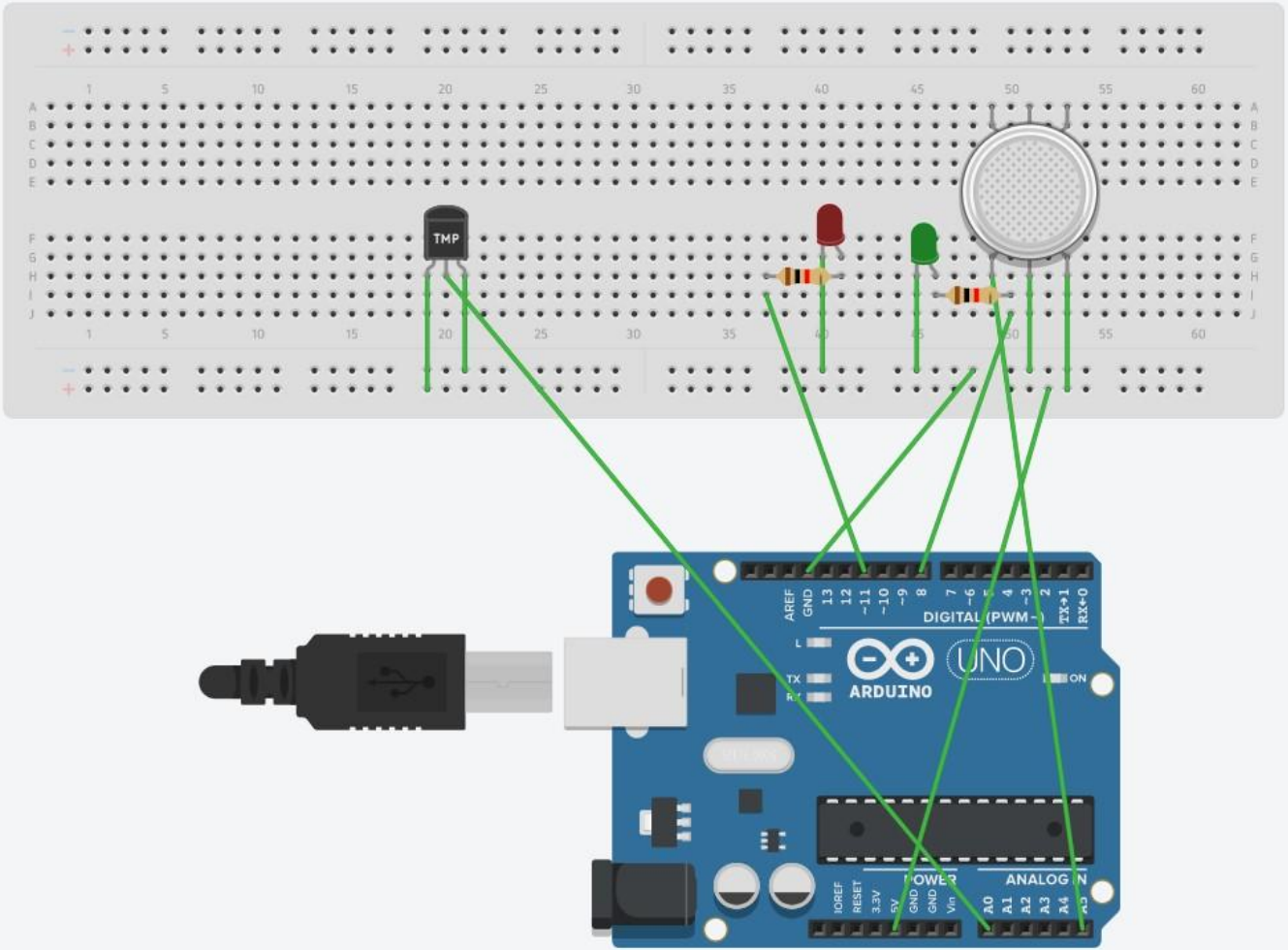


Smart Isolated
Biogas plant



Hydrogen Gas And Temperature Sensor Circuit

Result Calculations

- Mumbai Produce 9400 m Tons of waste in a day out of which 73% is food waste
- Average food waste generation in mumbai - 6852 tons per day
- Average Biogas production per ton of food waste - 500 m3 (800m3 max)
- 1m3 biogas = 2 litre of petrol or 6kWh of energy
- Total Biogas production from the waste in mumbai can be equal to = 2X500X6852 = 6852000 litre of petrol

Impact

- The amount of waste going to landfills will drop drastically
- All the unused waste will be converted into clean energy and a valuable fertilizer
- The amount of biogas generated will decrease our dependence on fossil fuels like petrol, CNG, coal etc.
- It will provide a smart power generation infrastructure to the cities that will be working inside the cities