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# Eco Smart Decomposer

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## ABSTRACT

As urbanization grips the booming cities of India, the problem of waste is rapidly becoming an enormous, vicious repercussion. In a country as vast as India, with cities as spread out as Mumbai, decentralization is the most effective solution for a fast approaching waste management crisis. Treating the household organic waste at source can help reduce the problem of waste drastically. This paper discusses the research and development of a decomposer designed for city households, which can manage, dispose and utilize the organic kitchen and food waste at the source of waste generation. This automatic, composter ensures easy usage, easy maintenance and user friendly interface. The output compost is free flowing, earthy smelling and ready to use for plant application. The home composter hence effectively replaces the kitchen waste bin with significant value addition.

**Keywords:** waste management, composting, organic waste, decomposers.

## I. INTRODUCTION

About one third of the total food produced in the world for human consumption is discarded on an annual basis. In India, 300 to 400 grams of solid food waste per person per day is generated in a town of normal size. The figure is almost 500 to 800 grams per person per day in cities like Delhi and Bombay. The situation in other countries is relatively similar or even worse. Food waste if utilized can be a boon in producing many useful products such as renewable energy (RE), cooking gas and good manure. In domestic environment such as individual houses, apartments, markets, malls, hotels etc., indeed food waste is simply being wasted and thrown into garbage then to landfill, which in turn act as open sources of anaerobic digestion causing the emission of greenhouse gases which has an impact of global warming.

Recycling food waste at a household level would represent a convenient and economical solution to divert a substantial portion of food waste from landfills at source. Composting is a naturally occurring decomposition process which breaks down organic matter into simpler chemical components in the absence of oxygen to produce compost .The project aims at developing a solution to efficiently manage, dispose and reuse the organic waste generated in the kitchens of city households and further proposes to develop a Home Use Domestic Composter which converts organic kitchen waste into usable compost, a good manure for plants and crops.

## II. DESCRIPTION

Composting is a natural process; it occurs by using microorganism under specific condition which leads to decomposition of organic waste. There are two common types of composting process that can be used,

One of the types called “Aerobic composting” that uses air in composting.

The second type called “Anaerobic composting” and this uses no oxygen.

We are using anaerobic process for decomposition. The designed machine is fully automatic and highly compact composting machine which converts the organic waste into compost within 24 hrs, with volume reduction of 85% to 90%. The entire process is natural and biological. The microorganism we use thrice in high temperature and are effective even in high acidic or salty condition.

A tank made of metallic sheets whose dimensions are 2*1*1.5 feet is used having a capacity of 5-10 kg of organic waste. It consist of shaft with blades run by motor, humidity and temperature controller, heater at the bottom, motor for mixing, cutting and exhaust fan at the outlet

## III. BLOCK DIAGRAM

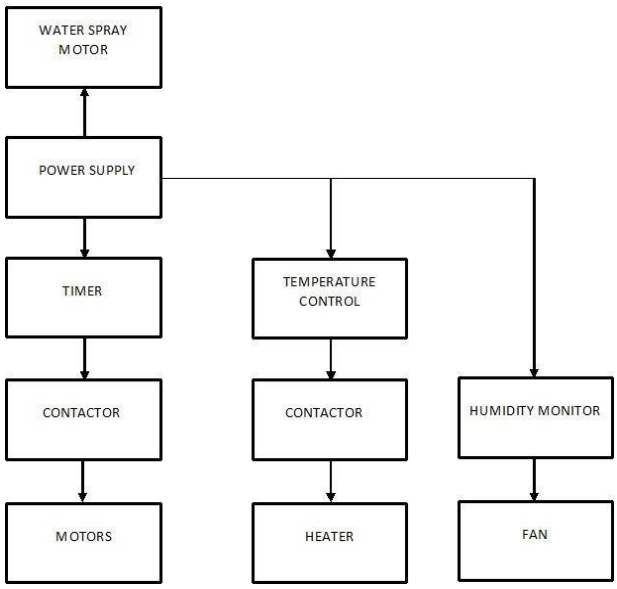


**Figure 1.** Block Diagram

## IV. WORKING

The main part is composting tank in which the organic waste substance is loaded through lid of the tank till the waste reaches the appropriate level.

Initially when waste is added the mixing blades with the help of induction motor at center of the tank, starts mixing and cuts the waste uniformly. The water is sprinkled on the waste through water spray. The moisture conduction in the waste is sensed by the humidity sensor due to which heater turns ON and composting tank gets heated. The appropriate value of temperature is applied ( above 50 degree centigrade approx.) by the heater. The tanks temperature and humidity is continuously sensed by the temperature and humidity sensor and is maintained at preset values. Due to this the water content in the organic waste is evaporated and it goes out into water tank through exhaust system. Switching of heater, motors and exhaust fan is done with the help of AC contactor which is controlled by preset timer. The values of temperature, humidity are displayed on the LCD. As any organic waste contains 70-80% water content, we achieve 70-80% volume reduction at this stage itself.

At the same time microorganisms decomposes the waste into compost and this happens within 24 hours. The microorganism used here is a thermopile bacteria, which thrives in high temperature. This is how we achieve 85- 90% of volume reduction. The machine is fully automatic and highly compact an able to decompose organic waste in a time frame of 38- 50 hours, with minimum harmful gases emissions and odors and it is almost a plug play machine with less power consumption.

## V. METHODOLOGY

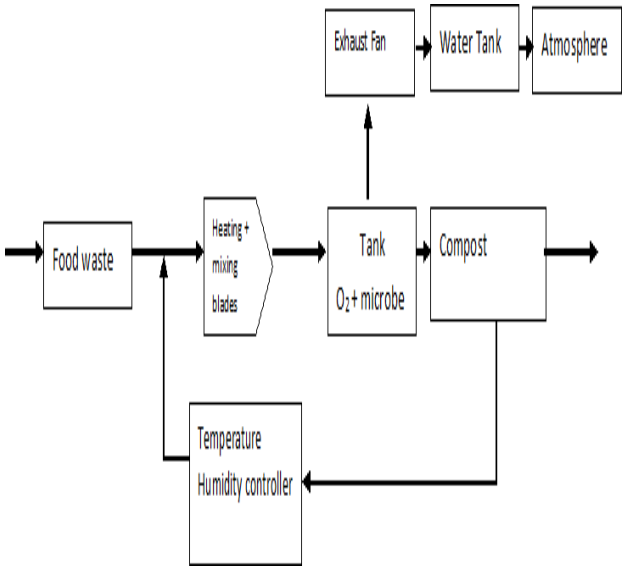


**Figure 2.** Methodology

This figure shows the block diagram of our designed composting machine. It shows how the machine works, it also shows main component of the machine and parameters controlling the machine

## VI. ADVANTAGES

- Compost is a valuable soil amendment as the compost feeds soil.
- It can be used for bioremediation of soil, pollution prevention, reduce erosion, nutrient run off and alleviate soil compaction.
- It retains needed moisture.
- It is an effective way to reduce greenhouse gases.
- Decentralize waste management solution.
- Reduce transport costs.
- Negligible odor, long term solution, maintenance/ support.
- Reduction of solids to be handled (ex. less excess sludge).
- Minimum electricity cost.
- The research has also shown that composting can also assist in enhancing the disease resistance of some plant like tomatoes and vegetable.

## VII. APPLICATIONS

- This machine provides food waste solutions for variety domestic uses, from restaurants to households.
- Reduce garbage volume and disposal costs.
- Houses, Hotels, Restaurants, Supermarkets, Municipalities, Canteen, Shopping centers, Food processing sites.

## VIII. CONCLUSION

In this project we presented a composting system that allows remote unsupervised composting, monitoring and management throughout the entire procedure. The study found significant portion of the generated wastes are compostable which is very useful to promote decentralized composting and associated marketing. Electricity generation is very much possible if we produce biogas from organic portion of the waste. It provides an effective way to reduce greenhouse gases with minimum electricity cost. As a future endeavor, the current project aims to expand on other activities of agricultural interest which now required human intervention.

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