Waste Segregation and Electricity Generation

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Abstract:
In this day –to-day life waste is and really important factor for the society as well as our mother earth. The improper segregation of the waste creates foul and improper disposal of waste creates more and more waste and this lead to the global warming and polluting the mother earth. So, this robot is basically for the segregation of the waste in a proper way and making a proper disposal of it , through collecting the dry waste and the generating electricity through its burning using different components. This project also helps to reduce the man workload of collecting it and segregating it by had this will create a better future ahead.

Introduction

The waste treatment is not limited to recycling, composting or form of environmental treatment. Hazardous toxic wastes like chemicals from chemical factory are there side by side with the domestic waste or organic waste. It should be the duty of every citizen to separate the biodegradable from nonbiodegradable waste from the base level. Biodegradable wastes can be dump in a soil or land and can be useful for making biogas. Wastes like Paper, plastic, metal, paper etc can be recycled. Separating waste can be useful for every level. This can be done at individual level, society level or university level. This project also helps to reduce the man workload of collecting it and segregating it by had this will create a better future ahead. World resources are limited and decreasing day by day and public awareness about all this is necessary. Also should be aware about the harmful effects of our throwaway system,one-step towards clean India. In short, This all indicates that making products last longer, and recovering materials is necessary. Generating energy from waste which is electricity or electric energy from the heat and light energy. then this energy can be used in homes,businesses,school and university. There are many ways of generating electricity from waste. These include combustion, heat conversion, light conversion etc.Converting heat and light energy from combustion are the two ways to generate electric energy.

LITERATURE REVIEW

Waste segregation is an important aspect of waste management that involves sorting different types of waste materials into separate streams for proper disposal or recycling. Robotics technology has been increasingly used to automate waste segregation processes, improving efficiency and reducing the environmental impact of waste management. In this lliterature review, we will explore some of the recent research and developments in waste segregation robotics. Choy et al. (2011), who developed a robotic arm system for sorting construction and demolition waste, conducted one of the earliest studies on waste

segregation robotics. The system was able to recognize different types of materials using a combination of visual and tactile sensors, and sort them into appropriate containers with high accuracy[1].

Five types of sensors are used for waste identification: proximity sensor to check metallic and nonmetallic part of a waste also image processing can be use for to detect the type of waste.Convolutional neural networks (CNNs) are the most commonly used ML technique for waste identification (24 out of 26 articles). There is complexity building this system as it deals with irregular inputs.limited data in datasets, and a lack of detailed waste categorization. Future work in waste identification should focus on deployment and testing in non-controlled environments, expanding system functionalities, and exploring sensor fusion. [2]. Another approach to classify waste materials is ML which is machine algorithm and based on their visual features. For example, Fuentes et al. (2018) developed a waste sorting system that uses a deep convolutional neural network to recognize different types of waste based on their images. System achieve almost accuracy[3]. In addition to improving waste segregation efficiency, robotics technology can also help reduce the risks and hazards associated with waste management. For example, Verma et al. (2019) developed a waste segregation robot that can handle hazardous waste materials such as batteries and electronic waste. The robot is equipped with a specialized gripper that can safely pick up and segregate hazardous materials, reducing the risk of injury or exposure to harmful chemicals[4]. There was an another approach to waste segregation robotics which involves using of PLC as a major component to segregate various wastes like metallic, non- metallic, dry,plastic and wet waste. For ex. Rashmi M. Kittali and Ashok Sutagundar developed a waste segregation robot that can segregation of various wastes. The robot is equipped with PLC and hydraulic cylinder as a major component that can safely segregate robots without intervention of human needs[5]. Overall, these studies demonstrate the potential of robotics technology to improve waste management practices and reduce the environmental impact of waste. Further research and development in this field could lead to more advanced waste segregation robotics systems that can handle a wider range of waste materialswith higher accuracy and efficiency.

METHODOLOGY

Objective of Waste segregation and electricity generation is achieved using a turbines and solar panels which converts heat energy into electrical enegy.[2] The process of integration is accomplished by integration of :-

1. Turbines,
2. Solar Panels and
3. Microcontroller system
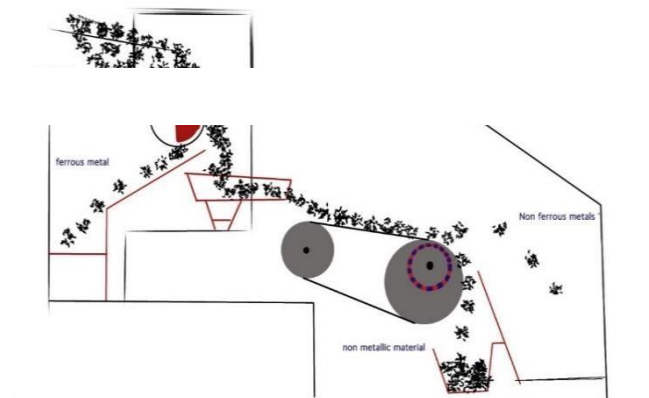4. Conveyer Belt system
5. Eddy current separator.

Algorithm:

Step 1: First Heavy and Light waste segregation
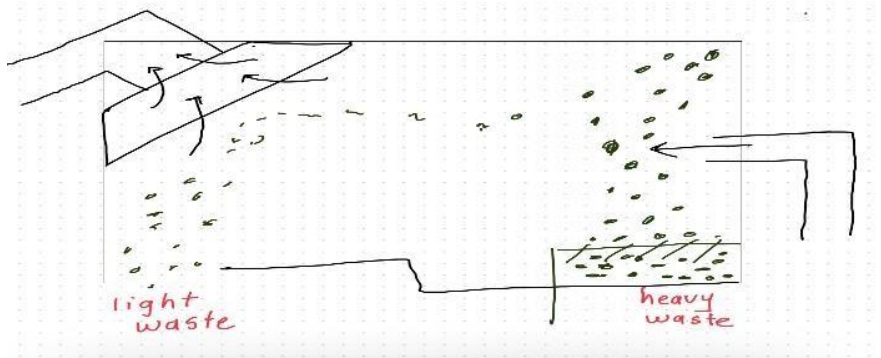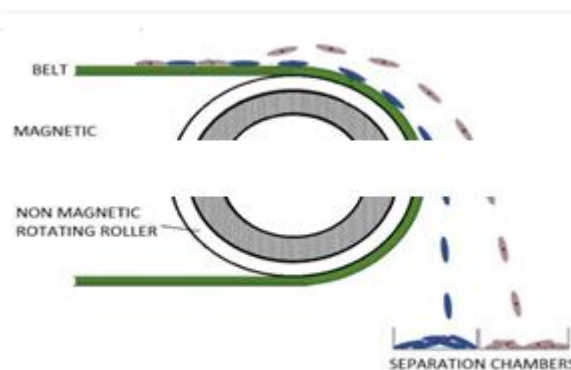

Step 2: From heavy waste separateMagnetic waste.

Step 3: Non ferrous waste then get segregate to metallic and non metallic

Figure 1.1 : Segregation of Light and Heavy waste diagram
waste using eddy separator.

Figure 1.2 : Segregation of magnetic and nonmagnetic waste diagram
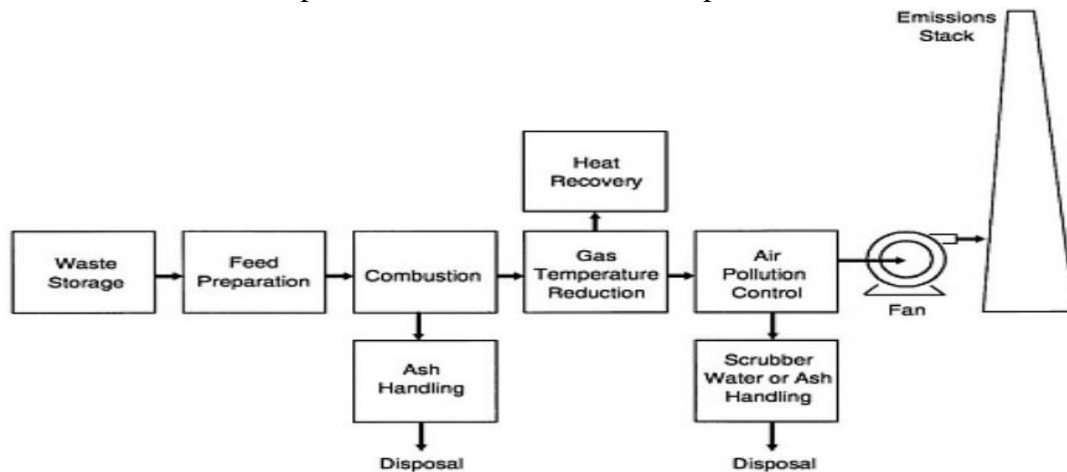
Step 4: light waste collected in container.

Step 5 Burning the waste.

Step 6: water from tank over container convert into steam and crotate the turbines and creates electricity.

Step 7: Solar panels convert light energy intoelectricity.

Step 8:voltage regulator regulate the voltage.

Step 9: HEPA Filter controller the pollution.

Fig. 2 Block diagram of Electricity Generation.

A. The Hardware Requirement and Setup

The hardware of the system is based on the conveyor belt system and magnetic field.to generate electricity turbines and solar system is necessary. The hardware requirements are discussed in the following section.

1. Conveyor Belt: According to the design of an effective and efficient material handling system which will increase productivity and minimize cost,the guidelines normally followed are:
    a. Designing the system for continuousmovement of objects.
    b. Going for low investment and highaccuracy.
    c. Maintaining gravity flow.
    d. Ensuring that the ratio of heavy andlight weight waste.
2. Neodymium magnet: In the field of informationtechnology, neodymium magnets are particularly
3. Solar Panels: Solar panels are generally made up of from silicon and another semiconductor and protected by glass material. When this material is exposed to photons of sunlight , it releases electrons and produces an electric charge.
4. Battery: Solar lead acid batteries look same as power backup lead acid batteries. However internal composition of chemicals are customised for solar application. As compared to normal inverter batteries, solar batteries have stronger plates and more lead. Luminous solar batteries are C10 rated deep cycle batteries which offer 20% more backup, 20% higher depth of discharge and are 10% heavieras compared to other solar batteries.

B. Specifications:

☐ Metallic and Non-metallic wastesegregation.

☐ Non-metallic waste is burnt andelectricity is generated.

● Reduction in air pollution generated through burning of carbon based waste and that carbon waste is collected for electricity

WASTE	WEIGHT	QUANTITY
Paper bag	100gm	1
Cardboard	20gm	1
Paper	4gm	1

- Overall time to burn the waste = 1min
- Generated electricity =12V
- Generated current =0.6amp
- Power generated =7w

Fig 3 : Calculation Table

Conclusion and Result

Whole waste will be separate into light ,heavy ,magnetic, nonmagnetic, metallic and nonmetallic. This system will help muncipality,universities,small societies. Waste management system and generating electricty succeed upto generation of 12v electricity.Generating electric energy using heat andlight energy.

Figure 4 : generation of electricity upto 12V

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