

# Solar Powered Garbage Management System

Anamika Patil<sup>1</sup>, Hemangi Thakare<sup>2</sup>, Sejal Puri<sup>3</sup>, Sejal Patil<sup>4</sup> and Namra Joshi<sup>5</sup>

<sup>1</sup>B.Tech Student, Department of Electrical Engineering, SVKM's Institute of Technology, Dhule, Maharashtra, INDIA

<sup>2</sup>B.Tech Student, Department of Electrical Engineering, SVKM's Institute of Technology, Dhule, Maharashtra, INDIA

<sup>3</sup>B.Tech Student, Department of Electrical Engineering, SVKM's Institute of Technology, Dhule, Maharashtra, INDIA

<sup>4</sup>B.Tech Student, Department of Electrical Engineering, SVKM's Institute of Technology, Dhule, Maharashtra, INDIA

<sup>5</sup>Assistant Professor, Department of Electrical Engineering, SVKM's Institute of Technology, Dhule, Maharashtra, INDIA

<sup>2</sup>Corresponding Author: hemangithakare8@gmail.com

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## ABSTRACT

India is a developing nation. With this development the population is also increasing day by day, with this increment in population the problems like scarcity of land, power requirement & waste management is also increased. Among all these issues waste management is leading particularly in urban areas. This paper proposes the solar Garbage Collecting Vehicle. The mechanical arrangement can be utilized for isolating wet and dry waste into independent compartments. The proposed system is sustainable as it is powered by solar panels. The key components used in this system are a Solar panel, IR sensor, moisture sensor, and ultrasonic sensor. The proposed system comprises novelty features like Waste Segregation, eco-friendly fueling, etc.

**Keywords**— Waste Management System, Solar Power, Arduino

## I. INTRODUCTION

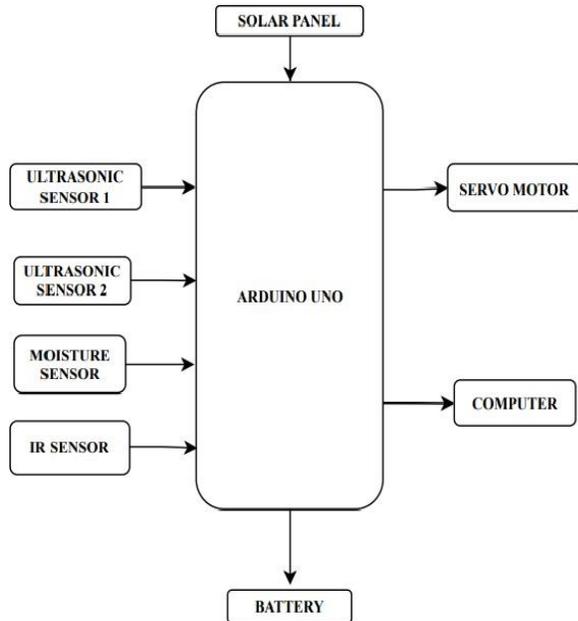
The current situation of the country regarding garbage segregation is very bad as people are not aware of the disposal of waste. There are many factors responsible for the increment in garbage like population growth, and lack of awareness about how to recycle garbage. Due to less awareness about garbage segregation people don't keep garbage in separate manner i.e. dry and wet garbage. In this fast lifestyle, people used to gather garbage in one bucket only. They don't segregate the waste. To overcome this problem, we proposed an Arduino-based system for waste segregation. The home, and town waste includes plastics, paper, wood, food items, soiled food, and other wastes. Such types of waste can be separated into the wet and dry compartments of the system, after the separation we send dry waste for recycling purposes and wet waste for appropriate reactions like making fertilizers. In some crowded areas, bins will be completely overfilled although people put their garbage in that bin it causes various types of diseases so we implant an ultrasonic sensor in this vehicle which indicates or alerts when the bin is filled out.

Another feature is, its works on solar power save fuels and are eco-friendly in nature.

## II. LITERATURE REVIEW

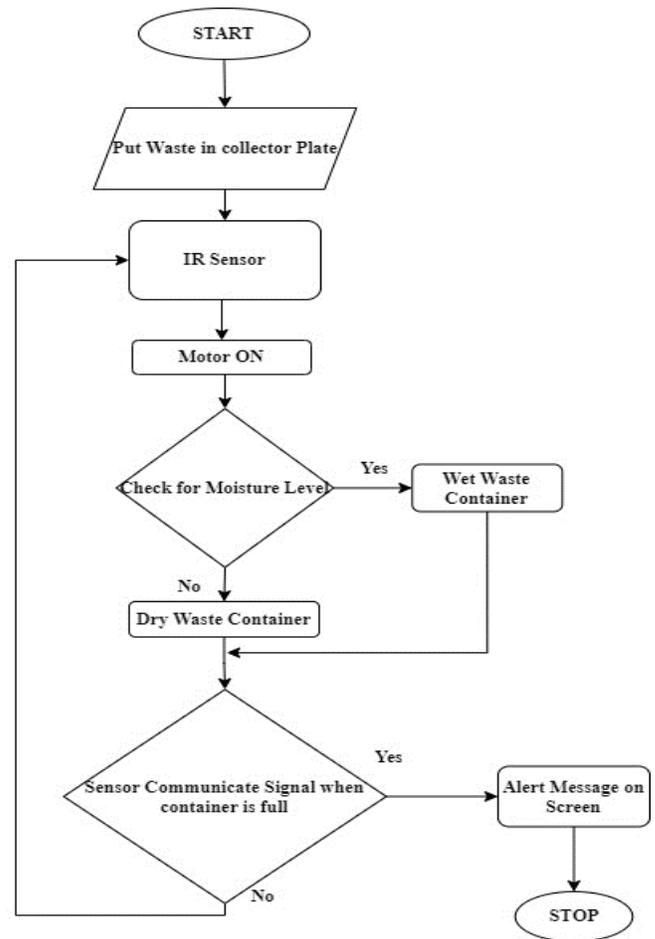
- **Mazhar Ibna Zahur et.al. (2019)** propose an IoT-based smart bin that gives updates to the city central server about their garbage status solar energy is used for power supply. [4]
- **Minhaz Uddin Sohag et.al. (2020)** represents a smart IoT-based integrated system consisting of a recognition system, an automated lid system, a display system & communication mechanism in urban areas. [5]
- **A M Hidayat et.al. (2021)** represent the issue of an effective & efficient waste management system and it was very costly they introduced the concept of a garbage collecting system.[6]
- **Dileep J. et.al. (2021)** discussed that smart cities have a waste segregation problem and their management is also a big issue. They addressed the application of microcontrollers in waste management. [7]
- **M. Thamarai. et.al. (2023)** present self-low power garbage management system that employs a CNN & IOT for households in smart cities. [8]

### III. PROPOSED SYSTEM



**Figure 1:** Block Diagram of Proposed System

Figure 1 illustrates the solar-powered garbage management system (SPGMS). Major components used in the solar power garbage collecting system. Here Arduino Uno ATmega328P is used as controller. Other electronic components connected to ultrasonic sensors were used as alarm means when the whole bin was filled it gave a signal to Arduino Uno. Arduino sends it to the computer and it will decode it then the buzzer will ring so that the corresponding person knows about the situation. IR sensor senses that some object was placed on a plank then the Moisture sensor senses moisture present in the garbage so that it segregates as per connection if moisture is present it falls into the wet waste compartment and if moisture is absent then it falls into the dry waste compartment so that we can segregate dry and wet waste by electronic. The Servo motor helps to rotate the plank after falling the waste. Solar panels are used for use to work motors, Arduino Uno and vehicles Battery connects in contact with the solar panel to store the energy and use it at times when solar power is not present. So that we use eco-friendly energy.



**Figure 2:** Working of Proposed System

The basic working of the solar garbage management system is illustrated in Fig. 2. First we turn on the supply through a battery which is charging through the solar panel, and another end is connected to Arduino Uno. When we put waste on top of the system the IR sensor which we are connected senses something is there so the servo motor will rotate flip open or close as we connect the moisture sensor which senses the presence of moisture if yes then the servo motor opens the door of wet waste and if no then dry waste door will open by this we can separate dry waste and wet waste in two different compartments. Vegetables, fruit, meat, etc. are gathered as wet waste, and paper, wood, leaves, etc. come in dry waste. When the container is full or overflows the ultrasonic sensor sends a sound signal. These signals will illustrate the Level of a system and how much waste is filled in it. Ultrasonic sensors send signals to Arduino Uno. Arduino Uno gives an alert and it is displayed on a screen.

#### **Advantages of the Proposed System**

- No Need for an Electrical Supply as the proposed system is powered by the solar system.
- Less Human Effort as the system is automatic.
- Time for segregation is reduced.

#### **Limitations of the Proposed System**

- Solar systems may not work during night hours or cloudy days.
- The cost of the system is comparatively high.

### **IV. CONCLUSION**

In this modern era waste segregation become a key challenge in big cities. By the use of the proposed system, we can separate the wet waste like leaves, vegetables, fruit waste, food items, and tissues, and dry waste like leaves, metals, papers, plastic, bottles, clothes, and wood in different compartments. The waste materials can be correctly segregated into their respective wet waste or dry waste compartments. After that, we reuse the dry waste and use wet waste as fertilizer. This proposed system can be employed for waste management of the city. It uses sensors to sense dry waste and wet waste. It works on solar energy by using a solar panel for eco-friendliness. It does not require human interference to separate it. It helps minimize the extraction of resources along with reducing pollution and energy consumption which is associated with manufacturing. We can conclude that this system will prove to be an efficient one.

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