

Waste Separator

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Abstract: The fast growth in the population has led to the increase in the volume of various waste that is generated on every day to day life. This increase in the voluminous of waste is due to sequence growth in the urbanization and industrialization has become a major problem for the various government like the local and the national government. It caused a serious problem for the local bodies for managing the wastes that is dumped all around as the landfill. In order to minimize the risk to the environment and health care of humans, it is necessary to take very careful measures when separating and transporting waste. Segregating the waste in a proper manner brings to the public attention a economic value of the garbage. The conventional method used in India for segregation of waste is through rag pickers which consumes a lot of time and has the major effects on the people health when they are exposed to those waste. Now we have the Waste Separator (WS) which is affordable and also easy to use which is the best solution for waste separation. It is constructed to segregate the waste into three category i.e. metal type of waste, biodegradable waste and non-biodegradable waste. The waste separator use the ultrasonic sensor for the plastic segregation and inductive proximity sensor for the metallic waste detection and an LCD display the segregation result. It is evident from the practical experimental reports that segregation of waste using WS is successful.

Keywords: Smart Dustbin, Capacitive Proximity Sensor, Ultrasonic Sensor, Waste Management

I. INTRODUCTION

In the present world, waste disposal is a huge cause. The disposal method of the large amount of generated waste had an effect on the environment. Improper open dumping of waste in landfill sites is a general method of disposing the waste. Living organisms such as plants, animals and Human health are affected because of such methods. The harmful waste disposal methods generate harmful chemicals which contaminate surface-level water and groundwater. And that can lead to disease vectors, spreading dreadful diseases. In India, Chiffonnier play a vital role in the recycling of slum waste and waste management. Chiffonnier and conservancy staff have higher condition of diseased due to infection that affects skin, respiratory system, gastric system, intestine and allergic disorders in addition to a high exposure to bites of rodents (rat species), dogs and other. The number of Chiffonnier can be reduced if segregation takes place at the place of civic waste generation. The people would not know the economic value of the waste generated unless it is recycled completely and properly. Many developments in technology have refused to be processed into useful things such as Waste to Energy, wherein the waste can be used to produce synthetic gas (syngas) composed of carbon monoxide and hydrogen. The gas is further burnt to generate electricity and steam; Waste to Fuel, wherein the waste can be used to produce biofuels. When the waste is segregated into basic types such as wet, dry and metallic, the waste has a higher possibility of recovery, recycled and reused. The advantage of doing this is that a large amount of the material is regained for recycling which means that more material could be recovered from the waste. The hazard in workplace for waste workers is reduced. Also, the separated waste could be directly sent to the recycling and processing plant instead sending it to the segregation plant than to the recycling plant. At present, there is no proper system for segregation of dry, wet and metallic wastes at a household level. The aim of the project is to provide a compact, low cost, and user-friendly segregation system for households to efficient the waste management process. Currently, there is no efficient system of segregation of dry, wet and metallic wastes at a household level. The purpose of this project is the realization of a compact, low cost, and user-friendly segregation system for urban households to streamline the waste management process. India's garbage generation stands at 0.2 to 0.6 kilograms of garbage per head per day. Segregation at source is crucial for clean cities. India's per capita waste generation is so high, that it creates a crisis if the garbage collector doesn't visit a neighborhood for a couple of days. Improper waste disposal causes problems that cause degradation of the environment. Waste has been piling up in many dumping grounds all over India. Most of this waste is in mixed form and hence cannot be disposed of effectively. The most commonly used waste handling techniques are burning of waste or using it as landfill. The waste is not subjected to recycling, composting, or any other form of environmental treatment. Hazardous toxic wastes lie side by side with the organic wastes. India's garbage generation weights about 0.2 to 0.6 kilograms of waste per head per day. Segregation at place is difficult to clean cities. India's per capita waste generation is so high, it creates a crisis if the Chiffonnier doesn't visit an area for a couple of days. Improper waste disposal causes problem like degradation of the environment. Waste has been accumulating in many dumping grounds all over India. Most of the waste is in mixed form and hence cannot be disposed effectively. The most widely used waste management methods are burning of waste or using it as landfill. The waste is not allowed to recycling, composting, or any other form of environmental treatment. The toxic wastes remain side with the organic wastes. It should be on the part of Municipality Corporation to separate the biodegradable waste from non-biodegradable waste. Biodegradable wastes can be made to composting. Wastes like plastic, metal, paper etc., can be subjected to recycling.

II. Related work

Amrutha Chandramohan et. al. [1] states there is no system for segregating wastes into categories as dry, wet and metallic at the household level. A Waste Separator (WS) is used at the household level so that the waste can be directly processed. The AWS

makes inductive sensors to identify metallic items, and allow capacitive sensors to distinguish between wet and dry waste depending on the threshold values set. However, it cannot separate ceramic into dry waste because it has higher relative dielectric constant when compared with other dry wastes that are segregated. By increasing the accuracy and overall efficiency, noise can be eliminated. The limitations of this system is that it can segregate only one type of waste at a time with an priority for metal, wet and dry waste. Thus, buffer spaces is used to segregate a mixed type of waste. Since the time for sensing metal objects is low the entire sensor module can be placed in a single platform where the object is stable to ensure best results. Nishigandha Kothari et. al.[2] used Ultrasonic Sensors to monitor the garbage collection. When the garbage reaches the sensor level an interrupt message is sent to the microcontroller. J.S. Bajaj et. al.[3] says that many up gradations can be done to the existing project. Some of which are listed below: Advanced process methods can be incorporated once the waste has been segregated, then the individual material is feeded for local use so that the segregation can be performed continuously once the waste is dumped. ArduinoATMEGA microcontroller is used to process outputs from the sensors. Based on the output from sensor the microcontroller provides control signals in the form of steps to dc motor. Depending on the type of material the object is classified. After classification these objects are dropped into its respective bin. Hence plastics, metals and other wastes will be separated from disposable objects. The block diagram of the proposed work is shown in the below figure 1.

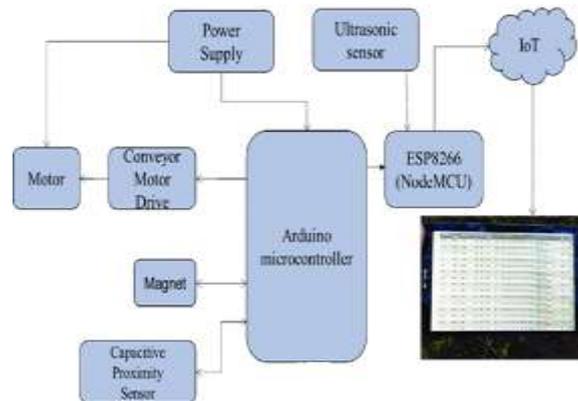


Fig 1: Block Diagram of the Proposed System

Inductive sensors are used for detecting metallic objects. Capacitive sensors are used for detecting plastics, glass and other disposable objects. They are adjusted to sense only disposable objects. Ultrasonic sensors are used for detecting non-transparent objects within the system. Arduino MEGA microcontroller is used for processing the outputs from the sensors. Based on the output from sensor, the microcontroller provides control signals in the steps to stepper motor. Depending on the number of times the motor rotates by a specific angle it aligns itself below the sensing plate. After that the object is dropped into its corresponding bin. Hence plastics and metals will be separated from easy disposable objects.

III.WORKING

The Waste Separator will help Municipal Corporation and Chiffonnier to efficiently manage and collect solid wastes from trash cans in their region using IOT based waste management system. It will provide dynamic service, which shows status of each trash can in that region and an efficient way to tackle fully filled trash can. In this smart dustbin, waste collection and segregation takes place. The hardware connection of the separator system is shown below in figure 2

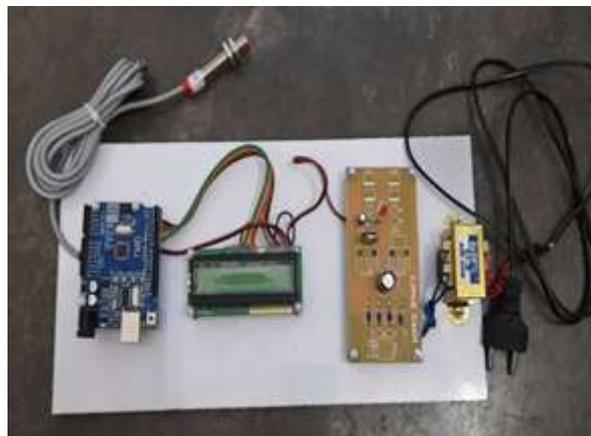


Figure 2: Hardware Setup Of The waste separator System

The proposed framework consists of conveyor motor drive which comprises a conveyor belt. As the waste is thrown in the belt and after some movement the assembly attached with the belt which comprises magnet, and a capacitive proximity sensor. While on

the movement of garbage waste the magnet which lies on the other side of the belt will attracts the metals and these are manually placed in the bin. While at the top of the conveyor belt were placed a capacitive proximity sensor which detects the presence of plastics. After the detection the belt moves further and stops. At the point the robot arm will remove the plastics and places it in the separate bin automatically and the remaining waste (**organic, papers...**etc.) are automatically drops down on the other bin.



Fig 3: Experimental result

After this process when the bins are filled as shown in the figure 3, Node MCU ESP8266 Wi-Fi module that is connected with the ultrasonic sensor is placed inside different bins which will detect the volume of the wastes inside the bin and sends the signals from different bins to the server by using IOT. Signals can be viewed in the form of percentage with the help of ubidots online application.

IV. CONCLUSION

The proposed method is a solution to the current waste management problem which will effectively separate metals, plastics and other waste. The Automated Material Segregation system (AMS) effectively employs magnetic material which is used to attract metal items like iron and capacitive proximity sensors to differentiate between plastic and glass waste and the other wastes such as organics, papers are automatically drops in its respective bin. This framework can be successfully conveyed in enterprises for material isolation, scrap shops and urban family units. From this project, the hope is stated and the aim of this project is by using this setup we can measure the accurate waste type efficiently. And as living beings are facing the problems of inefficiently disposing the waste and pollution, humans can minimize the wastage by optimizing the usage of waste in an opulent manner. The technology used in designing the development board and the sensors, then for the population of 1.252 billion of India, humans can save 2.504 billion gallons of wastage per day ideally.

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