

Automated Waste Segregating System

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ABSTRACT: The rapid growth in the population has also led to the surge in the volume of waste being generated on a daily basis. This increase in the generation of waste due to continuous growth in the urbanization and industrialization has become a severe problem for the local and the national government. It is also posing a serious problem for the local authorities to manage the wastes being dumped everywhere as landfill. To ensure the minimal risk to the environment and human health, it is necessary to take meticulous measures when segregating and transporting waste. Segregation of waste in a proper manner brings to the limelight actual economic value of the waste. The traditional method used for segregating of waste in India is through rag pickers which are time-consuming and can have adverse effects on the health of the people who are exposed to such wastes. Here we propose the use of an Auto Waste Segregator (AWS) which is cheap and also an easy to use solution for segregation of household waste. It is designed to segregate the waste into three categories viz. metallic, dry and wet waste. The system makes use of moisture sensor for the segregation of wet and dry waste and inductive proximity sensor for the detection of metallic waste and an LCD display for displaying the result of segregation.

KEYWORDS: Arduino UNO, Motor Driver, Metal Detector, Wet Detector, IR Sensor.

I. INTRODUCTION

Waste disposal is a huge cause for concern in the present world. The disposal method of a voluminous amount of generated waste has had an adverse effect on the environment. Unplanned open dumping at landfill sites made by municipal is a common method of disposal of waste. Human health, plant and animal life are affected due to this method.

The harmful method used for waste disposal generates harmful chemicals which contaminate surface and groundwater. It can give rise to disease vectors which spread harmful diseases. This also degrades the aesthetic value of natural environment can degrade the aesthetic value of the natural environment and it is an unavailing use of land resources. In India, rag pickers play an important role in the recycling of urban solid waste. Rag pickers and conservancy staff have higher morbidity due to infections of the skin, respiratory, gastrointestinal tract and multisystem allergic disorders, in addition to a high prevalence of bites of rodents, dogs and other vermin. Dependency on the rag-pickers can be diminished if segregation takes place at the source of municipal waste generation.

The economic value of the waste generated is not realized unless it is recycled completely. Several advancements in technology have also allowed the refuse to be processed into useful entities such as Waste to Energy, where the waste can be used to generate synthetic gas (syngas) made up of carbon monoxide and hydrogen. The gas is then burnt to produce electricity and steam; Waste to Fuel, where the waste can be utilized to generate biofuels.

When the waste is segregated into basic streams such as wet, dry and metallic, the waste has a higher potential of recovery and consequently recycled and reused. The wet waste fraction is often converted either into compost or

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methane-gas or both. Compost can replace demand for chemical fertilizers, and biogas can be used as a source of energy. The metallic waste could be reused or recycled.

Even though there are large-scale industrial waste segregators present, it is always much better to segregate the waste at the source itself. The benefits of doing so are that a higher quality of the material is retained for recycling which means that more value could be recovered from the waste. The occupational hazard for waste workers is reduced. Also, the segregated waste could be directly sent to the recycling and processing plant instead of sending it to the segregation plant than to the recycling plant.

II.METHODOLOGY

A. System Design

Once the input waste is placed on the conveyer belt, the conveyer belt starts moving and all the sensors are turned on and the sensing and segregation start. The metal sensor, the moisture sensor, the feedback sensors and the motor sensors that are used to get the segregators in place are given as input to Arduino UNO. The output is the final segregated wastes into different bins.

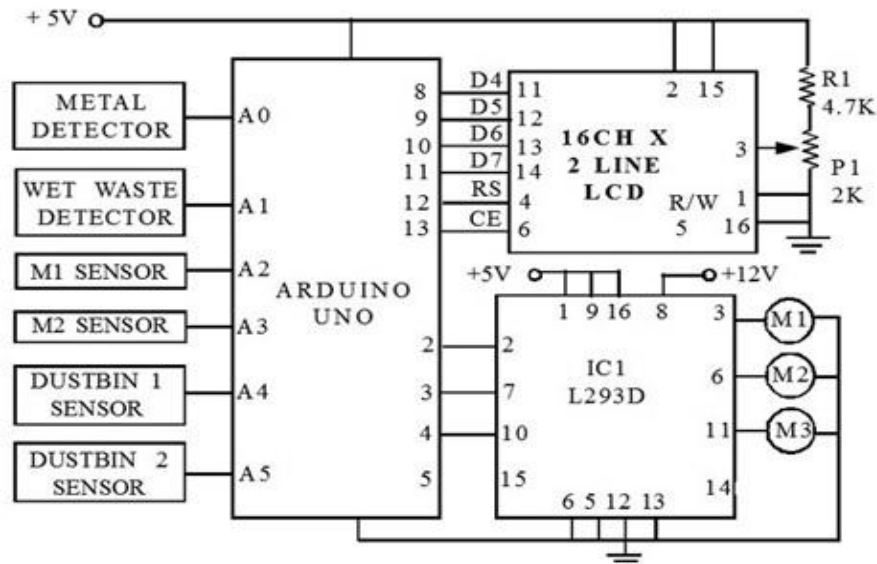


Fig. 1. Circuit Diagram

B. Flow Chart

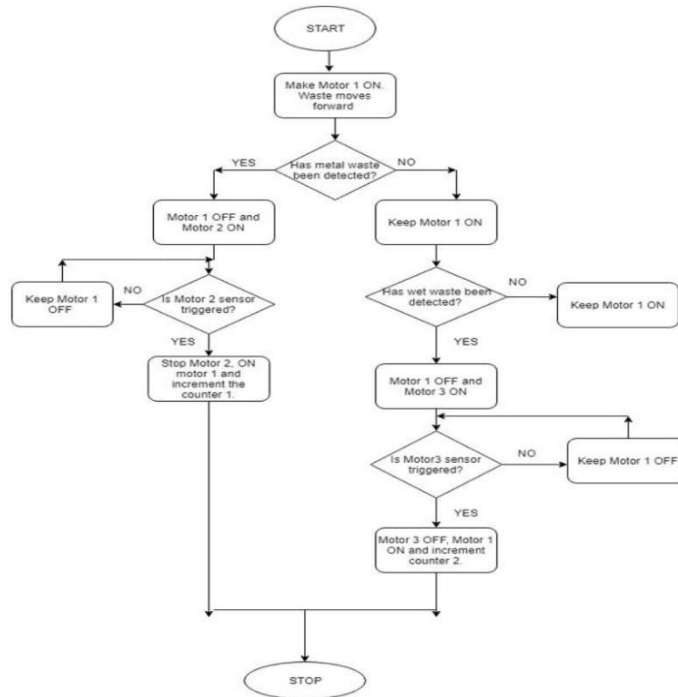


Fig. 2. .System Flow

- **Step-1:** When the waste enters the conveyer belt motor turns on and the conveyer belt starts moving.
- **Step-2:** The microcontroller, all the motors, and sensors are turned on.
- **Step-3:** The waste is sensed by the inductive proximity sensor to detect if it is a metal or no.
- **Step-4:** If the waste is metal waste then M1 is turned off and M2 is turned on and the waste is pushed into the metal waste bin. Also, the counter 1 is incremented (keeps a count of a number of metal waste dumped).
- **Step-5:** If not a metallic waste, M1 is kept on when it comes in contact with the moisture sensor that decides whether the waste is a wet waste or dry waste by checking the moisture content of the waste.
- **Step-6:** If the waste has some humidity it is detected as wet waste and M1 is turned off and M3 is turned on and the waste is pushed into the wet waste bin. Also, the counter 2 is incremented (keeps a count of a number of wet waste being dumped).
- **Step-7:** If not a wet waste M1 is kept on and then the waste is dropped into the dry waste bin placed at the end of the conveyer belt.
- **Step-8:** Finally the wastes are dropped into the respective bins and the segregation process is completed.

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III. EXPEREMENTAL RESULT

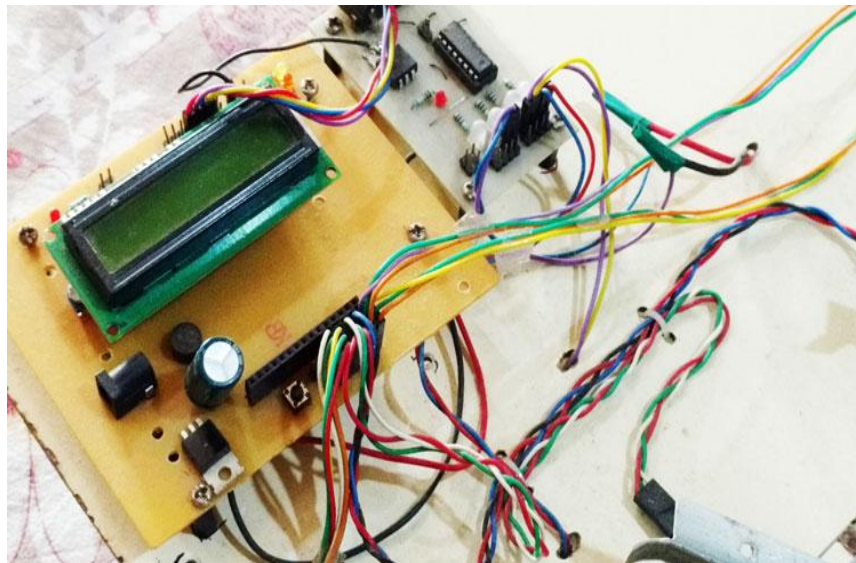


Fig. 4. Hands on Kit of Segregation System

This type of product can be used in housing societies, offices, etc. Since it is cost effective, it can be implemented on a large scale as well with some modifications. Using a robotic arm along with a conveyor belt will make the process of segregation easier. Also, more sensors can be used to segregate bio-degradable and non-bio-degradable waste, plastics, recyclable waste, e-waste, and medical waste.

IV. CONCLUSION

Implementation of this system at a local level like societies, educational institutes, etc. can reduce the burden on the local authorities. The automatic waste segregator is one small step towards building an efficient and economic waste collection system with a minimum amount of human intervention and also no hazard to human life. Using a conveyor belt makes the system far more accurate, cost-effective and also easier to install and use at a domestic level. Segregating all these wastes at a domestic level will also be time-saving. While implementing our system we came across many problems like the sensing range of inductive proximity sensor, the accuracy of the moisture sensor, adjusting the range of IR sensors and some more, but using some modifications we tried to make the system as reliable as possible but not completely perfect.

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