

Design And Fabrication of Plastic Segregation

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Abstract- Due to industrialization and urbanization the rapid rise in the volume and amount of waste and the disposal of it is becoming a huge problem that the world is facing today. One of the best ways out for this problem is to collect, sort and reuse or recycle this waste. This work proposes Segregation of Plastic machine which sorts waste materials into plastic and non-plastic using deep learning technique. Waste segregation process and techniques is applied on major materials such as paper, plastic, metal, and glass. The proposed design also consists of a prototype which acts as a real-time classifier. This system can reduce the human efforts by separating plastics from waste and also in keeping the environment clean.

Keywords- Environment, Waste, Segregation, Recycle, Learning, Plastic, Design.

I. INTRODUCTION

1.1 Introduction

Technological advancements are taking place day to day. Plastic Industries growth has been the key aspect of the development of any nation. With an increase in development, there is increase in the demand of plastic. This forces to increase of demand to produce plastic productivity in a limited time. A case study was done to get information about the problems due to this increase in demand. During the survey, it was observed that plastic production was common in most industries. Plastic waste is a major issue since approximately 10g of plastic is been wasted per day by per person. This accounts 25,940 tons per day. Hence, the idea of plastic segregation machine was established, to reduce plastic waste and reuse plastic, and keep environment neat and clean.

1.2 Project Background

It was observed that plastic production was common in most industries. The population of developing countries, especially from urban areas are more impacted by unsuitable managed waste, in comparison to those in the developed ones. In low income countries, over 80%-90% of waste is often disposed in uncontrolled dumps or openly burned, due to which toxic gases gets mixed with environment, this

consequences bad effect on health and environmental problems.

If we don't check the extent of plastic use immediately, then there is going to be destruction of the environment and the ecological balance in the very near future. The disposal and segregation of the waste need to be properly managed to minimize the risk of the health and the environment.

II. PROBLEM DEFINATION

2.1 Problem Statement

Plastic products have emerged as one of the most successful product worldwide in recent decades. Plastic can take from 450 to 1,000 years to decompose. Plastic waste is a major issue since approximately 10g of plastic is been wasted per day by per person. This accounts 25,940 tons per day.

2.2 Objectives

- To minimize the plastic waste and reuse it, and keep environment clean.
- The machines available in the market are quite costly. Therefore, an idea of making the machine cheap as well as resemble each machine.
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- To segregate the plastic waste from other non-plastic wastes easily.

III. METHODOLOGY

3.1 Proposed Methodology

In order to sort out wet wastes and dry wastes respectively, the main objective of this process is to segregate plastic from other types of mixed waste (non- plastic waste) more efficiently. In all the waste collected bins, we are placing three sensors which are capacitive, inductive and NIR moisture sensors to sense plastics, metals and wet wastes respectively in order to monitor the presence of other type of

waste collected in the bin, so it can be further segregated to have a proper segregation of wastes precisely, which provides accuracy to the system of waste segregation in case of any improper collection of wastes.

The processing element here is Arduino. The Arduino is coded based on our requirement for automatic control of the robotic arm. Inductive type sensor detects the presence of any metal in the proximity of its sensing face. If the object is metal then the sensing plate rotates towards the metal bin, else it goes for further detection processes. The capacitive sensor comes into action. It detects any material other than glass and plastic. If so, the sensing plate rotates towards the biodegradable bin and the material falls into it. If the object is glass or plastic then the sensing plate rotates towards the non-biodegradable bin and the material falls into it.

3.2 Proposed Solution

As above-mentioned problem faced in day-to-day life, we came up with the idea of **DESIGN AND FABRICATION OF PLASTIC SEGREGATION** system which will overcome plastic waste. This plastic can be reused for making different equipment such as chair, table, etc.

IV. FIGURES AND TABLES

4.1 Description of Parts and Components

4.1.1 Motor

The motor is used to rotate the shaft along with the bearing and conveyor belt.



Figure. 4.1 Motor

4.1.2 Inductive Proximity Sensor

An inductive proximity sensor belongs to the category of noncontact electronic proximity sensor. It is used

for detection and positioning of metal objects. The range of an inductive proximity sensor can depend upon the type of metal/material being detected.



Figure. 4.2 Inductive Proximity Sensor

4.1.3 Arduino Uno

Arduino Uno is a microcontroller board based on the ATmega328P. It has 6 analog input pins, 14 digital output pins, a 16 MHz quartz crystal, an ICSP header, reset button, a USB connection, and a power jack. This board is used as the main controller to send command to the sensors.



Fig. 4.3 Arduino Uno

4.1.4 Hopper

A hopper is used to collect waste material and to unload waste on belt conveyor slowly.



Fig. 4.4 Hopper

4.1.5 Motor Speed Controller

Motor speed controllers is a electronic devices that control motor speed. This sends a signal for the needed speed and drive a motor to that speed.

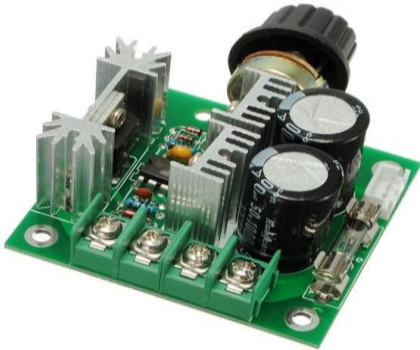


Fig. 4.5 Motor Speed Controller

4.1.6 Conveyor Belt

Conveyorbelt is used to carry material such as plastic, metal, non-metal. It will transport material from one end to another.



Fig. 4.6 Conveyor Belt

4.2 Material Procured

From the above survey and design concept we have the list of material required for the project.

| Sr. No | Components | Quantity |
|--------|-------------------------------------|----------|
| 1. | Motor | 1 |
| 2. | Inductive Proximity Sensor (PNP-NO) | 1 |
| 3. | Arduino Uno | 1 |
| 4. | Hopper | 1 |
| 5. | Motor Speed Controller | 1 |
| 6. | Conveyor Belt | 1 |

Table 4.1 Material Procured

4.3 Model

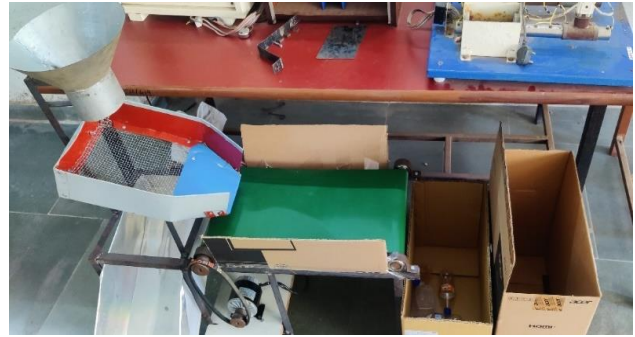


Fig. 4.7 Model

V. CONCLUSION

From the overall procedure of objective and problem statement for this project we did the literature review through which we got the information regarding the process like working, segregation process etc. This project will mainly focus on reuse of plastic and minimize the plastic waste. This machine is designed to effectively separate plastic materials automatically. The system can be further developed into a more effective one so as to segregate more precisely in situations which has more variations in the wastes. Through this system we can realize a compact and user friendly separation system for urban house hold, college and offices to streamline the waste management process.

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