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Design and Fabrication of Waste Management Bin

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Abstract: Since cities are becoming centre of attraction for the advancement of developing countries and without the removal or solution to the garbage problem these cities will not be that attractive.

The main objective of the smart bin is the segregation of waste at source so that the waste can be used to make interlocking bricks through moulding. The key issue of an inadequate waste management is that garbage bin at public places gets overflowed well in advance before the commencement of the next cleaning process. Hence, we need such a system which will minimize the problem to some extent. With the advancement in technology it is high time that we use the technology waste management system. The Design and fabrication of the smart bin is a singular solution to the specific and peculiar problem in waste management.

Keywords: Plastic, Polymer, Waste Management, Segregation, Reuse.

I. INTRODUCTION

The main goal of the project is to solve the problem of dumping of waste plastics. This waste can be in the form of wet and dry. Generally, a huge amount of these type of waste is generated from plastic industries and human's daily use. The quantity of waste generated and their potential impact depends on multifarious factors, hence we need such a system that can deracinate or at least minimize this problem to some extent with advanced technologies.

In this proposed system this design signifies the technique through which we can head toward a better future, the main aim of the project is to reduce the human effort and with the enhancement of smart city vision. These waste can be segregated in the form of wet and dry form with the help of customize soil moisture sensor and finally dry waste can be used in making interlocking bricks.

A. Mechanism Used

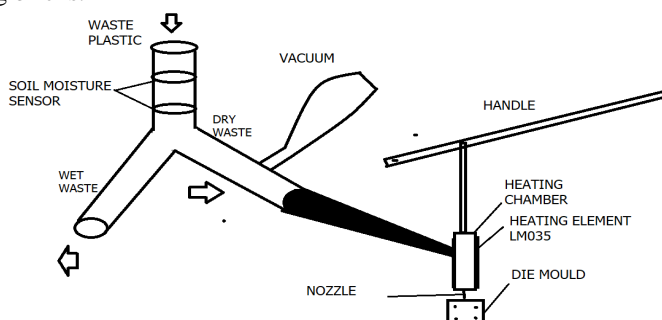
In Waste Management bin input waste is segregated into dry and waste form with the help of customized soil moisture sensor. Dry waste is passed to heating chamber with the help of vacuum suction. In Heating chamber heating element (LM035) is installed. Melted plastic waste is poured into die mold which is connected t heating chamber.

B. Working Principle

The opening of the bin contains two Soil Moisture sensors which sense weather the waste is wet or dry. These sensors are typically designed to sense the moisture content of the input waste. The sensor consists of Copper wire wounded on a wooden plank.

If the waste is wet conduction between the wires take place as the current increases collector emitter voltage changes which is being sensed by the comparator. Comparator is the which compare two voltages i.e. one is reference voltage and another is input voltage. The reference voltage is set to zero as the voltage increases above zero comparator sense the change and a signal is sent to microcontroller to move the servomotor 90° in anticlockwise direction. This waste is then transferred to the bin.

Now, if the waste is solid i.e. it don't contain any moisture it will be sensed by the microcontroller and the servomotors will shift 90° clockwise direction. And the waste will go in the heating chamber the plastic is melt using the electrode plates the molten plastic is then poured out in the form of interlocking bricks.



II. COMPONENT USED

- A. Three side opened bin
- B. Soil moisture sensor
- C. Arduino uno
- D. Comparator
- E. LCD Display
- F. Vacuum
- G. Heating Element
- H. Nozzle
- I. Die Mould

III. SELECTION OF MATERIAL

In the context of product design, the main goal of material selection is to minimize cost while meeting product performance goals. Systematic selection of the best material (Table 1) for a given application begins with properties and costs of candidate materials.

Table 1 Material Selection

Parts	Material Used
Bin	Plastic
Handle	Aluminum
Heating Chamber	Aluminum
Die Mold	Aluminum
Base	Wood

IV. PROCESS INVOLVE IN FABRICATION

- 1) *Design of Bin:* In this project worked is done upon segregation. After segregation waste is divided into wet and dry form due to which three opened bin is used. This project is a prototype so bin is of plastic but for industrial purpose it can aluminum, iron etc.
- 2) *Handle:* For pouring the material from heating chamber to die mold a handle has been used. This handle presses the material from heating chamber to die mold. This handle is of aluminum but for high pressure it can be iron, mild steel etc.
- 3) *Heating Chamber:* For melting the material a heating chamber has been used, Which is of aluminum. Six heating element(LM035) have been used for heating purpose.



- 4) *Die Mold*: Die has been used for converting the material into interlocking brick. It is of aluminum for no sticking of material.



V. ADVANTAGE

- A. The device is able to keep the environment clean and fresh.
- B. Waste management if done in proper manner not only eliminates the surrounding waste but also will reduce the intensity of the greenhouse gases like methane, carbon monoxide which is emitted by waste accumulated.
- C. Waste management earns you a few extra bucks every month.
- D. Right from the collection to the final step of segregation, every phase needs manpower and ultimately a large number of employment opportunities get opened up.
- E. Optimization to reduce cost and environmental impact and enhance social acceptability.

VI. RESULT

- A. In Waste management bin solid waste plastic is used, after segregation which is converted into interlocking brick with the help of heating element LM035.
- B. This interlocking brick which is in hexagonal shape having higher strength and durability.



VII. FUTURE PROSPECTS

- A. The expected output of our project is helpful for reducing the plastic wastes which cannot be dumped and it causes the several types of pollution in the environment such as soil pollution due to which the nitrogen fixing bacteria cannot make the soil fertile as plastic waste blocks the flow of air into the soil further plastic waste cause the water pollution also as many of the plastic waste is dumped into the rivers, lakes and oceans which harms animals living there and thus also pollute the drinking water.
- B. Thus this project helps reduce the plastic waste and thus in output we are making the interlocking bricks which will help to vanish the plastic waste from our country and thus help the environment to be clean as burning of plastic waste releases many gases such as NO_2 , SO_2 , CO_2 etc. These are the greenhouse gases which contributes to the Global warming and results in the rising of the normal temperature of the earth.

VIII. CONCLUSIONS

Plastics are the integral part of the society due to its extreme versatility and durability, light weight, excellent thermal and electrical insulations, chemical resistance, and safety in regards to its competing materials. However, coupled with all these properties and its relative inexpensiveness have made these plastics much more prone to easy disposal and, therefore, causing concern for environmental safeguard. When plastic products are used and discarded, these plastics and additives are undesirable from an environmental view point. Traditional plastics are not biodegradable and are extremely difficult components for landfilling for its volume and any future possibilities of groundwater and soil contaminations.

Therefore, instead of focusing on and comparing individual options, attempt should be made to integrate waste management systems in such a way that it can deal with the whole waste stream, and then compare their overall performances in environmental and economic terms.

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