SENSOR BASED SMART DUSTBIN FOR WASTE SEGREGATION AND STATUS ALERT

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ABSTRACT

Technology always help mankind in making life easier. Now presenting an innovative way which revolutionize the trash management system through this we are taking a step towards clean India. Present scenario in the public places where proper disposal is not being done because of which we come across overflow dustbins. Even the private areas which are clean enough failed to utilize the resources efficiently. To properly manage the waste it has to be handled, segregated, transported and disposed so as to reduce the risks to the public lives and sustainable environmental There is a rapid increase in capacity and categories of solid waste as a result of urbanization, constant economic growth, and industrialization. Global Waste Management Market reported that the amount of waste generated worldwide produced is 2.02 billion tones. This method is easy and simple solution of segregation of three types of wastes dry, metal and wet. It is designed to sort the trash into metallic waste, wet waste and dry waste ready to be processed separately for the next process of operation for this. Using Embedded technology to continuous monitoring the dustbin in order to check whether dustbin is full or not. Wireless sensors sense the amount of waste in the containers if it reached the maximum container capacity, sends instant messages to the trash management department which deploy them to collect the garbage in no time. By implementing this product at different location, instead of driving blindly on the static routes, we can optimize the collection schedule.

Keyword: - *Waste segregation, Smart dustbin, Sensor alert.*

1. INTRODUCTION

The generation and disposal of waste in large quantities has created a greater concern over time for the world which is adversely affecting the human lives and environmental conditions. [1]. Wastes are the one which grows with the growth of the country. Segregation of waste is important for proper disposal of vast amount of garbage modern society produces in an environmentally sensible mode. People became adapted to tossing things away and never realize the consequences of their action. The common method of disposal of the industrial waste is by uncontrolled and unplanned, and exposed dumping at the river sites and open areas. This method is injurious to plants, human health and animal life.

This liquid leachate generated because of improper disposal and mixed waste contaminates land, water at surface and ground that becomes source of harmful diseases and degrades value of environment and other resources of nature. [2:4]. The waste becomes valuable if it is segregated and recycled the recent advancements in technology [3] has also made waste to become useful entity with conversion of waste to different forms and harness energy such as Waste to Energy, in this conversion method the waste can be employed to generate synthetic gas (syngas) made up of carbon monoxide and hydrogen. The gas after burning can be used to produce steam and electricity; Waste to Fuel, for generation of bio fuels.

When the waste is segregated into basic streams. 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 [3]. 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 then to the recycling plant. Currently there is no system of segregation of dry, wet and metallic wastes at an industry. J.S. Bajaj [4] has suggested that a least cost, most appropriate technological option for safe management should be developed. 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.

1.1 Technical Background

The mixed waste is sorted based on the conventional methods at the industrial level [5]. Normally most of the unused and waste materials are found to be metal, wet, dry etc. These materials can be recycled for further use. The first step towards recycling is the segregation of waste [11, 12]. The primary aim of objective of proposed work is to segregate materials [14] such as metals, wet, and dry [15]. Here two sensors are used namely inductive proximity sensor and moisture sensor. For level detection infrared sensors are used to indicate the bins are full.
The three materials found mostly in waste are Metal, Dry (Plastic) and Wet [16]. These are the materials that can be recycled and the first step towards recycling is segregation. There are numerous benefits of recycling the waste materials. Scrap shops play a vital role in maintenance of waste that is generated. Scrap consists of recyclable materials that are byproducts from product consumption and manufacturing, such as parts of vehicles, building supplies, and surplus materials. Scrap has economic value, particularly recovered metals, and non-metallic materials are also recovered for recycling. Recycling of scrap materials is the key for effective waste management and it's economical too. The methodology adopted in this paper to resolve the issue of waste segregation is by making the entire process automated and to the reduce cost such that it could be adapted in a scrap industry.

1.2 Proposed Solution

Waste is pushed onto conveyer belt, the presence of waste is first identified by use of Infra-red sensor at start end of the conveyor belt, the waste moves further for detection with inductive sensor to detect it is metal. If it is detected metal, electromagnet rotates to in a direction to collect the metallic waste. Then demagnetization takes place and waste is dropped into dustbin. Further conveyer is moved and the dry waste is blown out using air blower. Here light particles like plastic, paper, etc. gets segregated. Conveyer belt moves further, now the moisture sensor detects the wet waste and it is dropped into another dustbin.

2. DESIGN AND IMPLEMENTATION

The Block diagram shows the different component used in the Smart Dustbin System is Power Supply, IR Sensor, Metal Sensor and Moisture Sensor. IR Sensor is connected in dustbin, it is used to detect the level of dustbin where dustbin is full or empty. With the Help of Sensors, the system can segregate the waste collected in collection point. In turn Controller initiates the arm to collect the waste and segregate accordingly.

Three Separate storage based dustbin is designed for automatic waste collection and segregation. As soon as the IR sensor senses that garbage container reached its maximum capacity the message is sent through GSM module to the trash management personnel that trash box is filled completely, so that they schedule the trash collection based on this information.

The sensor senses the content of the dustbin and sends the signals or the data to the ARM microcontroller then the microcontroller reads the data from the sensor and process the data received from sensor, and the same data will be sent to Dashboard section and this section send mail/message to respective Municipal / Government authority person or collection vehicle.

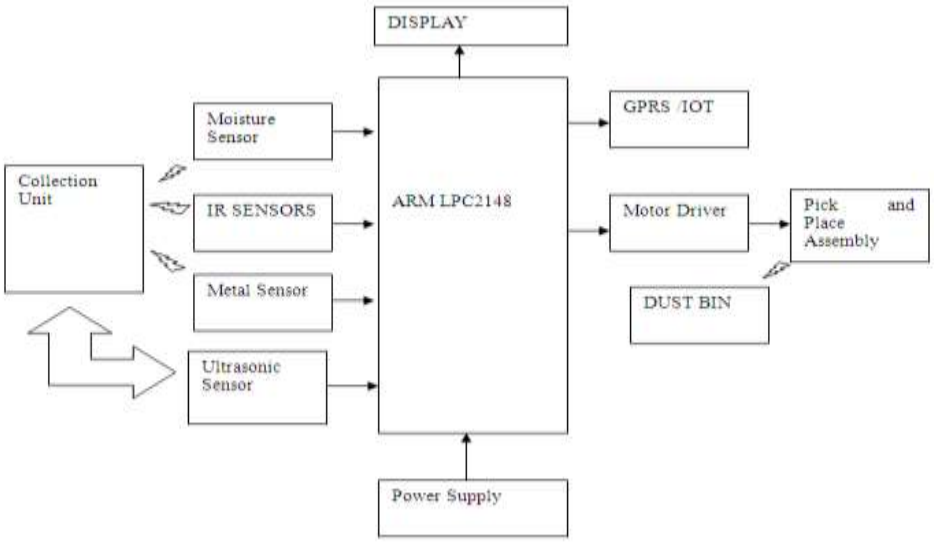

Fig -1: Block Diagram.

2.1 Results

The reading for results are determined and object for metal, dry, wet detected on conveyor is shown in Table 1. The experiment is carried out for small volume of the waste objects, and a minimum quantity of one object each for waste objects (wet, dry and metal) materials like key paper, nuts, plastic covers in small pieces, vegetable waste, etc. were used for the experiment.

The proposed system is tested with diverse materials each category has been considered with acceptance and rejection rate of the proposed system. Table 2 details the results of different category of results with true, false acceptance and rejection rate. The Fig.3 shows the detection of metals with 90% true acceptance and 10% false rejection of metal type materials. The detection of wet waste as shown in Fig.4 with 93% true acceptance and 5% false rejection and 2% true rejection.

Table -1: Detection Status

Test	Materials	Detected	Not detected
1	Metal waste	Yes	
2	Wet waste	Yes	

Table -2: Results of tests

Materials Tested	True Acceptance	True Rejection	False Acceptance	False Rejection
Metal	90			10
Wet	93	2		5

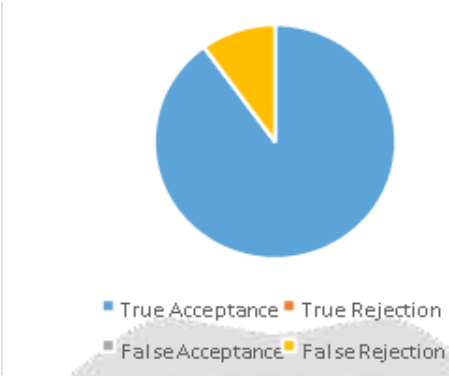

Fig -2: Results for Metal detection 90% true acceptance

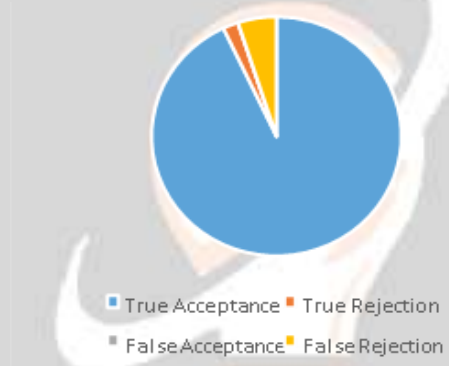

Fig -3: Results for Wet detection 93% true acceptance

3. IMPACT OF WASTE MANAGEMENT ON ELECTRICITY AND ENVIRONMENT

Chart-1 shows the environmental impact due to open burning of garbage. The Particulate Matter less than 10 micron (PM10) readings from Indian metros like Delhi, Kanpur and Pune are shown below.

The Chart-2 shows the year wise average garbage generation across India.

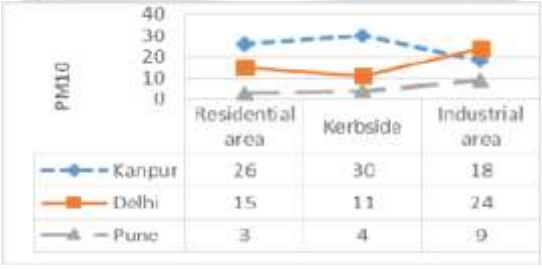

Chart -1: Air Pollution Index Due To Garbage Burning

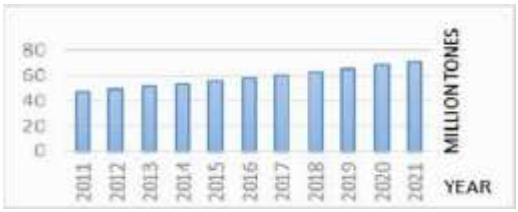

Chart -2: Waste generation in India

4. CONCLUSION

The proposed method is an efficient solution to the current waste management problem which effectively segregates metal, dry and wet waste. This system can be effectively deployed in industrial material segregation, scrap shops etc. The Sensor Based Smart Dustbin (SBSD) effectively employs moisture sensors to segregate. Our proposed work aims at segregation of waste materials in particular metal, wet and dry waste. It is the first step towards recycling. Recycling the waste materials has a huge impact on the economic condition of the country since recycling of plastic can reduce the manufacture of plastic using renewable resources and it also has an immense effect on the environment by effectively managing the solid waste. However, many up gradations can be done to our existing project. Some of which are listed below.

• Advanced processing techniques can be incorporated once the waste has been segregated.
• Methods for individual material feeding for local use so that the segregation can be per-formed continuously once the waste is dumped.
• Image sensing can be used to segregate materials through Image processing technology.

5. ACKNOWLEDGEMENT

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