



# Smart Garbage Segregation & Handling System Using IoT

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**Abstract:** Nowadays, population is increasing with increase in waste generation. Waste generated in India is in the range of 200-870 grams per day and its rate is rising by about 1.3% per capita per year in India. People throw the waste around the garbage bins, the bins are getting over loaded with trash. Some of the materials present in wastes have markets, so it is expedient to take them out of waste for reuse and recycling. This is possible only if waste is segregated. Developing a mechanized system to help save the lives of many and making the world a cleaner It is designed to sort the waste into biodegradable and non-biodegradable waste, thereby making waste management more effective. Thus, aim of our project is to make a municipal waste management system useful at domestic level.

**Keywords:** IoT, Handling system, waste management, plastic segregation, waste segregation system, metal waste segregation, IoT based system, GPS, GSM, etc.

## I. INTRODUCTION

In recent times, garbage disposal has become a huge cause for concern in the world. A large amount of waste that is generated is disposed by means which have a bad effect on the environment. The common method of disposal of the waste is by unplanned and uncontrolled open dumping at the landfill sites. This method is injurious to human health, plant and animal life. This harmful method of waste disposal can generate liquid leachate which contaminate surface and ground waters can harbor disease vectors which spread harmful diseases and can degrade 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.

Dependency on the rag-pickers can be decrease if segregation takes place at the source of municipal waste generation. When the waste is segregated into basic streams such as wet, dry, plastic and metallic, the waste has a higher potential of recovery, recycled and reused. The wet waste part is often converted into methane-gas. The metallic waste could be reused or recycled. The benefits of doing so are that a higher quality of the material is taken for recycling which means that more value could be recovered from the waste. The segregated waste could be directly sent to the recycling plant. We are implementing a smart system which is a cheap, easy to use solution for a segregation system at households.

## II. LITERATURE REVIEW

Several Studies had been done to separate the dry and wet waste but it doesn't separate metallic, paper, glass, etc. Surveys has been done to separate waste.

The Smart Bin allows us to well and cleanly set of the waste.[1] The automatic door opening system confirms that garbage disposal by the humans is completely handsfree and therefore very hygienic since there is no contact with the bin. Waste thrown away is sorted according to its capacitance. Wet waste has pointedly larger capacitance than dry waste and plastic and hence, it is easily unique. Plastic has different reflective properties than other dry waste and therefore infrared spectroscopy is the most suitable method to distinguish plastic from other dry waste.

This paper mainly focused on home automation system (can be used in malls, other public places, etc.) and this can be done in large scale in future.[2] Compared to the existing systems our system has some extra benefits. The wastes are segregated into their category so that it is easy to dispose according to the type of the waste. And the waste details are directly sent to cloud database in real time. Thus, the Smart Garbage Segregation & Management System will be helpful for the garbage disposal by segregating it according to its type thus contributing in a green means to the society and to our environment.

The main objective behind this project is to maintain a clean and hygienic environment.[3] The Smart-Bin proposed by us can effectively handle the problem of waste disposal, which is a major problem in many developing countries. Our system ensures that wastes cannot collect in the bins, by notifying the required staffs when the bin in filled. Our Smart-Bin also segregates the wastes very capably so that prompt and proper disposal methods can be undertaken. In the future, a number of these bins can be connected to the same web server to

properly study the waste generation patterns. Private staffs can be hired to monitor the wastes in the bins to prevent individuals looking to dispose different horrible items in the bins.

The fullness of bins is monitored through the use of sensors, making it possible to achieve a more effective system than the existing one.[4] Our proposed method thinks mainly on monitoring the process of waste management and providing a shortest path thereby avoiding human interference, human time and effort being conserved which results in healthy and clean environment. For smart cities where the people are busy with their chaotic schedule and wouldn't have enough time for managing waste the proposed idea. The main purpose of this system is to control gas emission and waste overflow in the garbage cans. This project is implemented and simulated by using NS2 simulator and Arduino UNO developer board.

**III. EXISTING SYSEM**

Waste management systems here are mostly monitoring systems rather than managing system. It only detects the presence of waste and the level of waste in the garbage bins. Once detected, the details are sent to the authorities using GSM which is a slow communication compared to the existing ones. Separation is only done for dry and wet waste also it is not automatic; it has to be done manually.

**IV. PROPOSED SYSTEM**

This paper proposes IoT based waste segregation and also sensor system will detect the level of waste substances in it and the message will be sent to the municipality office.

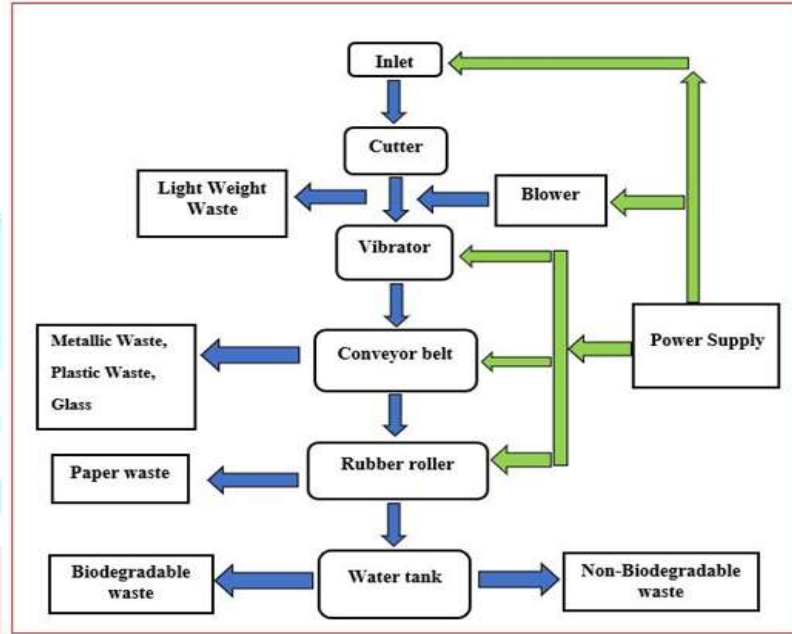


Fig 1. Block Diagram

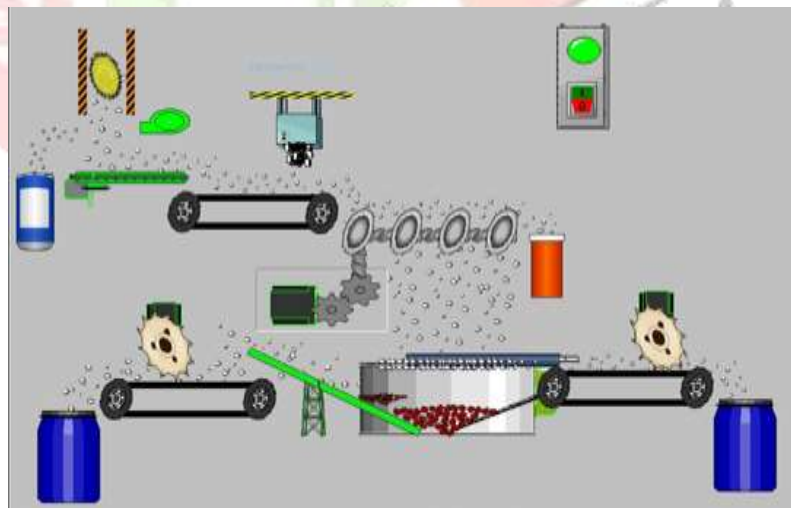


Fig 2. Hardware design

#### 4.1 Arduino

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller.



Fig 3. Arduino UNO

#### 4.2 GSM modem

Global System for Mobile Communications (GSM) modems are special type of modems that operate over subscription based wireless networks, similar to a mobile phone. A GSM modem accepts a Subscriber Identity Module (SIM) card, and basically acts like a mobile phone for a computer. Such a modem can even be a dedicated mobile phone that the computer uses for GSM network capabilities.



Fig 4. GSM Modem

#### 4.3 LCD Display

The Liquid Crystal library enables you to control LCD shows that are good with microcontrollers. It is 16x2 LCD display and an electronic component which is essential and is used in circuits and unique devices.

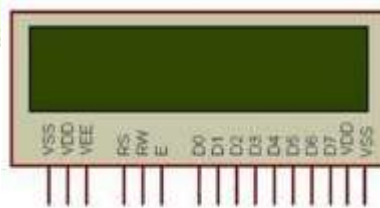


Fig 5. LCD Display

#### 4.4 GPS module

The Global Positioning System (GPS), is a satellite-based radio navigation system owned by the United States government and operated by the United States Space Force. It is one of the global navigation satellite systems (GNSS) that provides geolocation and time information to a GPS receiver anywhere on or near the earth where there is an open line of sight to four or more GPS satellites. Obstacles such as mountains and buildings block the relatively weak GPS signals.



Fig 6. GPS Module

## V. CONCLUSION

This paper mainly concentrated on large scale. Compared to the existing systems our system has some additional benefits. In existing systems, the wastes are only monitored and separates metallic and non-metallic wastes, wet and dry wastes but our system monitors the wastes and also segregates the monitored waste as metals, degradable and non-degradable wastes. The wastes are segregated into their category so that it is easy to dispose according to the type of the waste. And the waste details are directly sent to cloud database in real time. Thus, the Smart Garbage Segregation & Handling System will be helpful for the garbage disposal by segregating it according to its type thus contributing in a green means to the society and to our environment.

## REFERENCES

- [1] Wesley Pereira, Saurabh Parulekar, Sopan Phaltankar, Vijaya Kamble, "Smart Bin (Waste Segregation and Optimisation)", 2019 IEEE Amity International Conference on Artificial Intelligence (AICAI)
- [2] Shamin.N, P.Mohamed Fathimal, Raghavendran.R, Kamalesh Prakash, "Smart Garbage Segregation & Management System Using Internet of Things(IoT) & Machine Learning(ML)", 2019 IEEE 1st International Conference on Innovations in Information and Communication Technology (ICICT)
- [3] Souptik Paul, Kolkata Sayan Banerjee, Srutayu Biswas, "Smart Garbage Monitoring Using IoT", 2018 IEEE 9th Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON)
- [4] Amirthaa Sri K S, Anusha M, Kaveinaya M, Kaveeyavani R S, Abinaya M, Indirapriyadharshini, "Smart Garbage Maintenance System Using Internet of Things", 2018 3rd International Conference on Communication and Electronics Systems (ICCES)