# Smart Trash Segregator Dustbin Monitoring System

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*Abstract*—**Nowadays all types of garbages are dumped into the dustbin at the buildings. Hence it is difficult segregate it and time consuming task at destination level. To avoid all such situations. We are going to implement a project where segregation of wet and dry wastes made at source level and afterwards signal is sent to the Municipal Corporation. So that segregation of these wastes at destination level can be completely avoid. The main sources of wastes are industrial and domestic wastes. This project is mainly concentrates on domestic wastes whose value is unrecognized since people don't spend time on segregating waste into their basic streams. *I*nstead of sending them to industries first for segregation ,waste can be sent directly for recycling if waste is separated at household level . For monitoring waste collection process IR sensor have been used. In all the garbage bins the sensor will be placed. When the sensor detects it means garbage reaches the level of the sensor, then the indication will be given to a Arduino UNO.Information will be sent to the Municipal Corporation Using Wemos board .**

*Keywords - Arduino UNO, IR Sensor, Moisture Sensor, Servo Motor, Conveyor Belt, Open-Close Mechanism.*

## I. INTRODUCTION

Though the world is in a stage of making things better, there is still problem that is to be dealt with Garbages . Pictures of overflowing dustbins with garbages and the garbage being spilled out from the bins can be seen all around. As large number of insects and mosquitoes breed on it ,this leads to various diseases. Currently the waste gathering is conventional which acquire a lot of labors and is time overwhelming process. The "Kasa Muktha" ward program was started by BBMO for wide opportunity in learning and communication to extend the knowledge about waste segregation from the starting place ."Swachh Bharat Abhiyan" was initiated to ensure a clean environment. Amounts of waste are mainly determined by two factors: firstly,the population which is in any given area, and second, consumption patterns of the area. Dustbin is a basic need everywhere and also a common means. It has been seen that the garbage get collected often due to irregular removal of garbage that is present in the dustbin. Currently the waste gathering is conventional which acquire a lot of labors and is time overwhelming process

The Proposed system can solves three of those related problems.

- ➢ Efficient access to the garbage disposing points (public dustbin)
- ➢ Efficient in terms of time and fuel cost.
- ➢ Provide data collection on how much a city generates garbage and accordingly plan disposing process.

## II. OBJECTIVES

Our Project mainly deals with the most current topic i.e. Waste Segregation An efficient way of management needs to be provided for better place to live in. This project concentrate with the minimization of manual labour method utilization for exclusion of waste into an automated manner.

This style which is automation of manual work not only saves the manual segregators of the numerous health issues, but also it is prove to bean economical to the nation. This proposed system when installed in apartments

or small colonies, it proves to be beneficial in segregating the waste at the site of disposal itself. This is the objective of our project.

## III . RELATED WORK

**M.K Pushpa** proposed that the waste segregator as the name indicate,the waste is segregate into three major types: dry, wet, metallic. A permanent magnets is also placed inside the bin further segregate ferrous and non-ferrous metals.[3]
But in our project we segregated into dry and wet waste by using moisture sensors which is fitted on both side of the conveyor belt. Movement of wastes is detected by a motion sensor which is called PIR. The signal from the motion sensor initiates the push mechanism so that system will be atomatically on. Arduino microcontroller controlled the timing and movement of the conveyor belt.This helps Continuous and unnecessary action of any particular section is thus avoided.

**Nikitha Rao** proposed that, implementation is done only for a single bin. Instead of using many bins in congested fashion around the city, minimal number of smart bins can be used. Using only one sensor at the surface level instead of three not only makes it affordable but also achieves the same result. [4]

But in our project in addition with that integration of many bins each bins with a unique ID can be done by creating database for each bin which can be maintained by using SQL technology.

**Ruveena Singh** proposed that to design and develop a sorting system is the main goal of the system that sorts the waste automatically. The smart waste segregating system sorts the waste into biodegradable and non- biodegradable. The system starts when the waste material is present only, then the sensor transmits the signal and that signal is received by the microcontroller ans start the motor . If the metal detector detected signal then it is transmitted to the microcontroller and then the microcontroller make lid tilts towards the non- biodegradable waste bin. If the IR sensor detected signal then the lid tilts towards the bin which collect biodegradable. In case if no signal is transmitted by either sensor then the waste may be plastic bottle, glass bottle or poly bag, and then the lid tilts towards the bin which collects the non-biodegradable waste. Another IR sensor is attach in front of bin which detects that a person is arrived to throw the waste and this alerts the system. And in this way the waste is segregated. [5]

In our project Waste areto be sorted at the basic level first so that it is helpful to dump it properly and recyclables can be recycled. This system can be made more efficient by using different sensors for different kinds of waste. As per demand of user, more bins can be added in this project. And also some more efficient sensors can be used which can detect the waste in some packing, opaque plastic or poly bags.

**A Vanitha** proposed that the present day it has been seen that the dustbin is overflown with garbage,so the proposed system will help to avoid the overflow of dustbin. This system will give the real time information about the status of the dustbin. It will send the notification immediately when the dustbin is full. But in the proposed system it can be implemented with the time stamp in which the real clock is used to display to the person at what time the dustbin is full and when the truck driver have collected the waste from the dustbin [7].

**S Vinod Kumar** proposed that, with the help of Ultrasonic sensor, the level of waste in the dustbins is detected. To measure the weight of the dust bin force sensor is used. When the value which is measured by sensors exceeds a certain threshold value then red led becomes ON and this information with GPS location where the dust bin is located is sent to android device through GSM system. By comparing coordinates and updates the location it is inform to the respective vehicle to collect the waste. Android device will detects in which area dustbin is located. Microcontroller is used to attach the sensor system with GSM system. This will help in managing the garbage collection efficiently.[9]
But in our proposed system one bins can be placed to collect wet and dry waste separately by putting aseperation wall in between. Liquid waste will be collected on liquid waste bin directly. one bins with seperation wall can be placed to collect dry and wet waste separately and also collecting the liquid wastes at another dustbin. We have thus come up with an Automatic waste segregator that categorizes wet and dry waste.
An Arduino board forms the main part of the system. If any liquid waste is there it will directly falls onto the liquid waste dustbin. Wet and dry waste can be distinguished by using moisture sensor. It then falls off as the belt rotates and is collected later. In this proposedsystem we are using monitoring system also which will helps to monitor the waste collection process. Where we will be monitoring the garbage based on the data we receive from the hardware part. Here in monitoring we will be checking the level of garbage in the bins, getting the location of the garbage bin placed in the locality and also sending a notification to the local garbage stating the overflowing of the garbage bin along with its location. This cost effective proposed system is particularly suitable for installation in apartments and colonies.
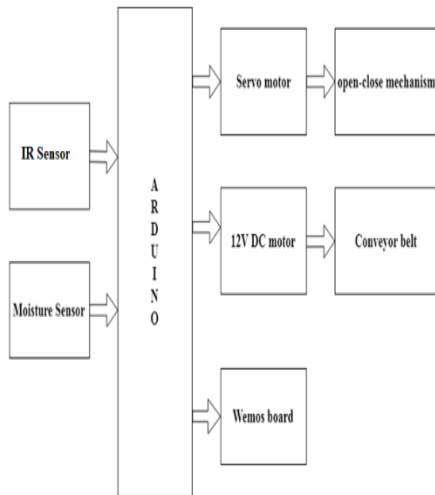
## IV. PROPOSED WORK

### A. System Design



Fig 1: Architectural Diagram of Smart Trash Segregator Dustbin

The above mentioned figure, it shows a microcontroller based Automatic trash segregator dustbin model implementation along with the help of different modules.

A simple Arduino UNO forms the heart of the system. It controls the working and timing of all the sub sections so as to sort the waste into dry and wet waste.

1. Mechanism of open close
2. PIR Motion Sensor
3. Conveyor Belt Mechanism
4. Wemos Board

### Mechanism of open close

The open close mechanism acts as a regulator to control the waste that falls on the respective bins. A 12V servomotor receives inputs from microcontroller to monitor which lid should be opened. This mechanism is initiated only if the IR sensor detects a waste in its vicinity.

### PIR Motion Sensor

The PIR motion sensor is mainly choosen for dection of movement of things. PIR (Passive Infrared) Basically, measures infrared light from objects in its field of view. **It** can detect motion based on changes in infrared light present in the environment. It is meant to detect if a human has moved in or out of the sensor range.

### Conveyor Belt Mechanism

A 12V DC servomotor is used to move the belt. This torque motor derives the necessary 12V and 2A current from an AC to DC converter. Between the converter and motor the relay makes and breaks the circuit to start and stop it respectively.

### WEMOS BOARD

It is a WiFi based board using a string variable can get location of bins and can send the message to the Municipal Corporation using the internet.

### B. Data flow diagram:

The main goal of the proposed system is to design and develop a segregating system that segregates wet and dry waste automatically. The proposed system working is explained with the help of flow chart .
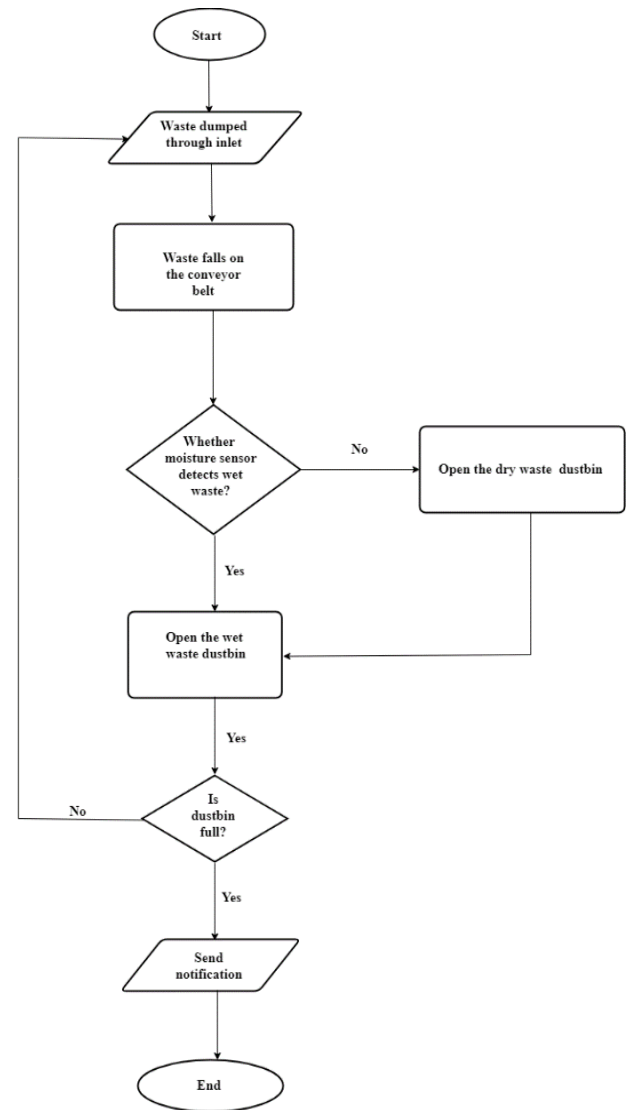


fig 2: flow chat

## V. EXISTING SYSTEM

In the existing system there is no indication of the dustbin overflow status. It is time consuming task and also it is less effective. since the truck will go and clean even if the dustbin is full or empty, It leads to the wastage of time. In this proposed system the level of the dustbin will not be known.

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solid waste can be separated using various techniques like Trommel separators,Inductor sorting,Eddy current separators ,Near infrared sensors,X-ray technology, and Manual sorting. In Trommel separators, Physical size segregation is achieved as the feed material spirals down the rotating drum, where the smaller material than the screen apertures passes through the screen, where the oversized material exits at the other end of the drum .In Eddy current separator  it uses a powerful magnetic field to separate non-ferrous metals from waste after removing all ferrous metals previously. In some cases, metallic components e.g. stainless steel and composite materials, cannot be sorted using magnetic separation and non-ferrous metal sorting processes. So this type of sorting is done by induction sorting system which is the solution to the previous problem. They mostly reflect light in the near infrared wavelength spectrum in Near Infrared Sensors When materials are illuminated. Based on their density, X-rays can be used to distinguish between different types of waste. In Manual Segregation The municipal waste is separated into plastic, paper, metallic, etc. manually.

## VI. CONCLUSIONS AND FUTURE WORKS

- Due to rise in urbanization the waste is increasing very fast. Therefore waste management is the important need to protect the environment.

- The technological growth and innovation can contribute to this important aspect to achieve environmental sustainability.

- Waste need to be sorted at the basic level first so that it is helpful for Municipal Corporation to dump it properly and further can be recycled.

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