SENSOR BASED WASTE SEGREGATIONS

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Abstract—***In recent year's collection and segregation of waste is the major challenge faced by all metropolitan cities worldwide; this is due to the rapid increase in population, industrialization and urbanization. There is lack of knowledge about segregation of waste at the domestic level. The major problems faced due to improper waste management include health hazards to human kind, environmental issues etc. The main objective of this paper is effective and efficient methods of waste collection and segregation at domestic level based on their nature of composition i.e. metal, plastic and organic, the waste is stored accordingly in their respective segments of the dustbin. Picking up garbage from the public areas such as on street corners, in parks or on campuses consumes more resources because workers have to drive their large vehicles to every garbage collection point to check if bin is full or not. The use of sensor integrated waste segregations saves a lot of fuel and work hours. In this paper, an approach linking the basic electronic sensors to garbage collectors will be resulting in saving the fuel, work hours and money. In this approach, sensors are placed in the rotating conveyor belts and bins located at public areas, to detect the types of waste and to sense the level of the garbage in the bin. When garbage reaches the threshold limit, the status of the bin is updated in the cloud, and this status can be accessed by the concerned authorities and an immediate measure can be taken for the cost-effective disposal. So, continuous monitoring of garbage bins will helps to keep environment clean and safe.***

Keywords— segregation, Arduino, proximity sensor, Conveyor belt

I.INTRODUCTION

The rising population of India poses serious threats with regard to the availability of living space, utilization of natural resources and raw materials, education and employment. But another serious peril that follows is the escalating amount of waste generated each minute by an individual. Every city is grappling with the menace of ever increasing waste. An astounding 0.1 million tons of waste is generated each day in our country. Sadly, only 5% of this colossal amount of waste is recycled. In India, the collection, transportation and disposal of wastes are unscientific and chaotic. A trend of significant increase in municipal solid waste generation has been recorded worldwide. This has been found due to over population growth rate, industrialization, urbanization and economic growth which have ultimately resulted in increased solid waste generation. Final destination of solid waste in India is disposal. Most urban solid waste in Indian cities and towns is land filled and dumped. By 2025, the waste management market size in India is projected to be worth around USD 14 Billion with an annual growth hovering around 7 percent. In fact, it is projected to hover around 80-85 MTs by 2030, offering a business case of approximately USD 20 Billion. Growing economy, soaring urban population, rising living standards and increasing consumption levels is what trending in the emerging economies across the globe. With India flourishing on the same grounds, an increase in the purchasing power parity has led to more affordability, accessibility to resource use and a rapid surge in the waste volumes as well.

II.PROBLEM STATEMENT

Rapid increase in volume and types of solid and hazardous waste as a result of continuous economic growth urbanization and industrialization is becoming a concerning problem for national and local government ensure effective and sustainable management of waste. The segregation, handling transport and disposal of waste are to be properly managed so as to minimize the risk to the health and safety of patients, the public and the environment. In the present scenario municipal workers are manually separating wastes it's difficult them to separate each and every waste bin in the locality. So it's not a practically feasible process. It will leads to so many health problems like respiratory illness etc. In recent survey 80 % of peoples suffering respiratory illness due to inhaling polluted air from overflowing waste bins. It's also a time consuming process and also economical process it require lot of fuel for waste collection and transportation.

III. PROPOSED SYSTEM

The system is to separate wastes according to their properties like metal, plastics, organic .Here we consider only the dry waste for the segregation process. Conveyor belt mechanism is mainly used

to separate wastes while moving through it. Proximity sensors are used in this system for segregate wastes according to their properties. Inductive proximity Sensor and capacitive proximity sensor is used to separate metals and plastic respectively. This system also introduces a rotating mechanical part which crushes the plastic kits which contain wastes. One of the major problems in waste Segregation is the separation of wastes inside the plastic kit. In present day we can see majority of waste disposed is put inside plastic kits. By crushing and passing through the conveyor it is possible to separate waste which is inside the plastic kit. The separated Waste is collected inside bins. With the help of Wi-Fi module the level of each bin is indicated either through website or mobile application.

IV. COMPONENTS.

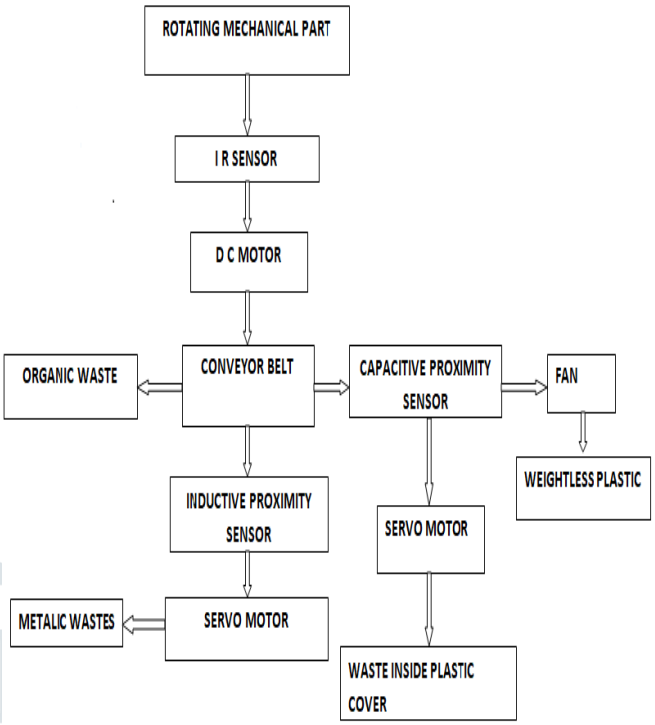
Software required

- Arduino IDE: An environment for arduino to write programs and upload it to board.
- Proteus 8 : A tool to create electronic prints for PCB and for automation purpose

Hardware required

- Capacitive proximity sensor
- Inductive proximity sensor
- IR module
- Arduino Board plus peripherals
- DC motor
- Mechanical components/Set up
- Fill level sensor
- Servo motor
- Fan
- Circuit components
- Conveyor Belt Setup
- Waste Bin Setup
- Wireless connectivity/Modules
- SMPS

V. WORKING



All the collected wastes are dumped into the container. Blades are attached in the corners, bottom and upper side of the container. The container is rotated at high speed. Thus all the wastes which are packed inside the plastic covers are getting separated. Then these separated wastes are passed to a slowly rotating pipe so that at the end the waste will come one by one and fall into the conveyor belt. An IR Sensor is attached to the end of the conveyor belts that when waste fall to the conveyor belt it starts moving. An inductive proximity sensor is attached at the side of the conveyor belt. If the moving waste is metallic, then the sensor detects and servo motor attached next to the sensor will push the waste to a bin attached on one side. The non metallic waste will continue moving. A capacitive sensor is attached on the way. It will be tuned to detect a particular grade plastic. The servo motor placed next to it will move the waste to the bin. Other light weight plastic will move to the bin by a fan attached next to the motor. The other wastes which are not metallic and plastic will move to the bin which is placed at the end of conveyor belt.

VI. ADVANTAGES

- The system will automatically separate waste into different categories. Thus manual separation is not needed .So ,it will reduce the workload
- Decrease health hazards to municipal workers. When the waste degrades it results in the production of harmful microorganisms. This will lead to air pollution followed by many respiratory illnesses. The system will indicate when the waste get overflow, thus the waste degradation can be avoided. Also The system can automatically segregate waste

thus there will no physical contact by the workers

- Save fuel and time .The system will indicate correct time when the waste gets overflow. Thus municipal workers need not check the bin regularly
- It saves time and money by using smart waste collection bins and systems equipped with fill level sensors.
- It keeps our surroundings clean and green and free from bad odor of wastes, emphasizes on healthy environment and keeps cities more beautiful.
- It further reduces manpower requirements to handle the garbage collection process.
- Applying smart waste management process to the city optimizes management, resources and costs which make it a "smart city".

VII. FUTURE SCOPE.

- To develop a system to interconnect all the waste bins to provide a route-map to give details about the amount of waste in each bin, were it is located, and warning messages.
- To develop a fully automated system for waste management for better and safer tomorrow
- GSM contraption to intimate to the nearest industry to use the metals collected.
- Plastic segregated can be processed based on their types, grades and colours.
- Convert the segregated waste into other useful forms.

VIII. CONCLUSION

The developed system can be used in all municipal corporations for effectively solving problem of manual segregation of waste. The product can be used in municipalities and public places and it will show the real-time waste level of the bin to the municipal authorities thus they don't need to check the waste bin frequently. So we can save both time and fuel and ensuring smooth waste management. Lesser man power and hence better profit and less expense can hence be ensured in the long run.

In recent years most of the peoples suffer from respiratory illness from inhaling the polluted air from overflowing waste bins. We can minimize this problem to some extend by proper waste segregation. The municipal workers suffer from many health issues due to exposure to these wasted. This problem can also be minimized by the developed system

This system is efficient and time saving than the currently employed method where the municipality employees perform. Though this system is simple in concept, it is very valuable and affordable. Hence to ensure being automated, a system which takes lots of dataset as input without human intervention and also has the capacity to think by itself offers the best solution. It acts as an aide for reducing pollution levels and in the long run focuses on the development of a nation and restoration of our ecosystem. We thus conclude that our project is an important asset to the society.

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