Mystery Dustbin for Waste Segregation

Vishwaja Narvekar[1], Simran Shaikh[2], Aditi Bura[3], Yuvraj Dhande[4]

[1,2,3,4]*Department of Computer Engineering, JSPM's Jayawantrao Sawant College of Engineering, Hadapsar, Pune, Maharashtra, India.*

Abstract—*Smart cities has become a necessity nowadays, as the population is increasing rapidly cause growth in the number of diseases due to unhygienic behavior of the people. To overcome these problems, we proposed Mystery Dustbin using Internet of Things (IOT) to maintain the cleanliness of our surroundings.*

In this, the waste is checked using different sensors (Moisture sensor, Inductive sensor, Capacitive sensor) and is segregated in its categories accordingly. Sensors such as Weight which is used to sense load of the garbage, Capacitive sensor to detect polymer(plastic), Moisture sensor to detect the moisture level ,Inductive sensor to detect metal garbage and ultrasonic sensor to check the garbage level filled in the dustbin. In present scenario Municipal corporation doesn't get the real time status of the overflow and mixed garbage is get collected. To avoid this, our system sends the alert to Municipal Corporation beforehand after which the garbage level is monitored and actions are performed respectively and segregates the waste.

1. INTRODUCTION

India is one of the most populated country in which one sixth of the population resides. As the population is high, a large amount of waste are produced from houses and industries.

We use dustbin to throw the waste but still there are some problems, such as: Sometimes waste is thrown outside the dustbin which is not monitored. Leads to ugliness of that particular area. Harmful gases are emitted to the surrounding from the waste as the dustbin is not covered. Waste can also cause diseases which can be harmful to human kind. Dustbin overflows are not cleaned timely. Generation of garbage cannot be stopped but we can maintain and monitor it.

We are implementing the system called Mystery Dustbin (using IOT) to overcome this problem. In our system we are differentiating the waste between the dry, wet and plastic and metal. Which becomes easier in managing huge amount of waste and its decomposition. To make people through the garbage inside the dustbin, we are implementing dustbin to make attractive using Internet of Things (IoT).

Mystery Dustbin have two parts. First part is garbage collector which is upside of the ground and second part which is underground. Using the underground concept it is possible to make area clean and also requires less space.

2. MOTIVATION

The motivation to build such system from observing many of accidents happened because of the waste spreads upon the road. Also observes that diseases are increasing rapidly due to the bacterias and insects which created because of garbage.

3. LITERATURE REVIEW

Chrislin L. Fernandes 1, Gabriela B. Gonsalves 2, Diksha D. Dessai 3, Diksha S. Lotlikar 4, Maria Samantha Cardoso have made IoT based technology to segregate dry and wet waste using the moisture sensor.

It uses the principle of capacitance to measure dielectric permittivity. A current is passed across the electrodes through the waste material and the resistance to the current in the material determines the water content. If the material has more water, resistance will be low and thus more current will pass through it[1]. Manisha Jayson, Sanket Hiremath, Lakshmi H R also used the IoT based technology to detect the water level of the waste using moisture sensor [2]. Rishabh Kumar Singhvi, Roshan Lal Lohar, Ashok Kumar, Ranjeet Sharma, Lakhan Dev Sharma, Ritesh Kumar Saraswat have made Internet of Thing (IoT) based technique and GSM/GPRS technique for interfacing between transmitter and receiver .It measures the percent filling of the dustbin. It stores the time and date in the database with percent filling[3]. Sazali Mahat, Siti Hajar Yusoff, Syasya Azra Zaini, Nur Shahida Midi, Sarah Yasmin Mohamad have used the IoT based technology to detect the metal waste using inductive sensor, color sensor, Bar magnet to detect aluminum, copper, steel metal respectively[5].

Santhosh Kumar B R, Rohit K, Varalakshmi Manjunath, Soundarya S Lokeshwari, Sahana

D N have developed the technology using IoT based system. Which is used to segregate the plastic garbage using capacitive sensor[6].

MS. SUCHITRA V MR. SHARIQ MOHAMMED SHAIKH MS. STUTI JHA MS. SUCHITRA V have used conveyor belt in there system for segregation purpose[7].

4. PROPOSED METHODOLGY

In this proposed system we are implementing the dustbin which is underground. Dustbin contains two parts. First part(garbage collector) is upside of the ground and second part(garbage container) is under the ground.

Components are used in this proposed system are :

Arduino: The Arduino Mega is a microcontroller board. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Weight sensor : In weight sensor, load cells are used which is a sensor or transducer that converts a load or force such as tension, compression, pressure, or torque acting on it into an electrical signal.

Capacitive sensor: Capacitive sensor is used to detect the plastic. It works on the principle of changing capacitive voltage between two plates by changing die electric medium between them.

Moisture sensor: Moisture sensors are used to measure the amount of water in a given substance. Which is used to determine whether the material is wet or dry.

Ultrasonic sensor: The ultrasonic sensor is used to detect the level of garbage in the dustbin. It works on the principle of SONAR and RADAR system which is used to determine the distance to an garbage.

Inductive sensor: Inductive sensor is used to detect the metal garbage. It uses the principal of electromagnetic induction for detection of the garbage.

Infra-red sensor: Infrared sensor is used to whether garbage is thrown in the dustbin or not for activating the conveyor belt. It is an electronic device, that emits in order to sense some aspects of the surroundings.

Conveyor Belt: Conveyor belt is endless loop carrying medium. It is used to pass garbage for detection and separation.

Working:

In our proposed system, to collect the waste we are using weight sensor to detect the waste. After sensing weight system will open its cap and put the garbage inside the Mystery Dustbin. Garbage passes on conveyor belt. Garbage first comes under detection Moisture sensor, which sense the moisture between the garbage, if moisture is high it will push it into the wet garbage collector. If moisture level is low then garbage comes under the Inductive sensor. Inductive sensor sense the garbage is metal or nor. If sensor get activated then actuator passes the garbage into metal collector(metal bin). If garbage is not metal then it goes under the capacitive sensor, which sense the dry garbage to detect the plastic, if it is plastic then it will push into the plastic garbage collector(plastic bin), else it will push into the dry garbage collector.

Ultrasonic sensor sense the level of each bin/collector(i.e. wet-bin, metal-bin, plastic-bin, dry-bin) of the Mystery Dustbin. If it is equal to or above the threshold level. Then ultrasonic sensor sends distance to Arduino and arduino will send message or alert to the Municipal Corporation through the GSM(Global System for Mobile Communication) module.

After getting the message or alert about status of the Mystery Dustbin, Municipal Corporation will comes at the location and collects the garbage.

Block Diagram:

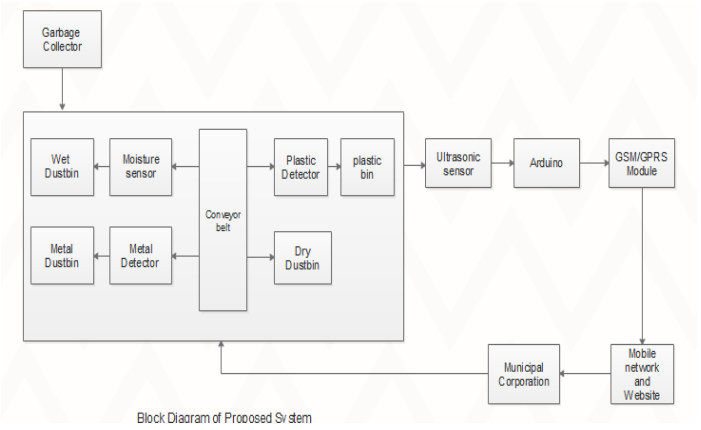

Fig. System Architecture

ALGORITHM:

1. Start.
2. User puts waste into the garbage collector.
3. Infra-red sensor get activated.
4. Garbage is then passed onto the conveyor belt.
5. Garbage is gone through first detector(moisture sensor).
6. Moisture sensor senses the moisture and determines whether the waste is wet or not.
7. If the waste is wet garbage is pushed into the wet bin and then go to step 13.
8. Else, garbage goes under Inductive sensor. The waste is checked.
9. If garbage is metal, then pushed into the metal bin and go to step 13.
10. Else, garbage goes under plastic detector the waste is checked.

11. If garbage is plastic, then pushed into the plastic bin and go to step 13.

12. In case of no detector gets activated, push the waste in the dry bin.

13. Level of garbage is to be checked using ultrasonic sensor. If level is full, send alert to Municipal Co-operation. Go to current step.

14. If garbage is not present, then stop.

Flowchart:

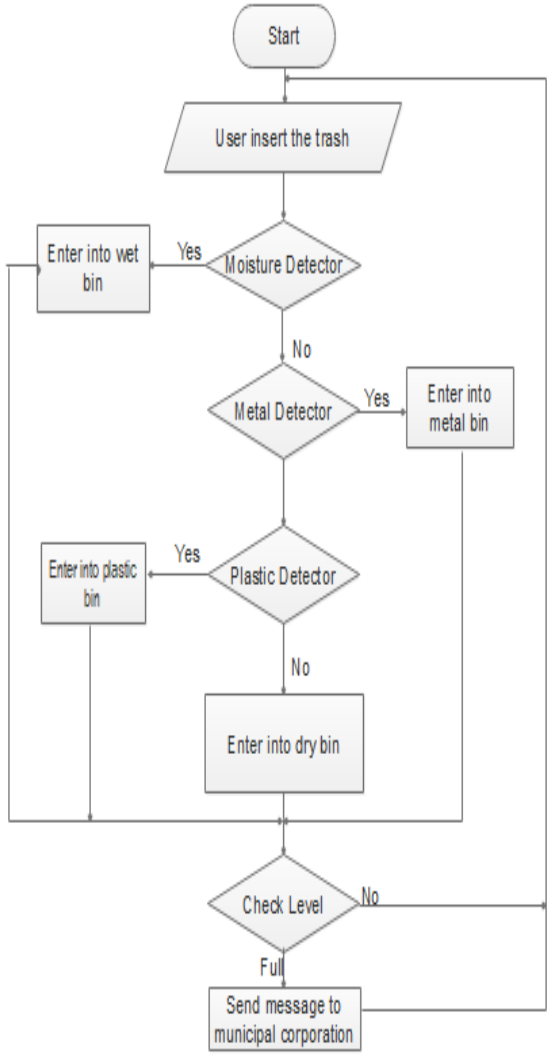

Fig. Flowchart

5. RESULT

Using Mystery Dustbin Waste is successfully segregate using wet garbage using moisture sensor, metal garbage using inductive sensor, plastic garbage using capacitive sensor and dry waste.

After dustbin is getting full message or alert is successfully sent to the Municipal Corporation using ultrasonic sensor and GSM module.

6. CONCLUSIONS

In the entire world waste management is a big challenge to solve. Due to which we are facing so many problems. We need new mechanism which is helpful to manage the waste. In our system, we have developed an efficient waste segregation and management system. This project is made as demo, it can be taken to product levels.

People through garbage into dustbin. Garbage passes on conveyor belt and segregates in wet, metal, plastic and dry waste. Ultrasonic sensor senses the filling level of dustbin. If it is more than threshold level then message sent to Municipal Corporation through GSM module. If Municipal Corporation get to know about filling of dustbin then it will send truck driver to clean it. In this way the dustbins are cleaned timely.

7. REFERENCES

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4. Sazali Mahat, Siti Hajar Yusoff*, Syasya Azra Zaini, Nur Shahida Midi, Sarah Yasmin Mohamad Department of Electrical & Computer Engineering, International Islamic University Malaysia Jalan Gombak, 53100 Kuala Lumpur, Malaysia *sitiyusoff@iium.edu.my.

5. Santhosh Kumar B R Dept of ECE, K S Institute of Technology, Bengaluru, santhosh964@gmail.com Rohit K Dept of ECE, K S Institute of Technology, Bengaluru, rohit.kasthurimurthy@gmail.com Varalakshmi N Dept of ECE, K S Institute of Technology, Bengaluru,

varalakshminalluru@gmail.com Manjunath Dept of ECE, K S Institute of Technology, Bengaluru, Soundarya S Lokeshwari Dept of ECE, K S Institute of Technology, Bengaluru, soundu1206@gmail.com Sahana D N Dept of ECE, K S Institute of Technology, Bengaluru.

6. MS. SUCHITRA V MR. SHARIQ MOHAMMED SHAIKH MS. STUTI JHA MS. SUCHITRA V, ELECTRONICS AND INSTRUMENTATION ENGINEERING, M S RAMAIAH INSTITUTE OF TECHNOLOGY, INDIA.

7. A.P. Nenashev, S.I. Krivosheev, A.A. Parfentiev, G.A. Shneerson, S.V. Scherbinin, St. Petersburg State Polytechnical University, St. Petersburg, Russia e-mail: integr@delfa.net.

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9. MR. H.N. CHAITHANYA DAS MR. JESWIN JOSE MR. KUSHAL R. MR. JAGADEESH H., ACHARYA INSTITUTE OF TECHNOLOGY, BENGALURU, DEPARTMENT OF MECHNICAL ENGINEERING.

10. Jun Nakatani *, Toshiya Aramaki, Keisuke Hanaki Department of Urban Engineering, School of Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan.