AUTOMATED AND MOVABLE WASTE SEGREGATOR

Rangaswamy U[1], S K Bharatesh[2], Shreyas B Aradhya[3], Tushar R Vasistha[4]

Student, Department, KSIT, Bangalore, India[1-4]

Abstract: This project presents Smart Dustbin-Separation of dry, wet and metal by using IOT and ROBOTICS. Now a day, due to the busy work schedule people are not able Separate dry, wet and metal waste. As we know, metals get corroded due to moisture, these moisture's are naturally obtained by decaying process of fruits and vegetables. This leads to diseases. Finally, we are step forward to keep the environment hygienic and clean. In this project, we are using conveyor belt along with the robotic arm assembly for separating the metals and non -metal wastes. The robot arm consists of capacitive proximity sensor, which can detect the presence of Plastics, wood…etc. On the other side a magnet is placed so that the metals can be attracted. These wastes are stored in different bins. When the dustbin is about to reach the full capacity this frame work sends a message with location to the operator. This process is done by using IOT and ROBOTICS.

Keywords: Robotics, IoT, Robotics,Dry, Wet and Metal.

I. INTRODUCTION

Ten million ton of garbage is generated in metropolitan cities. The landfills of most of these cities are overflowing with no space for fresh garbage waste. The philosophy of "waste management hierarchy" has been adopted by most nations as the step for developing municipal solid waste (MSW) management strategies. So we decided to separate waste in the home itself with the help of using sensors. Here we are going to use ultrasonic sensor and inductive sensor. in this project we are separating the waste at our home itself with the use of sensors. By separating the waste at home itself we can reduce the work done by the our municipality. This helps our government to recycle our waste in very simple manner.

According to a sanitation survey called ministry of urban development under the mission, it was found that about 50% people in India face the problem of improper waste collection and management. According to center of science and environment, innovative disposal and recycling methods must be introduced instead of landfill sites.

Waste segregation and recycling are effective ways of reducing dumped trash. Unfortunately, these practices are not widely implemented in the country. People have been negligent when it comes to proper waste disposal, ignoring labels and throwing recyclables that can still be reused. Most of the people are unaware or ignore the fact the waste segregation and recycling can reduce cost, reduce drain in our resources, and lessen the waste being produced. Typical composition of garbage people throw in are 5.8% metals, 3.5% glass, 1.6% plastic, 12.9% papers, 1.8% textiles and 53.7% biodegradables which means only the remaining 20.7% of the wastes should really be going to our landfills. In our country, recycling centers do manual process of sorting wastes so it increase human interface. For this we implement a system which minimizes human interference in the waste collecting and segregation process. Materials such as paper, glass and metals are the wastes that need to be segregated in this project.

II. LITERATURE SURVEY

Increasing urbanisation, fast rate of migration to cities and development have resulted in a steady growth in consumerism. An inevitable side effect of this is exponential increase in waste generation. Different types of waste needs to be handled differently for reasons like hygiene, non-spreading of disease, cleanliness and toxicity.

The model[1] consists of Node MCU(ESP8266) as a microcontroller, Ultrasonic sensor, Servo motor and Blynk app. Blynk app is used for referring attentive messages to the disturbed authorities thereby speedy act would be taken to vacant the bins. Blynk app requires high internet connectivity on both the sides.

The model[2] consists of DC motor, Stepper motor for the robot to move if it detects a metal, it collects it and rotate 180 degrees with servo and drop it in a bin. From this work we came to know that metals can also be segregated by a sensor called metal proximity.

The components used in this work[3]is Arduino UNO, ultrasonic sensor, GSM module, PIR sensor, LED's, Servo motor. Here we came to know that PIR sensor detects the human motion whereas ultrasonic sensor detects only object. They have implemented LED's to know the dust level instead of LCD.LEDS can't sustain for longer periods compared to LCD.

The work[4] have been done using Esp8266 module, ultrasonic sensor, Raspberry-pi, Servo motor. Through Raspberry-pi which is connected to monitor via the HDMI cable displays the information on the cloud server. They are displaying the house numbers once the trash limit has exceeded the threshold limit. By just knowing the house number it is difficult for the authorities to reach exact location.

The model[5] introduces GPS module that is easy for tracking of the house location with this one can overcome [4], the difficulty of identifying the house numbers. The aim of the work [6] is to establish a smart receptable which can be used in all type of premises. The receptable is placed above the line follower kit which directly route the trash bin outside the premises once it is filled. We came to know that a receptable (dustbin) can be moved with the help of a line follower robot which is capable of carrying the over weighted receptable outside with the help of 4 dc powered motor operated by 4-channel relay.

From the work[7],we came to know about capcitive proximity sensor detects liquids such as petroleum, oil and water and all kinds of other solids such as plastics, cardboard and animal materials such as leather, stainless steel etc.

The rain sensor-based system[8] functions only when water falls on the rain sensor directly. The cost of overall system increases as additional components are needed along with rain sensor . LDR sensor detects dry waste. So, it's better to use moisture sensor where it detects both dry and wet waste and hence the complexity of the system reduces.

A smart and automatic waste segregator unit [9] has successfully been implemented in the reported work. The AWS system separated the dry (recyclable) and wet (residual) waste efficiently using a raspberry pi, moisture sensor, and raindrop sensor as the main modules.

The project[10] mainly segregated 3 kinds of waste Metal, Dry and wet waste. The Metal is segregation is done using magnets. The remaining waste is passed through medium solid blower which blows away the dry waste. The rest waste is passed through the moisture sensor to get wet waste.The blower segregates low weight dry waste only.

From the paper[11] , Laser and LDR model have been usedfor the detection of plastic waste., the model also consists of open-close feature in it. When the dustbin reaches its limit, the open-close feature is disabled.

Smart Bin works on a simple yet efficient methodology. It may be customised for domestic or public use. The model uses dual motor and tray mechanism. The mechanism or the working[12] of the model is that a waste kept on a tray is detected using IR sensor. Once the waste is detected the now it is segregated with the help of moisture sensor.

In this model [13] the waste is segregated using into 3 categories i.e, dry, wet and metal waste. The waste is passed through compartment, compartment 1 mainly consists of metal sensor and an IR sensor, IR sensor is used to detect if the waste is present or not and metal sensor is used to check if the object is metal or not. If the object detected is metal then the object is sent to the bin 1,else it is sent to the compartment 2 where the waste is detected using IR sensor and differentiated whether the waste is dry or wet using moisture sensor, if the waste is wet then bin is rotated and the waste is sent to wet waste bin and if it's dry waste then the bin is again rotated and the waste is sent to the dry waste bin. With the help of NODEMCU the level of the bin is known and sent to the respective authority.

The model[14] is quite unique as there is no usage of conveyer belt. Just by using dc motors the dustbins are rotated in such a way that the waste detected by respective sensors are sent to respective bins.

The component used in the model[15] are Ultrasonic sensor is used to check the level status of dust bin so to determine if it is full or empty, while Load cell senses the weight of the garbage present in the dustbin and to determine if the threshold limit is reached or not. Active status of dustbin is shown on web page using connections through Ethernet shield.. The controller used here is Microcontroller PIC 16F8778. HTML is used to create web page . Web page provides information regarding location of dustbin placed, its status, name and contact details of the coordinator in that respective area. Real time status i.e., full or empty is shown on the web page and if it is full SMS is sent via GSM module to coordinator.

III. CONCLUSION

From the above referred papers, it can be concluded that there was human involvement in waste segregation process and the segregation process is less accurate. The proposed project, Automated and movable waste segregator uses Arduino, Limit switch, Inductive proximity, Moisture sensor, Capacitive Proximity, Conveyer Belt, GPS and Robotic Arm . To notify the municipal authorities we are using Telegram app.

The main goal of this proposed approach was to improve the waste management process and the city's environmental quality. Many times, it has been noted that the dustbins are not covered, resulting in waste leakage by birds. It also addresses the problem with the current method. With this proposed model, the saying "Cleanliness is next to Godliness" would be genuinely realized in the city by offering an automatic opening for the dustbin lid and providing the dustbin full status to the concerned worker. It will benefit societal health and cleanliness, and it will benefit business since we are attempting to make it affordable to as many people as possible. So that everyone can benefit from it, from the poor to the wealthy. This, we believe, will bring about some changes in terms of cleanliness and technology.

REFERENCES

[1]. P. V. Rao et al., "IoT based Waste Management for Smart Cities," 2020 International Conference on Computer Communication and Informatics (ICCCI), 2020, pp. 1-5, doi10.1109/ICCCI48352.2020.9104069.

[2] . V.P. et al., "Automatic Waste Segregation and Management," 2020 International Conference on Computer Communication and Informatics (ICCCI), 2020,pp. 1-5, doi: 10.1109/ICCCI48352.2020.9104196

[3]. IJIRMPS | Volume 9, Issue 5, 2021 ISSN: 2349-7300 "Smart Dustbin" Aakash Sharma ,   Abhishek Gupta, AditiyaPartap Singh, Akshat Sharma, Mandeep Singh Chib, Ms. Vasundhra Gupta.

[4] . A. Praveen, R. Radhika, M. U. Rammohan, D. Sidharth, S. Ambat and T. Anjali, "IoT based Smart Bin: A Swachh-Bharat Initiative," 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC), 2020, pp. 783-786, doi: 10.1109/ICESC48915.2020.9155626.

[5]. A. Sivasangari, U. R. Polishetty, Ajitha, Anandhi and R. M. Gomathi, "IoT based Smart Garbage System," 2021 5th International Conference on Computing Methodologies and Communication (ICCMC), 2021, pp. 506-509, doi: 10.1109/ICCMC51019.2021.9418455.

[6] . S. M. Azarudeen, B. Mohan, S. Pujita and P. Swapna, "Automatic Smart Receptacle Using IoT and Mobile Application," 2021 5th International Conference on Intelligent Computing and Control Systems (ICICCS), 2021, pp. 389-392, doi: 10.1109/ICICCS51141.2021.9432137.

[7]. T. M. B. S. Balu, R. S. Raghav, K. Aravinth, M. Vamshi, M. E. Harikumar and R. G. J., "Arduino based Automated Domestic Waste Segregator," 2020 5th International Conference on Communication and Electronics Systems (ICCES), 2020, pp. 906-909, doi: 10.1109/ICCES48766.2020.9137977.

[8]. D. Sunehra, K. Pravalika, A. Sruthi and G. Rajasri, "Implementation of an Automatic Waste Segregator System using Arduino Uno," 2021 6th International Conference for Convergence in Technology (I2CT), 2021, pp. 1-6, doi: 10.1109/I2CT51068.2021.9418212.

[9]. C. P. Singh, M. Manisha, P. -A. Hsiung and S. Malhotra, "Automatic Waste Segregator as an integral part of Smart Bin for waste management system in a Smart City," 2019 5th International Conference On Computing, Communication, Control And Automation (ICCUBEA), 2019, pp. 1-5, doi: 10.1109/ICCUBEA47591.2019.9129508

[10]. J. R. Raj, B. I. P. Rajula, R. Tamilbharathi and S. Srinivasulu, "AN IoT Based Waste Segreggator for Recycling Biodegradable and Non-Biodegradable Waste," 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS), 2020, pp. 928-930, doi: 10.1109/ICACCS48705.2020.9074251

[11] . N. H. Kamarudin, A. A. A. Rahim, N. E. Abdullah, I. S. A. Halim and S. L. M. Hassan, "Development of Automatic Waste Segregator with Monitoring System," 2019 4th International Conference on Information Technology, Information Systems and Electrical Engineering (ICITISEE), 2019, pp. 190-195, doi: 10.1109/ICITISEE48480.2019.9003813.

[12]. Jayson, Manisha, Sanket Hiremath, and H. R. Lakshmi. "SmartBin-Automatic waste segregation and collection." In 2018 Second international conference on advances in electronics, computers and communications (ICAECC), pp. 1-4. IEEE, 2018..

[13] . Akhil, S.S., Akhiljith, A.S., Aswin, S. and Amal, V., "Smart Waste Segregator". International Journal of Research in Engineering, Science and Management Volume-3, Issue-2, February-2020.

[14] . International Journal of Advanced Research in Computer and Communication Engineering Vol. 8, Issue 2, February 2019 Copyright to IJARCCE DOI 10.17148/IJARCCE.2019.8226 147 Smart Waste Segregation System Jeyapriya.K 1 , Lakshmi Priya.P2 , Krishna Pavani.K3 ,A.S .Balaji4 Student, B.E Computer Science Engineering, Anand Institute of Higher Technology, Chennai, India1,2,3 Assistant professor, Anand Institute of Higher Technology, Chennai, India4

[15] . K. Nirde, P. S. Mulay and U. M. Chaskar, "IoT based solid waste management system for smart city," 2017 International Conference on Intelligent Computing and Control Systems (ICICCS), 2017, pp. 666-669, doi: 10.1109/ICCONS.2017.8250546.