IoT based Smart Trash Pail Disposal

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ABSTRACT

A clean environment and human health are very important. Waste management is the major issue happened all over the world. The uncollected dust in the trash pail makes more cause. This problem could be overcome by using some new technology like Sensor, Motor, Arduino, keypad. The ultrasonic sensor is used to find the distance of the trash container and check whether the garbage container gets filled or not, if the garbage can gets filled this sensor will detect and the garbage container door will close automatically. The closed-door will open only by the municipal person using keypad system. The gas sensor(MQ7) is used to detect the unwanted smell and we can able to take an analyze who much methane and toxic gas are secreted from the garbage container. To protect the trash container from the natural calamities the rain sensor is used, when rain comes this sensor will detect and close the trash pail door automatically. This system will be used to control the environmental issue that comes from the garbage can.

1. INTRODUCTION

From the analysis of today's world, over 2.12 billion tones of unwanted waste are generated especially in India over 63 million tones of unwanted waste is generated. Many diseases that affect the human and other living beings by this unwanted waste that we generate in our daily life.

The World Health Organization(WHO) says that improper way of disposal of waste may cause many diseases like Parasitic Infections, Lungs Infections, Skin Infection, Candida, HV, Bacteremia, Meningitis. These diseases are very harm to human body.

We can able to understand clearly that east Asia and the pacific generate 468 million tones of waste, Europe and central Asia generate 392 million of waste, south Asia 334 million tones of waste is generated, In North America 289 million of waste is generated, 231 million tonnes of waste is generated in Latin America and the Caribbean, 174 million tonnes of waste is generated in sub-Saharan Africa, the Middle East and North Africa generate 129 million tonnes of waste. How much the world gets bigger the waste all increased regularly. By this analyze we can able to say that half of the world is filled with waste. Waste management is not managed properly is a major issue. The unwanted waste should be collected properly that garbage waste should not affect the human being, animals, plants, and society. To safeguard everything waste management is very important. From the unwanted waste, a bad odor will come and it will affect human health. A clean environment gives pure air to smell. Nowadays security of the garbage can is very important because some people will steal the garbage can for their purpose.
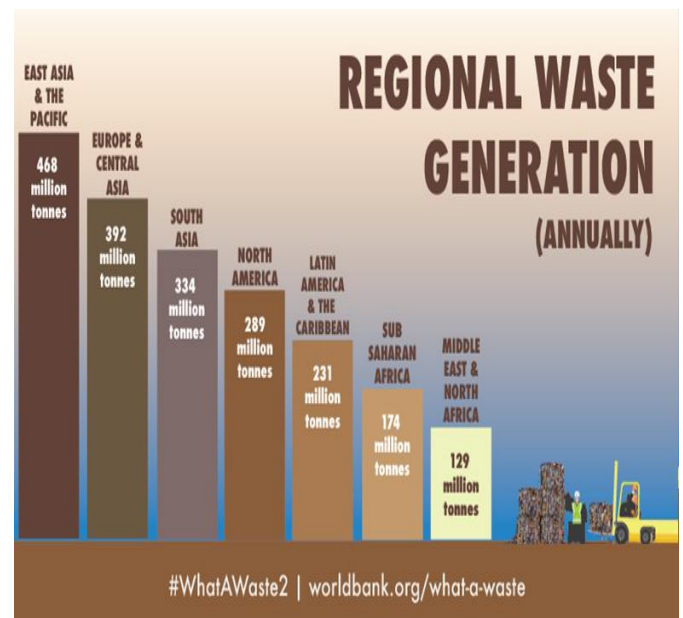

Figure 1: Analyse diagram for waste generation

To manage this problem the internet of things is very useful. Nowadays the world is run fully based on IOT. With this technology, we can achieve anything.

We can able to manage the waste using the IoT concept. This technology will help to reduce the waste management issue. This paper will convey how to manage waste in a proper way.The first process of this paper is if the trash can get filled means the ultrasonic sensor will detect and send alert to the municipal office and the trash can door will automatically close. The trash can door will only open by the municipal person using the keypad system. The four-digit number will know only to the municipal employes, The municipal person will type the passkey in the keypad if it matches means the trash can door will open. If the unwanted smell comes from the trash can means the MQ7 gas sensor will sense and send the alert to the municipal person and the analysis will store on the website. The concerned person will monitor the website if the limit cross means they will take immediate action to clean the trash can. From this, we can take the analysis of how much methane or toxic acid secreted.

When the rain comes the trash can door will automatically be closed. Then the normal person can't able to lift the trash can from this place the municipal person can only able to lift that.

2. LITERATURE SURVEY

In this paper, they used Artificial Intelligence algorithms to find waste. Once the waste finds the system will calculate the position of the waste from the garbage container using the camera. The robotic arm will collect the waste and put it into the garbage container[1].

The main aim of this paper is to capture the perfect image of the waste and segregated into four items like glass, metal, plastic, and paper. Here they used a machine-learning algorithm that is a Convolutional Neural Network (CNN). This system will reduce the cost and work of a human[2].

In this paper, they used weight sensor for better waste management. Weight sensor is used to find the weight of the garbage container, If the weight crosses the limit then the sensor will detect and send the SMS to the union person[3].

The objective of this paper is to adopt cloud computing and NFC technology to provide a web-based system and mobile application to support waste management.

Here the author said that the data mining and RFID techniques are the ones to control the issues of daily waste and this system will give awareness to the public by using this analysis[4].

This paper has achieved its aim by using the internet of things(IOT). They have used RFID, sensors, actuators. These smart devices are included in the environment to control and monitor the solid waste and collect the information about the particular environment[5].

For efficient waste collection in the garbage, This paper used an ultrasonic sensor. This ultrasonic sensor will find the level of the garbage. If the garbage gets filled this sensor will detect and send the alarm to the control room[6].
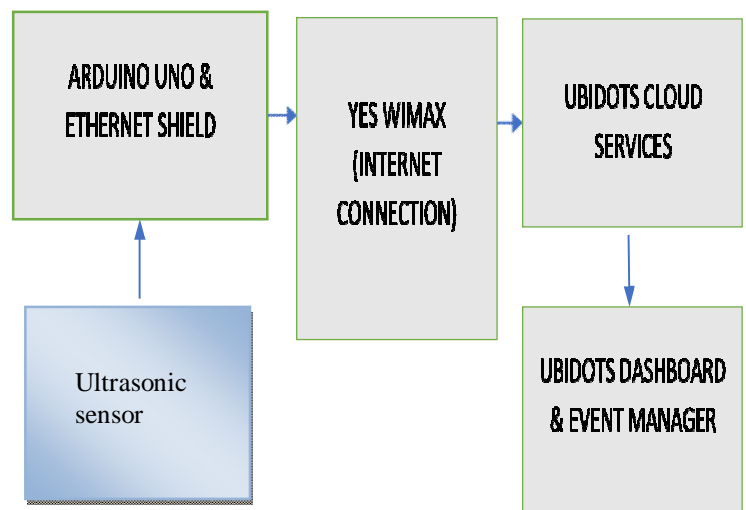

Figure 2: Block Diagram for waste management

In the existing model, the author had developed a good model for waste management. The author finds the solution to control the overflow of the garbage can.

This can be controlled using to approach :

- Internet of things
- Machine Learning

These two approaches are the best approach to control the overflow of the trash can.

In the Existing system some technology to control the overflow of the waste from the garbage can.

They used

- Ubidots cloud services
- Arduino UNO and Ethernet shield
- Ultrasonic sensor
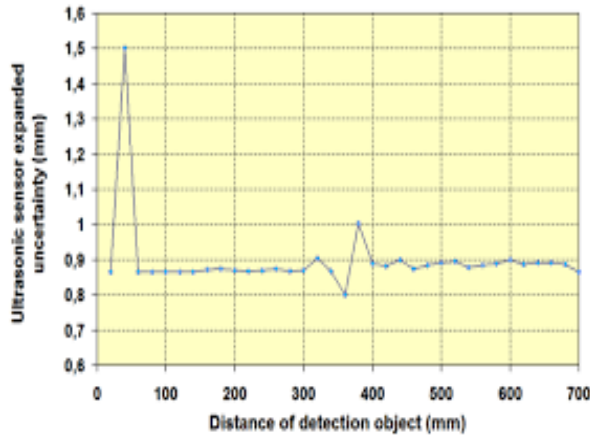- Ubidots dashboard and event manager

Figure 3: Distance measure analyze graph

By this diagram we come to know that the distance value is not constant the ultrasonic sensor will sense the distance of the trash can.

In the early system, they used ultrasonic sensor to find the distance between the bottom of the trash can and the top of the trash can. This ultrasonic sensor fix in the top of the trash can, If the waste overflow from the trash can this sensor will detect and alert to the municipal person.

$$\textbf{Distance } L = 1/2 \times T \times C$$

L=Distance
T=Time
C=Sonic Speed

This is the method that the ultrasonic sensor will calculate the distance. Air is very essential for this distance measure because without air the sensor will not detect the distance.

Figure 4: Trash can with ultrasonic sensor

In this System they create alarm or alert message to the municipal person mobile device. As the garbage level increase, the distance between the waste bin lid with ultrasonic sensor will decrease Once the level of distance less than the determined value (4 cm), Ubidots will alert and send message to authorized person in form of SMS
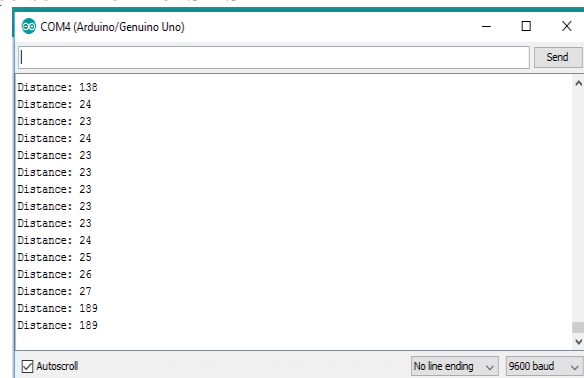

Figure 5: Distance detection result

3. **CONCLUSION**

This survey mainly focuses on the efficient way of a waste management system. Special focus on efficient waste collection to secure humans and other living beings from harmful diseases. From this system, we can make a good and clean way of collecting and transporting garbage waste and we can reduce the time and cost. we can able to reduce the vehicle service. This system will take accurate measurements without any interpretation.

By using IoT technology, this project can be developed by an efficient web-based platform to continue monitoring the trash can to make the world green and more healthy. This system finally used to keep the environment clean and happy. Thus the collection of waste may more efficient.

REFERENCES

1.Bo Tang, Student Member, IEEE, Zhen Chen, Gerald Hefferman, Shuyi Pei, Tao Wei, Haibo He, Senior**, Incorporating Intelligence in Fog Computing for Big Data Analysis in Smart Cities,** 2017 IEEE doi: 10.1109/TII.2017, pp.1-11.

2. V.B. Dzobelova1, A.K.Berkaeva2, A.V.Olisaeva3, **Municipal Waste Management in the Republic of North Ossetia-Alanya,** 2018 IEEE, pp.17-18.

3. Jia-Wei Lu, Ni-Bin Chang, Senior Member, IEEE, Li Liao, and Meng-Ying Liao, **Smart and Green Urban Solid Waste Collection Systems: Advances, Challenges, and Perspectives,** 2015, IEEE, pp.1-14.

4.C.K.M. Leeand Trevor Wu Department of Industrial and SystemsEngineering, **Design and Development Waste Management Systemin HongKong,** 2015, IEEE, pp.798-802.

5. Theodoros Anagnostopoulos, Member, IEEE, Arkady Zaslavsky, Senior Member, IEEE, Kostas Kolomvatsos, Alexey Medvedev, Pouria Amirian, Jeremy Morley, and Stathes Hadjieftymiades , **Challenges and Opportunities of Waste Management in IoT-Enabled Smart Cities,** 2017, IEEE, pp.275-289.
https://doi.org/10.1109/TSUSC.2017.2691049

6. Mohamad Azeer Al-Hami Husa2 2Faculty of Electrical Engineering, Universiti Teknologi MARA Cawangan Pulau Pinang, **IoT based smart garbage monitoring & collection system using WeMos & Ultrasonic sensors,** 2019, IEEE, pp. 1-6.

7. Khalid Jamal Jadaa1 , Latifah Munirah Kamarudin 2 , R. Badlishah Ahmad3 , Waleed Noori Hussein4**, Multi Objects Detection and Tracking System for Smart Home using Wireless Sensor Network**, International Journal of Advanced Trends in Computer Science and Engineering Volume 8, No.5, September - October 2019 , pp. 2434 - 2441

8. Jessica Velasco , Cherry Pascion , Jean Wilmar Alberio , Jonathan Apuang , John Stephen Cruz , Mark Angelo Gomez , Benjamin Jr. Molina, Lyndon Tuala,August Thio-ac, Romeo Jr. Jorda, **A Smartphone-Based Skin Disease Classification Using MobileNet CNN** , International Journal of Advanced Trends in Computer Science and Engineering, pp. 2632 – 2637.
DOI: 10.30534/ijatcse/2019/116852019

9. P. Pandiaraja, N Deepa 2019 , **A Novel Data Privacy-Preserving Protocol for Multi-data Users by using genetic algorithm** , Journal of Soft Computing , Springer , Volume 23 ,Issue 18, Pages 8539-8553.
https://doi.org/10.1007/s00500-019-04239-1

10.K Sumathi, P Pandiaraja , **Dynamic alternate buffer switching and congestion control in wireless multimedia sensor networks** , Journal of Peer-to-Peer Networking and Applications , Springer.

11. P.RajeshKanna and P.Pandiaraja 2019, **An Efficient Sentiment Analysis Approach for Product Review using Turney Algorithm** , Journal of Procedia Computer Science , Elsevier ,Vol 165 ,Issue 2019, Pages 356-362.

12. S.Thilagamani , N. Shanthi," **Gaussian and gabor filter approach for object segmentation**", Journal of Computing and Information Science in Engineering,Vol.14,Issue 2, pp. 021006,2014.
https://doi.org/10.1115/1.4026458

13. S.Thilagamani , N. Shanthi," **Object Recognition Based on Image Segmentation and Clustering**", Journal of Computer Science,Vol. 7,No.11,pp. 1741-1748, 2011.
https://doi.org/10.3844/jcssp.2011.1741.1748

14.P.Santhi, S.Kiruthika,"**Lung Based Disease prediction Using Lobe Segmentation Based on Neural Networks**", International Journal of Pure and Applied Mathematics",Vol.118, No.8,PP. 499-504,2018.

15.P.Santhi, R.Vikram," **Implementation Of Classification System Using Density Clustering Based Gray Level Co Occurrence Matrix (DGLCM) For Green Bio Technology**", International Journal of Pure and Applied Mathematics",Vol.118, No.8,PP. 191-195,2018.