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DESIGNANDFABRICATIONOFANAUTOMATED WASTE SEGREGATOR SYSTEM

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Abstract:*WasteManagementandsegregationisamuch-neededprocessinmetrocities and urban areas due to the spreading of diseases. It is estimated that India produces 60 milliontonsofmunicipalsolidwasteannuallyatpresent.Wastelyinglitteredinthe surrounding,dumpedonopenlands,becomesamajorproblemforvarioustypesof disease-causingbacteriaandviruseshence,segregation,transport,handling,anddisposalofwastemus tbemanagedproperlytominimizetherliskstothepublicand environment.Whenmixeddryandwetwastebreaksdowninthelowland,itcreatesnasty greenhousegases.Segregationmakesitattainabletoutilizeandrecyclewasteeffectively. This waste segregator system can easily segregate waste. When waste is thrown in thepipe, the IR sensor will sense the waste. Waste is divided into three categories namelyWet,Dry,andMetallic.Anothersensorwillsensethegarbagecategory.Asperthe algorithmused,ifthewasteismetallicthenthemechanismwillbringthemetalcollecting bin below the pipe and with the help of a servo motor the waste will fall into the metalbin.Similarly,theprocesswillrepeatifwetwasteissensed.Ifthesensordoesn'tactivate both the sensorcategory thenthewaste will be consideredtobe adry wastesegregation system for household use, so that it can be sent directly for processing. It is designed to sorttherefuseintometallicwaste,wetwaste,anddrywaste.TheAWSemploysaparallel resonantimpedancesensingmechanismtoidentifymetallicitems,andcapacitivesensors todistinguishbetweenwetanddrywaste.Experimentalresultsshowthatthesegregation of wasteintometallic,wet,anddrywaste hasbeensuccessfullyimplementedusingAWS.*
Keywords: **Dry,Wet,Metal,Sensors,Segregation.**

1. INTRODUCTION

In India, about 60 milliontonnes of waste isgenerated every year. Ten million tonnes 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. According to a sanitation survey calledtheMinistryofurbandevelopmentundertheSwachhBharatmission,itwasfound that about 50% of people in India face the problem of improper waste collection and management. According to the Centre of Science and Environment, innovative disposal and recycling methods must be introduced instead of the "Swachh Survekshan-2016" conducted. Thus, we have proposed a cost-effective Automatic waste segregator that categorizes the waste as plastic, metallic, or organic. The monitoring system helps to monitor the waste collection process.The common method of waste disposal is unplannedanduncontrolleddumpingatlandfillareas.Thismethodishazardoustohuman health, and plant, and animal life.When the waste is segregated into basic streams such as plastic, metallic and organic, the waste has a higher potential of recovery, and then, recycled and reused "Automatic waste segregator and monitoring system" for proper managementofwaste.Theorganicwasteisconvertedeitherintocompostormethanegas

or bothCompost canreplace the demand forchemical fertilizers, andbiogascanbe used asasourceofenergy.Themetalwastecouldbereusedorrecycled.Evenifthereislarge-scaleindustrialwastesegregationpresent,itisalwaysfeasibletoseparatethewasteatthe sourceitself.Thehazardfor   wasteworkersisreducedAlso,theseparatedwastecouldbe directly sent totherecycling andprocessingplant insteadofsendingit to thesegregation plant and then to the recycling plant.

2. METHODOLOGY

A waste management system is the strategy an organization uses to dispose of, reduce, reuse, and prevent waste. Possible waste disposal methods are recycling, composting, incineration,landfills,bioremediation,wastetoenergy,andwasteminimization.Wasteis divided into three categories namely Wet, Dry, and Metallic. Another sensor will sense the garbage category. As per the algorithm used, if the waste is metallic then the mechanismwillbringthemetalcollectingbinbelowthepipeandwiththehelpofaservo   motor the waste will fall into the metal bin.
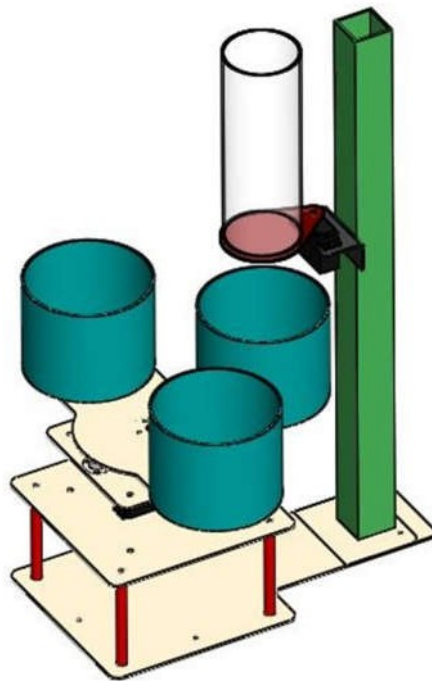
3. DESIGNDRAWINGSFROMSOLIDWORKS

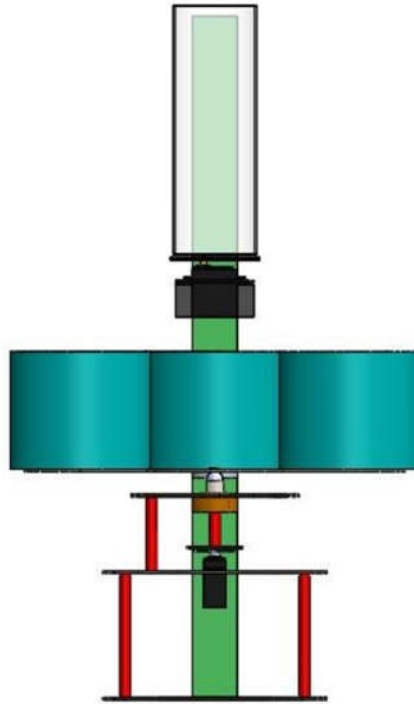

FIG. 3.1: 3DVIEWOF AUTOMATICWASTESEGREGATIONSYSTEM.

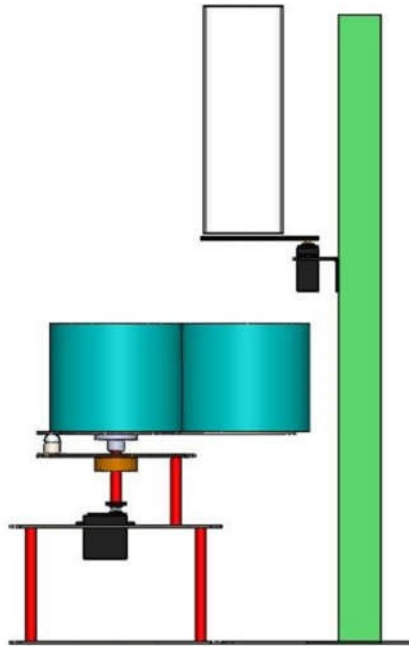FIG3.2:FRONTVIEWOFAUTOMATICWASTESEGREGATIONSYSTEM

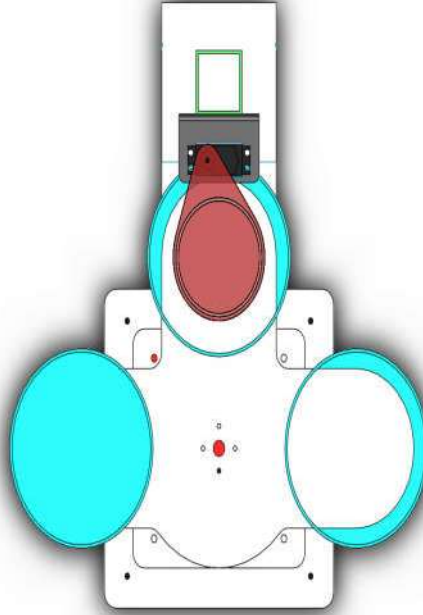

FIG3.3:SIDE VIEWOFAUTOMATICWASTESEGREGATIONSYSTEM

FIG3.4:TOPVIEWOFAUTOMATICWASTESEGREGATIONSYSTEM

4. COMPONENTS

1. ServoMotor(MG996R)
2. BasePlate
3. Container
4. RoundPlate
5. RodSpacer
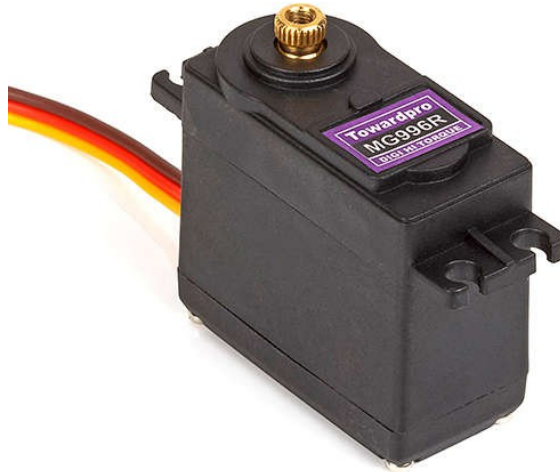6. SupportingFrame
7. Mounts
8. Joints&Screws
9. Coupler

5. PARTSDESCRIPTION

1.SERVOMOTOR(MG996R)

a) Weight:55g
b) Dimension:40.7×19.7×42.9mm
c) Stalltorque:9.4kg/cm(4.8v);11kg/cm(6.0v)
d) Operatingspeed:0.19sec/60degree(4.8v);0.15sec/60degree(6.0v)
e) Operatingvoltage:4.8~6.6V

GearType:Metalgear
a) Deadbandwidth:1us
b) Wirelength:32cm

Features:

a) GearType:Metalgear
b) ServoPlug:JR(FitsJRandFutaba)
c) Servoarms&screwsincluded,andfitwithFutabaservoarm
d) It's a universal "S"type connector that fits most receivers, including Futaba, JR, Hitec, GWS, Cirrus, Blue Bird, Blue Arrow, Corona, Berg, and Spektrum.
e) CE&RoHSapproved
f) Wehaveupgradedourservogearsetandshafttoaluminum6061-T6.Itis stronger and lighter than copper.
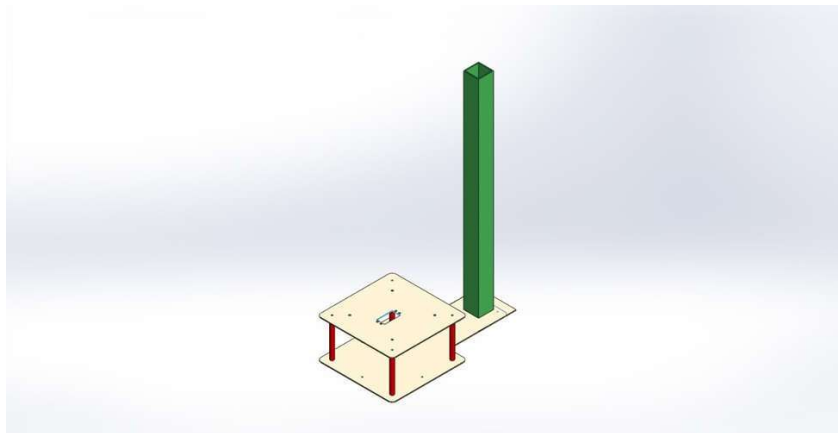
2. RoundPlate:
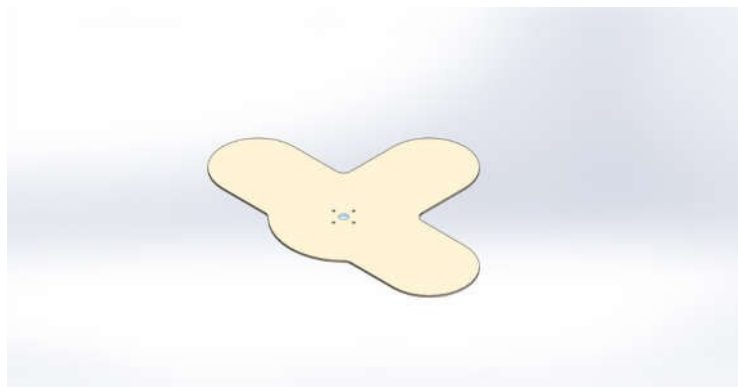
RoundPlateisusedtoholdthecontainerandrotateaccordingly.

3. Container:
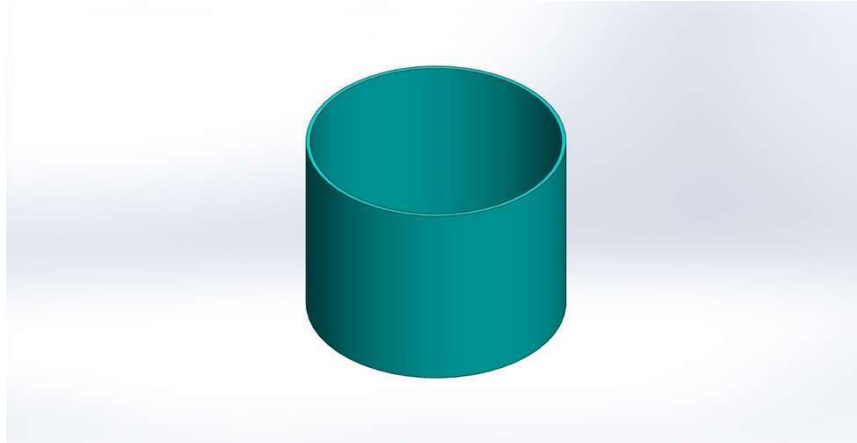
Thecontainerisusedtocontain/holdthedifferenttypesofwaste.

4. SupportingFrame(MildSteel):

Aframeis often astructural systemthat supports other components of physical construction and/ora steel framethat limits the construction's extent. AnA-frameis a basic structuredesignedtobearaload in alightweight economicalmanner. Thesimplest form of an A-frame is two similarly sized beams, arranged at an angle of 45 degrees or less, attached atthetop,like anuppercase letter 'A'. These materials are often wooden or steel beams attached at the top by rope, welding, gluing, or riveting.

5. BasePlateandRodSpacer:
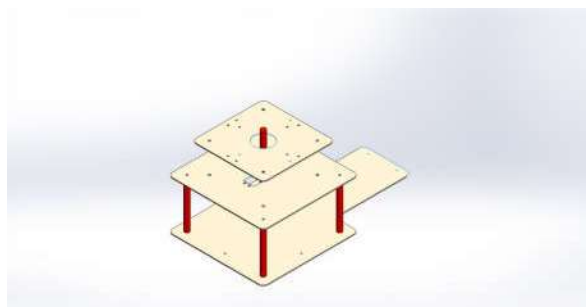
6. WORKING

1. Dropthewasteintothepipe.
2. IRsensorwillsensethewasteanditwillrestonthebottomplate.
3. Now the sensor on the plate will sense the waste as in 3 categories - Metallic or wet.
4. Now the algorithm is so made that if the waste is metallic then the mechanism willbringthemetalcollectingbinbelowthepipeandtheservo willletthewaste fall into the bin.
5. Similarly,theprocesswillberepeatedforthewettest.
6. Ifboththesensordoesn'tactivatethenthewastewillbedetectedasdrywaste.

7. RESULTS

"Automatic Waste Segregation System" sorts wastes into three different categories, namelymetal,plastic,andwet(organic)waste.Wetwastereferstoorganicwastesuchas vegetable peels, leftover food, etc. Separating our waste is essential as the amount of waste being generated today causes an immense problem.

Here,wehavetestedthehouseholdwasteswhich aregenerated ineveryhometoday and we have come up with the following result.

When exposed to our automatic waste segregator and monitoring system.The proposed system would be able to monitor the solid waste collection process and management of the overall collection process.
It would provide in-time solid waste collection. The technologies which are used in the proposed system are good enough to ensure the practical and perfect for solid waste collection process monitoring and management for a green environment.

8. CONCLUSIONS

This paper enhances the cleanliness of smart cities through the practical application of Automaticwastemanagementandsegregationsystemusingautomationwithurbanization and increasingpopulation,disposal of wasteis a major concern. This proposed system is an effective waste segregation system that has no human intervention or interference to separate dry and wet waste. It provides timely collection and disposal. The proposed system can be deployed on a domestic scale in a household or a large scale in public places.

FUTURESCOPE

- Inletselectioncanbeincorporatedwithacrushermechanismtoreducethesizeof incoming waste.
- Provisionscanbemadeforonspotdecompositionofwetwaste.
- Solarpanelscanbeusedforpowersupply.

REFERENCES

1. Padmakshi Venkateshwara Rao, Pathan Mohammed Abdul Azeez IoT-based waste management for smart cities International conference on computer communication and information (ICCCI), Coimbatore, India, Jan22-24,2020.

2. NikolaosBaras,DimitrisZiouziosAcloud-basedsmartrecyclingbinforin-house waste classification in the 2nd International Conference on Electrical, Communication and Computer Engineering, Istanbul Turkey June 12-13 2020.

3. Shashank Shetty, Saket Salvi "SAF-Sutra: A prototype of Remote Smart Waste Segregation and Garbage Level Monitoring System" International Conference Communication and Signal Processing, India, July 28-30,2020.

4. Claude-Noel Tamakaloe, Dr. Elena V. Rosca "Smart System and the Internet of Things (IoT) For Waste Management" Bioengineering/Electrical and Electronic Engineering Dep. Ashesi University Accra, Ghana.

5. Rania Rizki Arinta, Dominikus Boli Watomakin Improve Smart Waste Management to Preserve Tourist Attraction Yogyakarta in IoT Environment International Conference on Smart Technology and Applications (ICoSTA), 2020.

6. Chetna Kaushal, Anshu Singla "Architecture for garbage Monitoring System using Integrated Technology"15 September 2020.

7. M. Al-Maaded,N. K. Madi,RamazanKahraman, A.Hodzic,N. G. Ozerkan, An Overview of Solid Waste Management and Plastic Recycling in Qatar, Springer Journal of PolymersandtheEnvironment, March2012,Vol.20(1),pp 186-194.

8. Raghumani Singh, C. Dey, M. Solid waste management of Municipality of Thoubal, Manipur- a case study of Green Technology and Environmental Conservation,2011 International Conference, Chennai.

9. VikrantBhor,SmartManagementSystemforgarbageinInternationalJournalof Engineering Research and Technology March-2015.

10. Kumar, N. S., Vuayalakshmi, B., Prarthana, R. J., & Shankar, A. (2016). IoT smart garbage alert system using Arduino UNO. 2016 IEEE Region 10 Conference (TENCON).