[SORTING BINS]

A report submitted in partial fulfillment of the Academic requirements for the award of the degree of

Bachelor of Technology

Submitted by

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UNDER THE COURSE

ENGINEERING EXPLORATION AND PRACTICE

CENTRE FOR ENGINEERING EDUCATION RESEARCH

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(Autonomous)
(NAAC Accredited with 'A+' Grade & NBA Accredited)
(Approved by AICTE, Permanently Affiliated to JNTU Hyderabad)
KANDLAKOYA, MEDCHAL ROAD, HYDERABAD-501401

2021-22

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CERTIFICATE

This is to certify that the report entitled **"SORTING BINS"** is a bonafide work done by **G SREE LAKSHMI (21H51A0504) L VAISHNAVI (21H52A0510),VASANTHA (21H51A0524),YOSHITH (21H51A0543),VENGAL (21H51A0550)**of I BTech, in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology, submitted to Centre for Engineering Education Research, CMR College of Engineering & Technology, Hyderabad during the Academic Year 2021-22.

(Names of the Project Coordinators)
1. **Mr. Kayyam Sathish** (Asst. Prof)
2. **Mr. M Raman** Kumar (Asst. Prof)
3. **Mr. B KONDALU**(Asst. Prof)

B.Suresh Ram (Associative Professor)
CEER HOD

DECLARATION

We, the students of I B. Tech of Centre for Engineering Education Research, CMR COLLEGE OF ENGINEERING AND TECHNOLOGY, Kandlakoya, Hyderabad, hereby declare, that under the supervision of our course coordinators, we have independently carried out the project titled "Title" and submitted the report in partial fulfillment of the requirement for the award of Bachelor of Technology in by the Jawaharlal Nehru Technological University, Hyderabad (JNTUH) during the academic year 2018-2019.

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Internal examiner **External examiner**

ACKNOWLEDGEMENT

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We would like to thank the Principal of CMRCET, Dr. V.A. Narayana, for his support in the course of this project work.

We would like to thank my Project coordinators **B. Suresh Ram** (Associative Professor) CEER HOD**, Mr. Kayyam Sathish** (Asst. Prof), Mr. M, Raman Kumar (Asst. Prof)
Mr. B. Kondalu (Asst. Prof) for his/her guidance to complete my project work.

Finally, we thank all our faculty members and Lab Assistants for their valid support.

We own all our success to our beloved parents, whose vision, love and inspiration has made us reach out for these glories.

TABLE OF CONTENTS:

ABSTRACT:

Waste management faces numerous difficulties because of its enormous, quickly developing populace in a densely populated nation in the developing nations. The primary target of the research work is dry and wet waste separation and management process. A portion of the trash individuals produce is biodegradable, some are recyclable, and some are not one or the other. Waste segregation includes isolating wastes as per how it's dealt with or handled. Isolation of waste through at unloading locales burns-through additional time and labor. This work suggests a Waste Segregator, which is a modest, simple to utilize answer for an isolation framework at family units. The waste segregator utilizes moisture sensor to distinguish wet and dry waste and separate them. This system can be used in industries for the employees to use daily. It will be used for wet food junks or even as a normal daily bin. The automatic wet and dry waste and separating system has been developed using microcontroller. As the integrated circuits and microcontroller become more and more accessible and the technology is a fact of today with the improved availability of sensor device.

1.INTRODUCTION:

Waste can be solid, liquid, or gases and each type have different methods of disposal and management. Waste management deals with all types of waste, including industrial, biological, household, municipal, organic, biomedical, radioactive wastes. In some cases, waste can pose a threat to human health. Health issues are associated throughout the entire process of waste management. Directly, through the handling of solid waste, and indirectly through the consumption of water, soil and food. Waste is produced by human activity, for example, the extraction and processing of raw materials.

The aim of waste management is to reduce the dangerous effects of such waste on the environment and human health. A big part of waste management deals with municipal solid, which is created by industrial, commercial, and household activity Proper management of waste is important for building sustainable and livable cities, but it remains as a challenge for many developing country and cities.

In all waste processing and recycling operations the fed material is a ‘waste’ product generated in the primary production. The end products are recycled metal or a by-product produces by chemical treatment of the feed material .and a discharge product is usually much smaller than that of the original ‘waste’ material`.

E-waste is any electrical or electronic equipment that’s been discarded. This includes working and broken items that are thrown in the garbage or donated to a charity reseller like Goodwill. Often, if the item goes unsold in the store, it will be thrown away. E-waste is particularly dangerous due to toxic chemicals that naturally leach from the metals inside when buried.

Why is segregation important?

Isolation keeps up with climate wellbeing and local area health. At the point when trash pickers put their hands into the trash to clean it, it brings about slices that further prompts risky medical problems, bringing about crumbling of a carport picker wellbeing. Henceforth, it becomes mandatory to help these trash pickers via cautiously isolating the waste that is created at the residences. At the point when the waste is not isolated as expected, it prompts less reusing on the grounds that it is anything but a simple assignment to eliminate materials for reusing .

2. LITERATURE REVIEW

EXISTING SOLUTIONS:

The existing solution of our project are:

1 . Segregation of bio degradable and non bio degradable waste.

2 . Segregation of plastic and non plastic waste.

3 . Segregation of metallic and non metallic waste using

conveyor belt.

3. PROBLEM DEFINITION:

Actually, the separate columns which are provided for segregating the waste such as paper, plastic, wet waste, dry waste are not made use in a proper way.

And it is very difficult for the workers to segregate it themselves.

3.1 PROBLEM STATEMENT:

Since it's tough to segregate the wet waste and dry waste manually, even though separate bins are provided they are not properly made use of. So, our team has come up with an idea of segregating the waste, in which we have taken use of moisture sensor, if it detects even 1% of moisture then it shall go to the wet waste column or else the dry waste column.

3.2 OBJECTIVE:

The main objective of our project is to help the workers segregate the waste depending upon whether it is dry or wet uptosome extent which will be very helpful for the workers as well as for the purpose of recycling based on the types of waste.

Actually, when the waste is thrown away, there is a chance of wet waste getting stagnated and many kinds of dangerous bacteria can spread. So, by this project it can be avoided to some extent.

Arduino is the device on which all the components are connected to. first of all Ir sensor is connected to Arduino, which detects whether the substance is present or not. And then the control is passed over to the moisture sensor, which detects whether the moisture /wet content is present or not in that particular substance. After that is the moisture content is present the Dc servo motor takes the charge and lets the substance to move into a separate column of the segregation process.

By this we move towards a sustainable environment followed by sustainable living.

Climate change presents a variety of complex environmental, social, and economic challenges for countries across the globe. In recent decades, the consequences of climate change have become increasingly apparent—from rising global temperatures and more extreme droughts to strengthening tropical storms, destructive wildfires, and devasting floods.

As humans and ecosystems across the planet are suffering from the damaging impacts of climate change, many individuals, communities, and organizations worldwide are embracing environmental sustainability and making this critical cause a priority. These efforts will allow us to decarbonize our planet and conserve natural resources to support the health and wellbeing of future generations.

3.3 REQUIREMENT ANALYSIS:

INFORMATION OF THE COMPONENTS USED:

HARDWARE DESCRIPTION:

1. Arduino UNO microcontroller
2. Moisture senor
3. Dc servo motor
4. IR sensor
5. Jumper wires

SOFTWARE DESCRIPTION:

1. Arduino tool (IDE)

1.ARDUINO UNO:

The microcontroller is an embedded computer chip that controls most of the electronic gadgets and appliances that people use on a daily basis, right from mobile phones, washing machines to anti-lock brakes in cars. The microcontroller was introduced in the electronics industry with the purpose of making our tasks easy that come with even a remote connection with automation in any way. Arduino Uno is a microcontroller board based on 8- bit ATmega328P microcontroller. Along with Atmega328P it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller.

The Arduino Uno comes with USB interface, 6 analog input pins, 14 I/O digital ports that are used to connect with external electronic circuits. Out of 14 I/O ports, 6 pins can be used for PWM

output. It allows the designers to control and sense the external electronic devices in the real world. The software used for Arduino devices is called IDE (Integrated Development Environment) which is free to use and required some basic skills to learn it. It can be programmed using C and C++ language.

Features:

More frequency and number of instructions of cycle

Built in regulation

Flexibility and ease of use

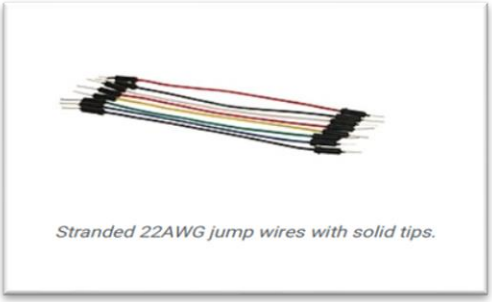
Quick start

Low voltage requirement

2. THE BREADBOARD:

A breadboard, or protoboard, is a construction base for prototyping of electronics. Originally the word referred to a literal bread board, a polished piece of wood used when slicing bread. In the 1970s the solderless breadboard (a.k.a. plugboard, a terminal array board) became available and nowadays the term "breadboard" is commonly used to refer to these.

3.JUMP WIRES:



A jump wire (also known as jumper, jumper wire, DuPont wire) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering. Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

4.MOISTURE SENSOR:

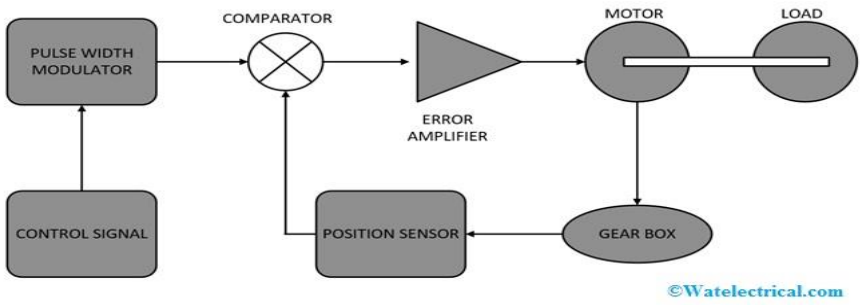
Moisture sensor measures the volumetric content of water based on resistance / conductivity and gives the moisture level as output. The sensor is equipped with both analog and digital output, so it can be used in both analog and digital mode.

The soil moisture sensor consists of two conducting plates which functions as a probe. This sensor is used to measure the volumetric content of water. It can measure content in the soil based on the change in resistance between these two conducting plates. It uses capacitance to measure the dielectric constant of the soil. Dielectric constant can be called as the ability of soil to transmit electricity. When there is more water, the soil will conduct more electricity which means that there will be less resistance. Therefore, the moisture level will be higher. Similarly dry soil conducts less electricity. When there will be less water, then the soil will conduct less

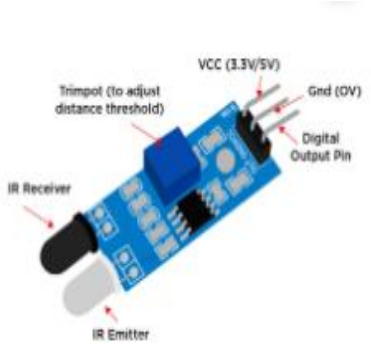
electricity which means that there will be more resistance. Therefore, the moisture level will be lower.

5. DC SERVO MOTOR:

A DC motor along with servomechanism (closed-loop control system) acts as a servo motor which is basically used as a mechanical transducer in the automation industry. Based on its accurate closed-loop control, it has versatile applications used in many industries. The DC servo motor definition is, a motor that is used in servo systems is known as a servo motor. A servo system is a closed-loop system where the feedback signal (position, velocity, acceleration, etc.) drives the motor. This signal acts as an error and based on controller, accurate position or velocity is achieved. The motors are coupled to an output shaft (load) through a gear train for power matching. Servo motor acts as a mechanical transducer as they convert an electrical signal to an angular velocity or position.



6.IR SENSOR:



An infrared (IR) sensor is an electronic device used to measure and detect infrared radiation in its surrounding environment. An infrared sensor works the same way an object detection sensor does. The sensor typically has an IR LED & an IR photodiode, and combining these two gives way to a photo-coupler or optocoupler. The IR LED is basically a transmitter emitting IR radiations; it looks similar to a standard LED. And since the radiation it generates is not cannot be seen by the human eye; the radiation is detected by infrared receivers which are available in photodiodes form.

The infrared photodiode responds to the infrared light generated by the infrared LED. The resistance of photo-diode & the change in output voltage is directly proportional to the infrared light. However, it is imperative to remember that IR photodiodes are not the same as usual photodiodes as they detect only IR radiation.

After the infrared transmitter has produced an emission, it arrives at the object & some of the emission bounces or reflects back towards the infrared receiver. Based on the intensity of the response, the sensor output is decided by the IR receiver.

3.4 METHODOLOGY:

When the waste substance lies on moisture sensor and if the waste substance has any water content / moisture content then it is treated as “wet waste” and goes into wet waste column else to the other column. Before this first IR sensor detects if the substance / waste is present /not followed by the above process.

Then the dc motor controls the movement of waste to either of columns.

CONNECTIONS:

All the components need to be connected to Arduino. According to the Digital, Analog, VCC, and Ground pins. Arrange a breadboard and connect 5V pin of Arduino to breadboard, such that the vertical line points of breadboard works as power supply pins of 5v. Now connect one of the ground pins of Ardiono to breadboard, such that the vertical line points of breadboard works as ground pins.

To connect IR sensor, Ir sensor contains one Digital pin, one vcc pin, one ground pin connect Digital pin(2) of Arduino to Digital pin of Ir sensor , and connect vcc , ground pins through breadboard.

To connect moisture sensor Moisture sensor contains one VCC , one ground and out pin . one analog pin , connect vcc and ground pins through breadboard, connect Digitalpin(11) of Ardiono to sesnsor’s outpin , connect Analog pin(4) of Arduino to sensor .

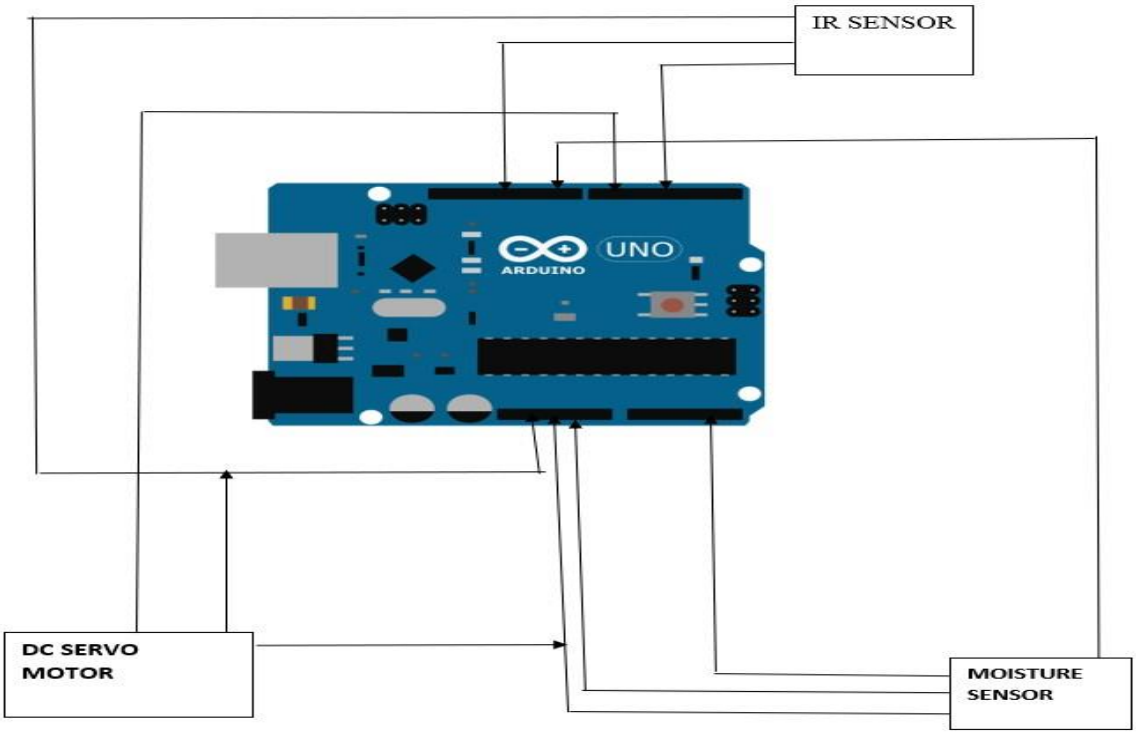
To connect DC servo motor, it contains one out pin , vcc pin , and ground pin connect Digital pin(8) of Arduino to Dc motor and vcc, ground pins through breadboard.

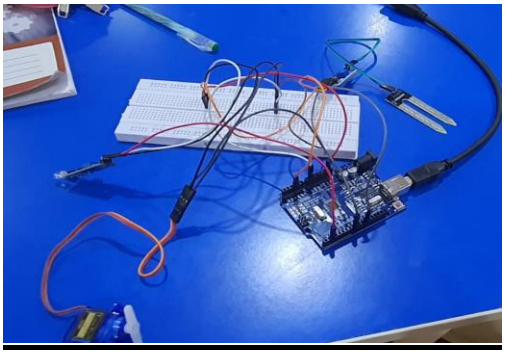
Information of costs of the components used:

S.NO	COMPONENTS	QUANTITY	COST
01	ARDUINO UNO	1	<1000
02	DC SERVO MOTOR	1	<1000
03	IR SENSOR	1	<1000
04	MOISTURE SENSOR	1	<1000
05	FEW JUMPER WIRES	15	<500
06	BREAD BOARD	1	<400

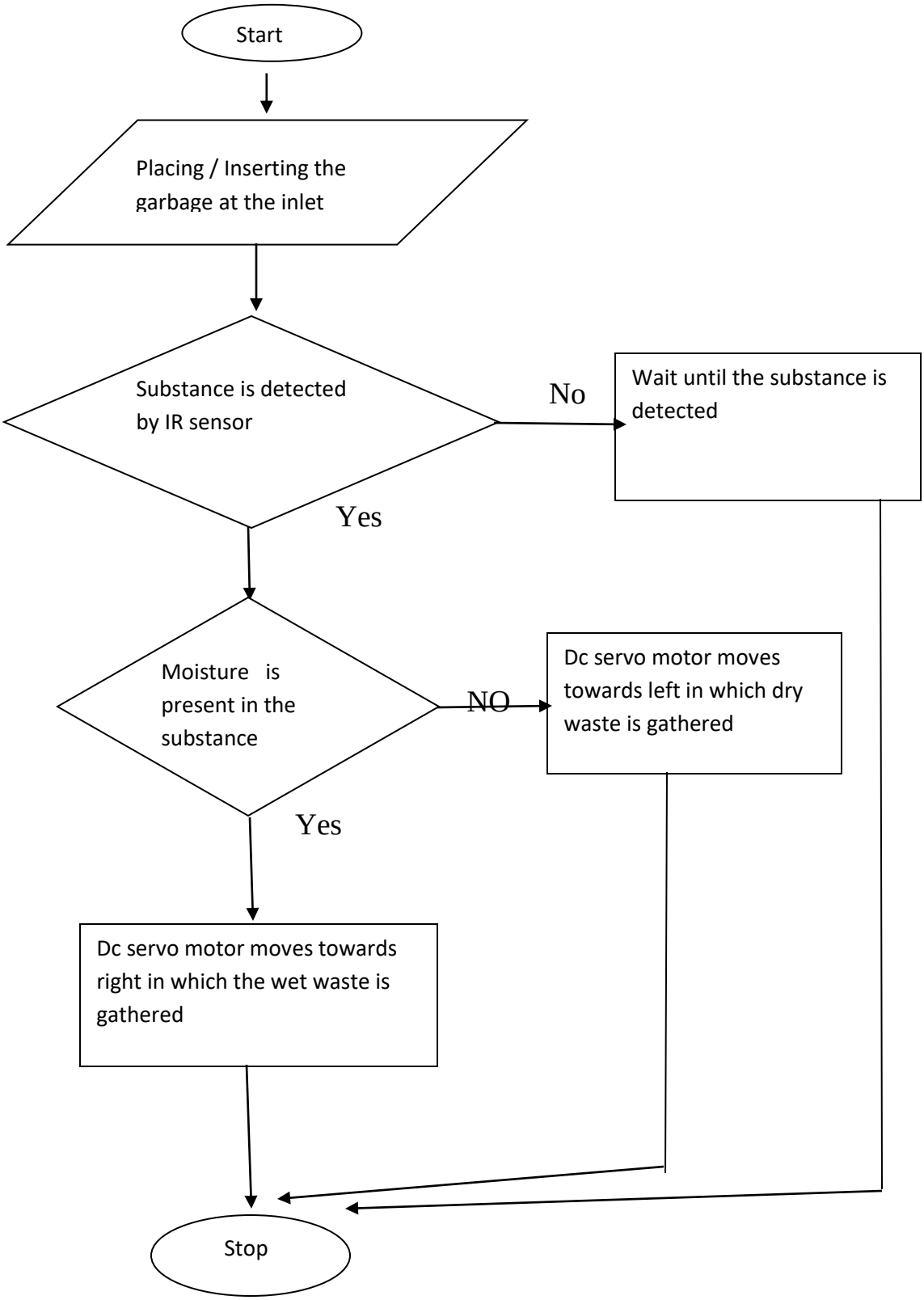
The cost of our project is around 1200.

4.1 DESIGN OF PROPOSED SOLUTION/CONCEPTUAL DESIGN :





4.BLOCK DIAGRAM OF PROPOSED SOLUTION:



4.3 DESIGN DESCRIPTION:

All the components are placed on the cuboidal shaped box.

Hardware Used:

Servomotor- It is used to control the movement / direct the waste into its segregation

Jumper wires-It is used to connect the sensor and motor to the Arduino

Moisture sensor- It detects the moisture content in a particular substance

Ir sensor: It detects whether the substance is present or not

Software Used:

Arduino Uno – It is the host which controls the other components

Arduino (IDE) – it is a platform where the coding part is done according to the requirements.

Advantages:

Dustbin itself separates the waste through the designed mechanism.

Keeps the surroundings neat and clean.

Makes the work easier and efficient for the municipality workers.

Segregated waste can also be recycled if possible.

Hand picking can be avoided.

Disadvantages:

Need to check once in a while whether the mechanism is going on a proper way or not.

If the components fail to work need to be replaced with the new one.

5 IMPLEMENTATIONS:

This methodology can be implemented in many areas such as public places, hospitals, house etc..

5.1 RESULTS AND DISCUSSIONS:

Waste management deals with all types of waste, including industrial, biological, household, municipal, organic, biomedical, radioactive wastes. In some cases, waste can pose a threat to human health.

Exponential population growth has led to increased farming, which leads to greater greenhouse gas emissions and deforestation. Industrial and technological growth means we need more power than ever. Yet our planet is reaching a breaking point. We are beginning to see the consequences of global warming on ecosystems and communities. That's why now more than ever businesses need to invest in environmentally sustainable and socially responsible practices, like using clean energy and paying living wages, to secure a livable future.

In other words, we need more energy and materials than ever before. Despite this, our planet can only provide so many resources before they begin to deplete. For this reason, businesses must step in and do their part. They have more power than any group of individuals, and they can help secure a livable future by investing in sustainable and responsible practices like reducing waste, using commercial clean energy, and paying fair wages.

Isolation keeps up with climate wellbeing and local area health. At the point when trash pickers put their hands into the trash to clean it, it brings about slices that further prompts risky medical problems, bringing about crumbling of a carport picker wellbeing. Henceforth, it becomes mandatory to help these trash pickers via cautiously isolating the waste that is created at the residences.

5.2 CONCLUSIONS:

Human activities are the major cause of environmental degradation because most of the activities humans do harm the environment in some way. The activities of humans that causes environmental degradation is pollution, defective environmental policies, chemicals, greenhouse gases, global warming, ozone depletion, etc.

All these affect the environment badly. Besides, these the overuse of natural resources will create a situation in the future there will be no resources for consumption. And the most basic necessity of living air will get so polluted that humans have to use bottled oxygen for breathing.

The environment regulates various natural cycles that happen daily. These cycles help in maintaining the natural balance between living things and the environment. Disturbance of these things can ultimately affect the life cycle of humans and other living beings.

The environment has helped us and other living beings to flourish and grow from thousands of years. The environment provides us fertile land, water, air, livestock and many essential things for survival.

Thus, a sustainable city and a good quality of environment can be ensured, thereby it also assures good health and wellbeing of humans.

It would be another step towards clean and green environment.

6.APPENDIX:

6.1 REFERENCES:

https://ieeexplore.ieee.org/document/9104196

https://ieeexplore.ieee.org/abstract/document/8663148

https://ieeexplore.ieee.org/abstract/document/9641526

6.2 SOURCE CODE:

```
#include<Servo.h>
Servo motor;
int pos = 0;
void setup()
{
  motor.attach(8);
  pinMode(2, INPUT);
  pinMode(6,INPUT);
}
void loop()
{
  int i=0,n=0;
  motor.write(0);
  int sensorValue0 = analogRead(A0);
  if (sensorValue0 < 100)
{
  if(digitalRead(6) !=HIGH)
  {
 motor.detach();
 delay(50);
 motor.attach(8);
 motor.write(0);
 delay(50);
```

```
for (pos = 0; pos <= 180; pos += 1) { // goes from 0 degrees to 180 degrees
   // in steps of 1 degree
   motor.write(pos);              // tell servo to go to position in variable 'pos'
   delay(15);
}
 motor.detach();
 }
 else
 {
   motor.detach();
 delay(50);
 motor.attach(8);
 motor.write(0);
 delay(50);
 for (pos = 180; pos >= 0; pos -= 1) { // goes from 180 degrees to 0 degrees
   motor.write(pos);              // tell servo to go to position in variable 'pos'
   delay(15);                     // waits 15ms for the servo to reach the position
  }

 delay(50);

 motor.detach();

 delay(50);
 }
```

```
}
 else
 {
  motor.write(0);
 }
  motor.write(0);
}
```

7.JOURNALS /PUBLICATIONS:

Indian J.Sci.Res. 18 (2): 255-259, 2019 ISSN: 2250-0138 (Online)

A RESEARCH STUDY ON WASTE SEGREGATION AT SOURCE IS THE KEY IN MUNICIPAL SOLID WASTE MANAGEMENT IN DELHI

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ABSTRACT

Segregation at the source is the key in solid waste management, especially when we have limited economical resources. We divide solid waste into three categories Wet, Dry and hazardous waste. According to solid waste management rule, 2016 it is responsibility of generators to segregate waste into these three categories. Lack of awareness, loosely implementation of laws and various other reasons are obstacles in achieving appropriate results. After segregation we can choose Reduce, Reuse and Recycle for appropriate solid wastes. Solid waste management should be sustainable ecologically as well as economically. In a developing country like India it's very important to have a cast effective solid management plan. We have to deal with poverty, population growth and high urbanization rate combines with ineffective and under-funded solid waste management technique.

KEYWORDS: Segregation, Solid Waste Management

Solid waste management in developing countries is looked as major challenge to civil bodies. At a time when the national capital is dealing with increasing load of solid waste and struggling with its scientific disposal, we have to rethink the segregation methods of solid waste. There are five municipal corporations (comprising over 280 wards) are there in the city, according to Delhi pollution control committee (DPCC) these 280 wards generate approximately 14,000 tonnes per day (TPD) of solid waste in delhi. We mainly use landfilling and burning as a tool for disposal of solid wastes. There are three landfilling sites are there in the city Bhalswa, Okhla and Ghazipur. Height of these landfilling sites are increasing dangerously. As load on these sites are increasing day by day and bearing capacity of these sites are decreasing with time, we have to find a way forward. Ministry of Environment, Forest and Climate Change Government of India has notified The Solid Waste Management Rules 2016, in supersession to the Municipal Solid Waste (Management and Handling) Rules 2000. The new rules generally relate to Municipal Solids Waste. A new category of Domestic Hazardous Solid wastes has also been established. The new rules have also made a provision of segregation at source, before this provision most of the segregation were done at destination. Solid Waste can be segregated into the different streams like Biodegradable waste (it includes organic waste, e.g. kitchen wastes, fruits, flowers, leaves from the trees, paper etc.). Basic reason for segregation of solid waste is that we need different treatment for different solid wastes. As Landfill sites in Delhi had exceeded their capacity way back in 2008 and most of these sites is being contaminating soil, groundwater and air quality in and around their surroundings. In an important judgment NGT (national green tribunal) told that (Order of the National Green Tribunal in the matter of Almitra H. Patel & Anr. Vs. Union of India & Others dated 11/09/2017 regarding municipal solid waste management in Delhi.) The Municipal Corporation shall, at its own cost after taking all help from other stakeholders including NCT Delhi, start the work of segregation, compaction and bioremediation of the municipal solid waste. In an another order in March 2019 NGT said that civic body should notify at least three wards or zones as model wards where complete compliance with solid waste management rules is expected. NGT also said that the "model wards" are required to be compliant within six months while the remaining wards or zones have to be made "fully compliant in respect of environmental norms within one year". The three municipal corporations have taken different approaches to pursuance of these orders. All three, however, are focusing on ensuring source segregation of waste at the household and commercial level in their attempt to fully comply with municipal solid waste management by-laws.

LITERATURE REVIEW

Municipal Solid Waste Regulations and Schemes in India

The Environment Protection Act enacted in 1986 gave power to the central government to regulate all forms of waste and to tackle specific problems that may be present in any region of India. Under the Act, the central government has the power to take measures to protect and

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