



IJIRCCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 3, March 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.379



9940 572 462



6381 907 438



ijircce@gmail.com



www.ijircce.com

Wet and Dry Waste Segregation Using Arduino

Mr.A.A.Magar¹, S.S.Gawai², K.S.Gawande², S.N.Bhakare², A.S.Patil², V.K.Ingle², R.G.Paithankar²

Head of Department, Dept. of ENTC, Anuradha Polytechnic, Chikhli, Maharashtra, India¹

Diploma Student, Dept. of EE, Anuradha Polytechnic, Chikhli, Maharashtra, India²

ABSTRACT: A methodology is introduced with oversee waste in large urban areas adequately without checking the parts 24x7 physically. Here the issue of disordered waste assortment is addressed by planning an Arduino Uno framework which will screen every dumpster exclusively for the measure of waste kept. Here a computerized framework is accommodated isolating wet and dry waste. A mechanical arrangement can be utilized for isolating wet and dry waste into independent compartments. Sensors can be utilized for isolating wet and dry. In this process, ultrasonic sensor detects the object when placed. Based on the moisture content present in the object, moisture sensor will detect the type of waste. The waste is segregated accordingly in to the bins. It leads to reduced quantities of hazardous waste and toxic gases like carbon-di-oxide and methane. It also reduces human efforts.

KEYWORDS: Arduino Uno, Moisture sensor, Ultrasonic Sensor, Dc Servo Motor, Arduino IDE Software,Coading

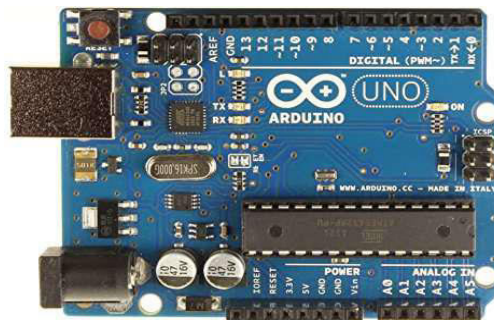
I. INTRODUCTION

Today enormous urban communities all throughout the planet are dealing with a typical issue, dealing with the city squander adequately without making city messy. The present waste administration frameworks include an enormous number of workers being selected to go to a specific number of dumpsters this is done each day intermittently. This prompts an exceptionally wasteful and messy framework wherein a few dumpsters will be spilling over certain dumpsters probably won't be even half full. Wastes like plastic, damped paper and so forth may likewise be oppressed to recycling. In some manners by which, the waste will truly work an asset. By isolating waste into entirely unexpected classes we will carry out measures which will cause compelling asset usage. This is used at individual just as society level. Squander the executives is the one in everything about center contemplations of contemporary age. As countries round the world region unit creating, their contemplations and obligation regarding a better climate is furthermore expanding. During this task, execute an effective decent waste administration framework. Presently days in many urban areas there are numerous dustbins which are in awful conditions. The trash in a dustbin is totally flooded off the dustbin. Many individuals are tossing trash on that dustbin which is as of now full or flooded. Because of this messy of trash receptacles contamination is expands which are terrible for the climate. This makes an exceptionally terrible look of the city which is an approach to help to the air contamination and to some destructive illnesses which are effectively spreadable. Waste disposal is a huge cause for concern in the present world. The disposal method of a voluminous amount of generated waste has had an adverse effect on the environment. Unplanned open dumping at landfill sites made by municipal is a common method of disposal of waste. Human health, plant and animal life are affected due to this method .The harmful method used for waste disposal generates harmful chemicals which contaminate surface and groundwater. It can give rise to disease vectors which spread harmful diseases. This also degrades the aesthetic value of natural environment can degrade the aesthetic value of the natural environment and it is an unavailing use of land resources. In India, rag pickers play an important role in the recycling of urban solid waste. Rag pickers and conservancy staff have higher morbidity due to infections of the skin, respiratory, gastrointestinal tract and multisystem allergic disorders, in addition to a high prevalence of bites of rodents, dogs and other vermin. Dependency on the rag-pickers can be diminished if segregation takes place at the source of municipal waste generation. The economic value of the waste generated is not realized unless it is recycled completely. Several advancements in technology have also allowed the refuse to be processed into useful entities such as Waste to Energy, where the waste can be used to generate synthetic gas made up of carbon monoxide and hydrogen. The gas is then burnt to produce electricity and steam; Waste to Fuel, where the waste can be utilized to generate befouls. When the waste is segregated into basic streams such as wet, dry and metallic, the waste has a higher potential of recovery and consequently recycled and reused.

II. RELATED WORK

ARDUINO UNO

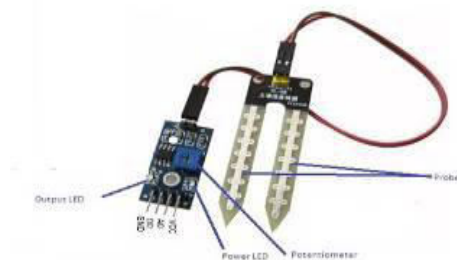
The arduino uno is an open-source microcontroller board based on the microchip ATmega328P microcontroller (MCU) and developed by arduino.cc and initially release in 2010. The microcontroller board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the arduino IDE (Integrated Development Environment), via a type B USB cable or barrel connector that accepts voltages between 7 and 20 volts, such as a rectangular 9 volt battery. It has the same microcontroller as the Arduino Nano board, and the same headers as the Leonardo board. Arduino was introduced back in 2005 in Italy by Massimo Benzie as a way for non- engineers to have access to a low cost, simple tool for creating hardware projects. Since the board is open-source, it is released under a Creative Commons license which allows anyone to produce their own board. If you search the web, you will find there are hundreds of Arduino compatible clones and variations available but the only official boards have Arduino in its name.



Arduino uno

MOISTURE SENSOR

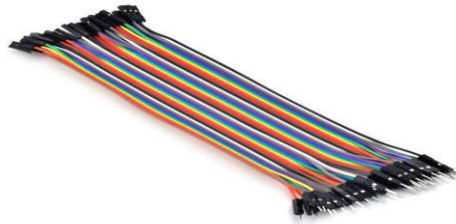
The soil moisture sensor consists of two probes which are used to measure the volumetric content of water. The two probes allows the current to pass through the soil and then it gets the resistance value to measure the moisture value. When there is more water, the soil will conduct more electricity which means that there will be less resistance. Therefore, the moisture level will be higher. Dry soil conducts electricity poorly ,so 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. This sensor can be connected in two modes; Analog mode and digital mode. First, we will connect it in analog mode and then we will use it in digital mode.



moisture sensor

JUMPER WIRE

A jumper wire is an electric wire that connects remote electric circuits used for printed circuit boards. By attaching a jumper wire on the circuit, it can be short-circuited and short-cut (jump) to the electric circuit. By placing the jumper wire on the circuit, it becomes possible to control the electricity, stop the operation of the circuit, and operate a circuit that does not operate with ordinary wiring. Also, when specification change or design change is necessary on the printed circuit board, reinforcement of the defective part, partial stop of the unnecessary function, and change of the circuit configuration of the unnecessary output part by attaching or detaching the jumper wire can do jumper wire (NSL: New Showa Lead) is a lead-free tin-plated annealed copper wire.



Jumper wire

DC SERVO MOTOR

A type of servomotor that uses DC electrical input to generate mechanical output like velocity, acceleration or position is known as DC servomotor. It is somewhat similar to a normal DC motor. However, there exist some differences between a normal dc motor and dc servomotor. Basically, DC servomotors of all types are required to be excited individually. This leads to provide linear characteristics between torque and speed.

A servo motor or servo is one type of electrical motor used to rotate the machine parts with high precision. This motor includes a control circuit that provides feedback on the current location of the shaft of the motor so this feedback simply allows these motors to revolve with high precision. A Servo motor is beneficial in rotating an object at some distance or angle. This motor is classified into two types AC servo motor and DC servo motor. If a servo motor uses DC power to work then the motor is called a DC servo motor whereas if it works with AC power then it is known as an AC servo motor. This tutorial provides brief information on the DC servo motor. A servomotor that uses DC electrical input to produce mechanical output like position, velocity, or acceleration is called a DC servomotor. Generally, these types of motors are used as prime movers within numerically controlled machines, computers, and many more wherever starts & stops are made precisely & very quickly.



12v dc servo motor

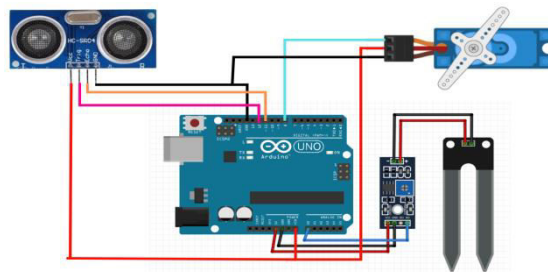
ULTRASONIC SENSOR

Ultrasonic detection is one of the greatest ways of reliably sensing levels and determining proximity. Since they have been in use for many years, ultrasonic sensors have a significant portion of the sensing market. These sensors play a crucial role in countless applications, from industrial automation to robotics and automotive safety systems. In this brief overview, we'll delve into the mechanics of ultrasonic sensor working. The use of ultrasonic sensors in various fields, such as drones and electric cars, is growing as the automation sector develops. This blog provides a deep knowledge of what is ultrasonic sensor and how it works



Ultrasonic sensor

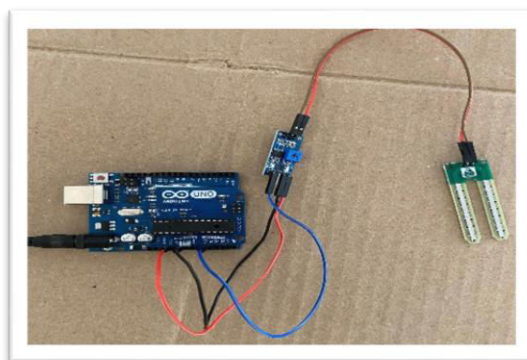
CIRCUIT DIAGRAM



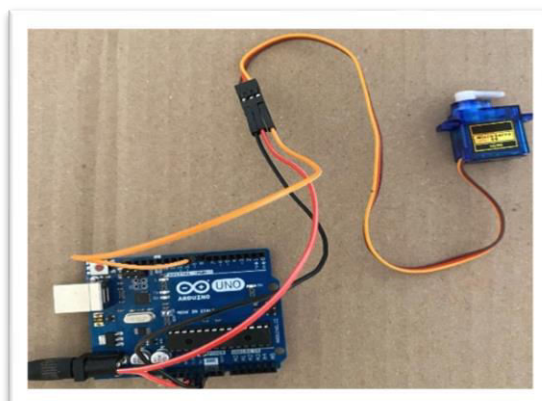
Circuit Diagram

THE PROCESS OF MAKING SYSTEM

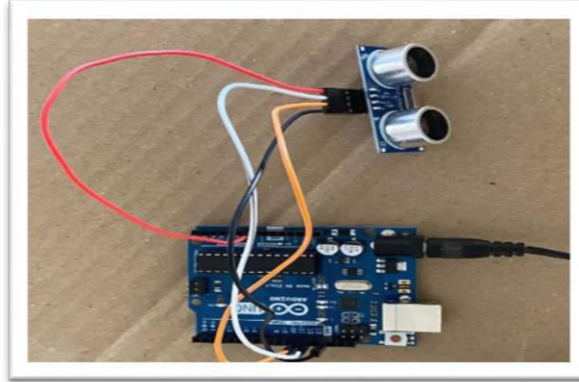
Step1: Firstly, Arduino UNO board, power supply and moisture sensor are setup on the board. These processes are shown in figure;



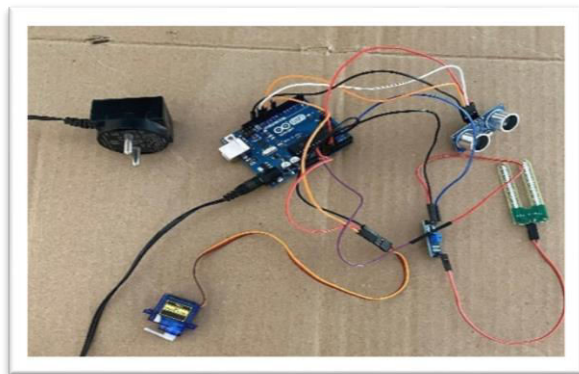
Step2: then connected servo motor to arduino uno board shown in figure.



Step3: then connected ultrasonic sensor to arduino uno board shown in figure.

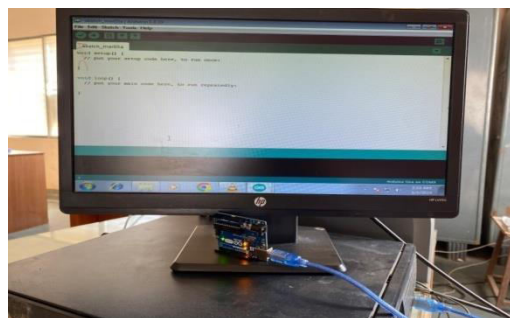


Step 4: All instrument are connected with arduino uno board shown in figure.



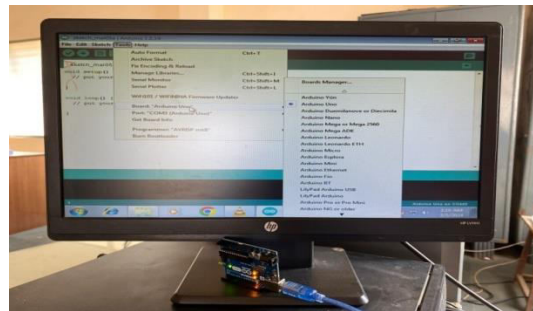
WRITE THE PROGRAM USING ARDUINO IDE SOFTWARE

The user have had the Arduino IDE software to write the program. Arduino UNO board is connected to the computer using the USB cable. And then, double-click the Arduino application, and then write the program.



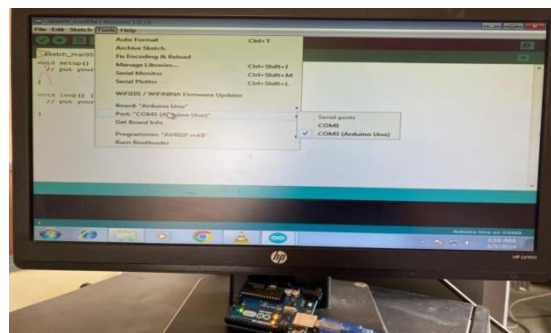
Start creating screen of arduino program

This program uses the functions pin Mode (), digital Write (),and delay (), which are provided by the internal libraries included in the IDE environment. The user can select the suitable board in the tools bar.



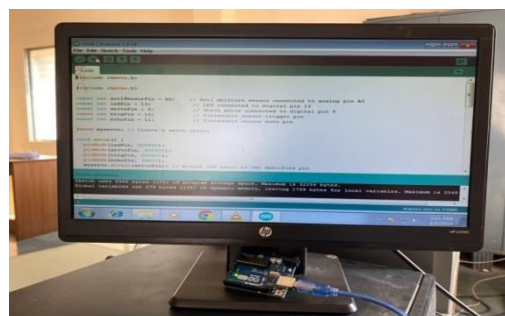
Select the board

And then, select the serial/COM port that Arduino is attached to:
Tools > Port > COM 3.



Select the serial port

If the users selected the serial port, the users can write the coding for the process. Now, simply click the “Upload” button in the environment. Wait a few seconds – the users should see the RX and TX led son the board flashing. If the upload is successful, the message “Done uploading.” will appear in the status bar.



Upload the program.

COADING:

```
#include <Servo.h>
```

```
#include <Servo.h>
```

```
constintsoilSensorPin = A0; // Soil moisture sensor connected to analog pin A0
constintledPin = 13; // LED connected to digital pin 13
constintservoPin = 8; // Servo motor connected to digital pin 9
constintrigPin = 10; // Ultrasonic sensor trigger pin
constintechoPin = 11; // Ultrasonic sensor echo pin
```

```
Servo myservo; // Create a servo object
```

```
void setup() {  
  pinMode(ledPin, OUTPUT);  
  pinMode(servoPin, OUTPUT);  
  pinMode(trigPin, OUTPUT);  
  pinMode(echoPin, INPUT);  
  myservo.attach(servoPin); // Attach the servo to the specified pin  
  Serial.begin(9600);  
}
```

```
float getDistanceUltrasonic() {  
  digitalWrite(trigPin, LOW);  
  delayMicroseconds(2);  
  digitalWrite(trigPin, HIGH);  
  delayMicroseconds(10);  
  digitalWrite(trigPin, LOW);
```

```
  float duration = pulseIn(echoPin, HIGH);  
  float distance = duration * 0.0343 / 2; // Calculate distance in centimeters  
  return distance;  
}
```

```
void loop() {  
  int soilMoisture = analogRead(soilSensorPin); // Read analog value from soil moisture sensor  
  float ultrasonicDistance = getDistanceUltrasonic(); // Get distance from ultrasonic sensor
```

```
  Serial.print("Soil Moisture: ");  
  Serial.println(soilMoisture);  
  Serial.print("Ultrasonic Distance: ");  
  Serial.println(ultrasonicDistance);
```

```
  int dryThreshold = 600;  
  int dryThreshold1 = 700;
```

```
  if (ultrasonicDistance < 4) {  
    delay(1000);  
    if (soilMoisture > dryThreshold) {  
      digitalWrite(ledPin, HIGH);  
      myservo.write(180);  
      delay(1000);
```

```
    }  
    if (soilMoisture < dryThreshold1) {  
      digitalWrite(ledPin, HIGH);  
      myservo.write(0);  
      delay(1000);  
    }  
  }  
  else {  
    digitalWrite(ledPin, HIGH);  
    myservo.write(90);  
  }
```

```
}
```


III. CONCLUSION AND FUTURE WORK

The smart bin was experimental with various items which are disposed on a regular basis. The wastes such as vegetable peels, wet tissue, were used to test the effectiveness of segregation of wet waste, it was observed that the system started to function only offer the waste is placed on the upper bin, following a three second delay period, the materials thrown by the user was correctly segregated into its respective wet waste sub bin. This system helps the native municipal administration in waste management system for segregating dry waste and wet waste. It uses sensors for sensing dry waste and wet waste. The planned system is an endeavor to boost current waste assortment system in India for “Clean India mission”. Smart waste segregation system avoids human intervention, reducing human time and energy. With growing urbanization presents a smart and cost effective solution for waste segregation. The proposed “Smart Bin” is an efficient waste segregation system that requires no human intervention to separate dry and wet waste and paves the path for timely collection and disposal. Proper waste removal helps improve air and water quality as well as reduces greenhouse gas emissions. It helps in minimizing the extraction of resources along with reducing pollution and energy consumption which is associated with manufacturing new materials. Due to this information, we can control the overflow of the garbage in public areas and the pollution which generally occurs around the bins. This System can segregate and decompose the decomposable waste material which will be useful for the users mainly who belong to the agriculture field. Overall, this methodology keeps environment clean and fresh.

REFERENCES

1. .Amrutha Chandramohan, Joyal Mendonca, Nikhil Ravi Shankar, Nikhil U Baheti, NitinKumar Krishnan Suma M S, Automated Waste Segrega- tor,RashtreeyaVidyalaya College Of Engineering (R.V.C.E), Bangalore, In- dia. 4-5 April 2014.
2. NishigandhaKothari ,Waste to Wealth, NSWAI, New Delhi, Jul. 2013.J.S. Bajaj, Urban Solid Waste Management in India, Planning Commission Government of India,NEW DELHI,1995.]
3. .Narayan Sharma, NirmanSingha, Tanmon-dutta “SmartBins Implementation for SmartCities” in Sept 2015Volume 6 issue 9.
4. Twinkle Sinha, K. Mugesh Kumar, and P. Saisharan “SmartDustbin” in May 2015Volume 3 issue
5. .BikramjitSinghandManpreet Kaur “SmartDustbins for SmartCities” in 2016,Volume JyotiSavakare, ShubhangiSolunke, RahulTagalpallewar,MaheshBhagwat “Smart Garbage Monitoring System with CompressingMechanism” Issue 6 Volume
6. KannapiranSelva raj and Dr. ArvindChakrapani“Smart Dustbin Monitoring System” using LAN server and ArduinoinApril 2017, volume 2 issue
7. 7.Varudandi, S., Mehta, R., Mahetalia, J., Parmar, H., &Samdani, K. (2021). A Smart Waste Management and Segregation System that Uses Internet of Things, Machine Learning and Android Application. 2021 6th International Conference for Convergence in Technology (I2CT).
8. C. P, M. G., Yadav, S., Shanmugam, A., V, H., & Suresh, N. (2021). Waste Classification and Segregation: Machine Learning and IOT Approach. 2021 2nd International Conference on Intelligent Engineering and Management (ICIEM).
9. Rafeeq, M., Ateequrahman, Alam, S., &Mikdad. (2016). Automation of plastic, metal and glass waste materials segregation using arduino in scrap industry. 2016 International Conference on Communication and Electronics Systems (ICCES).
10. Shetty, S., &Salvi, S. (2020). SAF-Sutra: A Prototype of Remote Smart Waste Segregation and Garbage Level Monitoring System. 2020 International Conference on Communication and Signal Processing (ICCSP).



INNO  **SPACE**
SJIF Scientific Journal Impact Factor
Impact Factor: 8.379



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

 **9940 572 462**  **6381 907 438**  **ijircce@gmail.com**



www.ijircce.com

Scan to save the contact details