SMART COMPOST SYSTEM

*Note: Submission to THE ROBOTICS CLUB - SNIST as a part of POST INDUCTION'22d

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***Abstract*—As per the report of environmental protection agency the percentage of waste material thrown on the landfills increases year by year. Because of these pollution increases as these waste material emits the methane gas and other harmful gases. These gases go into air as we inhale it goes to human body and it create pollution in environment. These gases are the alarm to the global warming because of this it starts heating the planet. Now-a-day we are realizing that in summer season temperature increases year by year. The best option to done with the waste as we throwing on landfills is to do composting. Composting means put a waste in close unit and let the microorganism breakdown to make humus like product. This product can be used as a fertilizer for plants and soils. In this system with the help of Arduino, temperature sensor, gas sensor, humidity and moisture sensor compost will be monitored. According to reading of these parameters controlling actions are to be taken. If the moisture or temperature goes below the level, then it will automatically open the water pipe and air pipe. It closed after moisture level reaches to some predefined value. We can monitor all these parameters remotely with the help internet.**

I. Introduction

Composting means breakdown of microorganism at particular temperature to form a nutrient full product for plant. There are many ways to do composting. We can start compost at our home too. If we seriously think about it compost is form from the wastes product we throw away as garbage. The main problem is that what we throwing as garbage waste our municipalities collect daily and thrown on some landfills. Landfills mean wholes on the ground. After throwing it on landfills they leave the waste as it is for years and years. As a result it starts decomposing and this type of decomposing is anaerobic composting. Anaerobic composting means microorganism breaks without oxygen. Since the waste is open and microorganism breakdown in air as a result it starts emitting methane gas and it is harmful for our environment. As methane gas emits continuously from the waste it ends up with heating our planet year by year. So composting is good option instead of filling the lands with garbage's and it is counted in solid waste management.

II. Problem Statement

As we see nowadays organic farming is widely practicing by the people. It involves storing all the biodegradable matter such as vegetables waste and rotten leaves and allowing microorganisms to grow. The problem of making the compost is it need proper maintenance and great observation to make a good organic compost. The challenge with this approach is the care needed to maintain the composting environment. This involves aerating the compost, adding materials to maintain heat/pH, and watering the compost as needed. This is where the Smart Compost System can help.

III. Literature Survey

We all discussed about the problem statement and put out our own ideas and changes to bring this small scale project which can be made fast. We saw multiple videos and had many discussions on how to implement our idea in an efficient way and what are the measures we need to take while doing the project.

IV. Architecture

COMPONENT REQUIRED

Hardware

a) Gas sensor: Gas sensor converts the components and concentrations of various gases into standard electrical signals by using specific physical and chemical effects. It has been widely used in the detection of noxious and harmful gases and natural gas leakage.

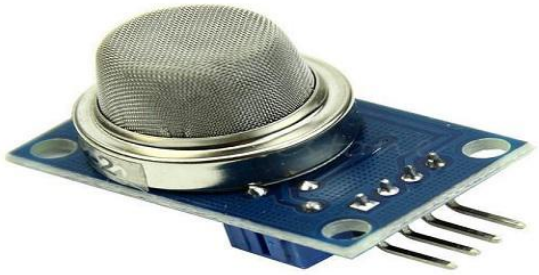

Fig 1.Gas Sensor MQ2

Identify applicable funding agency here. If none, delete this.

b) Temperature Sensor: A temperature sensor is a device that detects and measures hotness and coolness and converts it into an electrical signal.

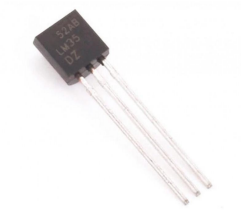

Fig 2.Temperature Sensor

c) Moisture Sensor: The Soil Moisture Sensor measures soil moisture grace to the changes in electrical conductivity of the earth (soil resistance increases with drought). The electrical resistance is measured between the two electrodes of the sensor. A Comparator activates a digital output when an adjustable threshold is exceeded.

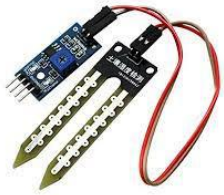

Fig 3. Moisture Sensor

d) Water pump: A water pump can drain water from a basement or shallow flooded areas, drain and fill a swimming pool or dam. It can also be utilised in the irrigation needed for agriculture. Water pumps are employed for getting rid of excess water to reduce the downtime from large rain events.

Fig 4. Water Pump

e) Jumper Wires: A jumper wire is an electrical wire, or group of them in a cable, with a connector or pin at each end 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.

f) Arduino UNO: Arduino UNO is a low-cost, flexible, and easy-to-use programmable open-source microcontroller board that can be integrated into a variety of electronic projects. This board can be interfaced with other Arduino boards, Arduino shields, Raspberry Pi boards and can control relays, LEDs, servos, and motors as an output.

Fig 5.Arduino UNO.

g) Servo motor MG995 : MG995 servo is a simple, commonly used standard servo for your mechanical needs such as robotic head, robotic arm. It comes with a standard 3-pin power and control cable for easy using and metal gears for high torque. A Me RJ25 Adapter also help you to connect the servo with Me Baseboard or Make block Orion easily.

Fig 6.Servo Motor

h) Center Shaft DC: Many putters have a sight line, an aiming aid, on the top of the putter head to mark trs the club head closer to that sight line than to the heel.

Fig 7.Center Shaft DC Motor

i) Relay: Relays are electrically operated switches that open and close the circuits by receiving electrical signals from outside sources.

Fig 8.Relay

V. Software requirement

a) Arduino IDE: Arduino "Integrated Development Environment" is an open source Arduino Programming acclimated compose codes in simple way and transfer it to the Board.:

b) Proteus Software: The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic: prints for manufacturing printed circuit boards.

c) Auto CAD : CAD (computer aided design) design is used in almost every industry, in projects as wide-ranging as landscape design, bridge construction, office building design, and movie animation. With 2D or 3D CAD programs, you can perform a variety of tasks: you can create a 3D model of a design, apply material and light effects, and document the design with dimensions and other annotations. With features like point clouds, you can add real-life context to your drawings to create a digital twin or recreate physical objects in your designs:

d) Thinker cad : Tinkercad is a free web app for 3D design, electronics, and coding, trusted by over 50 million people around the world. Build STEM confidence by bringing project-based learning to the classroom.:

VI. Implementation and Working

Working: 1.In our bot we are using components like Arduino-UNO, Temperature sensor, Moisture sensor, Servo motor mg996g , Relay etc. 2.The container contains two sections 3. In the one section the working takes place. 4. The portion is total covered with aluminium foil. 5. Inside the aluminium foil we input all the kitchen waste in it 6. Through the help of cutter inside the bot make the wastage into powder like substance. That takes at least 40 days to get organic compost. 7. The powder will be used as an organic material for farming instead of using chemical fertilizers.

VII. CAD DESIGN

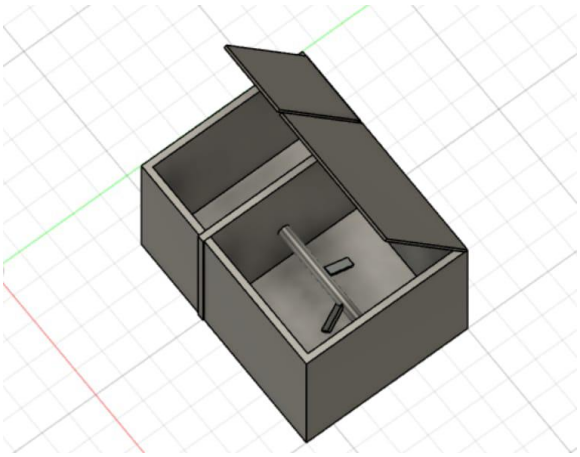

Fig 9. CAD Design

VIII. BLOCK DIAGRAM

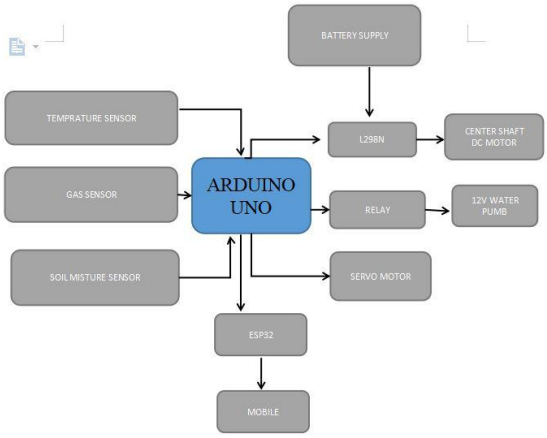

Fig 10. Block Digram

IX. RESULT

The smart compost gives you good fertilizer for the growth of a plant and can be used for agriculture purpose. This project is a helpful for the people to grow the organic plants in their houses and can save their health from artificially grown one

X. FUTURE ENHANCEMENT

Composting is the delicate procedure of supervised decomposition of organic waste, which gradually transforms waste to nutrient-rich manure. That helps people to get food without chemicals involved and everyone be healthy .This makes future to become healthy and happy.

XI. REFERENCE

1. The reference is taken from a new paper name TIMES OF INDIA their was a article on it. 2. The information was taken from internet from an article. 3.https://www.ijcea.com/smart-composting-system-using-iot/ 4.https://ecetp.colorado.edu/

XII. SOURCE CODE

```
#include <Servo.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
//const int rs= 12, en=11, d4=5, d5=4, d6=3, d7=2;
Servo myservo;
int pos = 0;    // variable to store the servo position
int gassensor = A1; // gas sensoer pin
int buzzer=12; // buzzer pin
int sensorvalue; //gas sensora
int t=0;
int tempsensor = A0; // temperature sensor pin
float temp;
float tempc;
float tempf;
LiquidCrystal_I2C lcd(0x27, 2, 16);
int water;//random variable
int motor1pin1 = 2;
int motor1pin2 = 3;
int sensorPin = 3;

void setup()         // put your setup code here, to run once:
{
pinMode(gassensor, INPUT);
pinMode(buzzer,OUTPUT);
pinMode(tempsensor,INPUT);
pinMode(motor1pin1, OUTPUT);
pinMode(motor1pin2, OUTPUT);
pinMode(5,INPUT);
lcd.backlight();
myservo.attach(9);
  Serial.begin(9600);
  delay(2000);
}

void loop()
{
  // GAS SENSOR
  sensorvalue = analogRead(gassensor);
  Serial.println(sensorvalue);
 if(sensorvalue==70)
 {
   Serial.println("gas sensor warning...");
   digitalWrite(buzzer,HIGH);
  {
    myservo.write(90);
    delay(2000);
  }
  Serial.println("no gas detected");
  digitalWrite(buzzer,LOW);
    myservo.write(0);              // tell servo to go to position in variable 'pos'
    delay(2000);                       // waits 2s for the servo to reach the position
}
// LCD
delay(2000);
t=t+2;
temp=analogRead(tempsensor);
tempc=(temp*5)/10;
tempf=(tempc*1.8)+32;
Serial.println("___");
Serial.println("Temperature Logger");
Serial.print("Time in Seconds= ");
Serial.println(t);
Serial.print("Temp in deg Celcius = ");
Serial.println(tempc);
Serial.print("Temp in deg Fahrenheit = ");
Serial.println(tempf);
lcd.setCursor(0,0);
lcd.print("Temp in C = ");
lcd.println(tempc);
lcd.setCursor(0,1);
lcd.print("Temp in F = ");
lcd.println(tempf);
//WATER PUMP
water = digitalRead(5);
 if (water ==HIGH)
 {
 digitalWrite(motor1pin2, LOW);
  }
  else
  {
  digitalWrite(motor1pin2,HIGH); //high to continue proving signal and water supply
  }
  delay(400);
}
```

CIRCUIT DIAGRAM

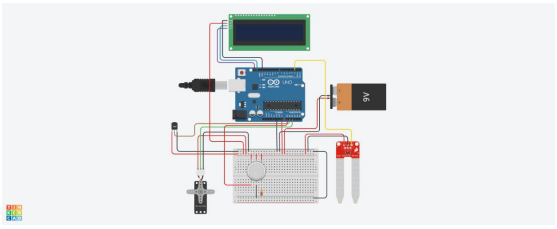

Fig 11. Circuit Diagram

RECORD OF EXPENSES

COMPONENTS	**QUANTITY**	**PRICE**
Arduino UNO	1	800
Temperature Sensor LM35	1	80
Relay	1	70
Motor pump	1	80
Buzzer	1	50
Center Shaft DC Motor	1	150
Bread Board	1	80
Vector Board	1	30
Servo Motor 995	1	300
Jumper wires	3	50
Gas Sensor MQ2	1	110
Soil Moisture Sensor	1	80
Battery 12V	1	300
SPSD Switch	1	10
I2C Module	1	80
LCD Display 16*2	1	120
Pipes	1	30
TOTAL	20	2420