A

Mini Project Report

on

**Food Wastage Monitoring System**

Submitted in partial fulfillment of the
Requirements for the award of degree of

**Bachelor of Technology**

in

**Computer Science and Engineering – Data Science**

by

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**(2020-2024)**

**DEPARTMENT OF DATA SCIENCE**

**CERTIFICATE**

This is to certify that the project entitled **"Food Wastage Monitoring System"** being submitted by **G.NAGENDER REDDY, K.KUMARA SRINIVAS REDDY, S.DHANUSH REDDY** bearing the Hall Ticket number **20eg110107, 20eg110113, 20eg110126** in partial fulfillment of the requirements for the award of the degree of the **Bachelor of Technology** in **Computer Science and Engineering – Data Science** to **Anurag University** is a record of bonafide work carried out by them under my guidance and supervision from June 2023 to September 2023.

The results presented in this project have been verified and found to be satisfactory.The results embodied in this project report have not been submitted to any other University for the award of any other degree or diploma.

**Internal Guide** **External Examiner**
**Dr.M.SRIDEVI**
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# ACKNOWLEDGEMENT

It is our privilege and pleasure to express profound sense of respect, gratitude and indebtedness to our guide **Dr. M.Sridevi**, Associate proffesor,Hod,DS, Anurag University, for his/her indefatigable inspiration, guidance, cogent discussion, constructive criticisms and encouragement throughout this dissertation work.

We express our sincere gratitude to **Dr. M.Sridevi**,Associate proffesor,Hod,DS Anurag University, for her suggestions, motivations, and co-operation for the successful completion of the work.

We extend our sincere thanks to **Dr. V. Vijay Kumar**, **Professor & Dean,** School of Engineering, Anurag University, for his encouragement and constant help.

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# DECLARATION

We hereby declare that the project work entitled "**Food Wastage Monitoring System**" submitted to the **Anurag University** in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in Computer Science and Engineering – Data Science is a record of an original work done by us under the guidance of **Dr. M.Sridevi**, Associate proffesor,Hod,DS and this project work have not been submitted to any other university for the award of any other degree or diploma.

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# ABSTRACT

The Food Wastage Monitoring System for University Canteen is a project aimed at reducing food waste in university canteens by implementing an efficient monitoring system. Motivation for this project is to tackle the issue of food waste in our university canteen by implementing a Food Wastage Monitoring System. Taking action at the canteen level, inspire a culture of sustainability within university community and contribute to a more sustainable future. Food wastage in university canteens is a significant issue that contributes to inventory loss, financial inefficiency, overproduction and also spoils the university environment. As a result, valuable resources are wasted, leading to increased costs and negative impacts. To address the food wastage issue in the university canteen, we propose implementing a Food Wastage Monitoring System using IoT devices is proposed. The system will utilize smart weighing scales, load cells, RFID-enabled weighing systems, and IoT-enabled display units to measure the weight of food items and display it in real-time. The weight data will be saved using data logging devices for further analysis.

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# 1.INTRODUCTION

Food wastage is a pressing global concern with far-reaching implications for the environment, finances, and sustainability. In educational institutions such as university canteens, this issue is particularly significant due to the large volumes of food prepared daily and the associated challenges of managing food inventory efficiently. Our project, the "Food Wastage Monitoring System " addresses this critical problem by implementing an innovative and technology-driven solution. This project is motivated by the urgent need to reduce food wastage within our college community while instilling a culture of sustainability. By employing Internet of Things (IoT) devices, data collection, and cloud-based analytics, we have developed a comprehensive system that not only monitors the quantities of food being wasted but also actively engages students and canteen management in understanding and mitigating this wastage. According to the FSSAI (Food Safety and Standards Authority of India), one-third of all food in India is wasted or gets spoilt before it is eaten. Food Wastage Monitoring System showcases how technology, sustainability, and community involvement come together. It highlights our dedication to reducing food wastage, encouraging mindful eating, and supporting environmental protection efforts. Our project helps to raise awareness among students about the amount of food wasted in the canteen and to educate students about the consequences of food waste, such as its environmental impact and the social implications for communities.

## 1.1 MOTIVATION

According to the FSSAI (Food Safety and Standards Authority of India), one-third of all food in India is wasted or gets spoilt before it is eaten. Our motivation for this project is to tackle the issue of food waste in our college canteen by implementing a Food Wastage Monitoring System. We believe that by taking action at the canteen level, we can inspire a culture of sustainability within our college community and contribute to a more sustainable future.

## 1.2 PROBLEM DEFINITION

Food wastage in college canteens is a significant issue that contributes to inventory loss, financial inefficiency and also spoils the college environment. The lack of an efficient monitoring system results in overproduction, improper inventory management, and wasteful consumption practices. As a result, valuable resources are wasted, leading to increased costs and negative impacts.

### 1.3 OBJECTIVE OF THE PROJECT

The primary objective of your project is to raise awareness among students about the amount of food wasted in the canteen.project aims to educate students about the consequences of food waste, such as its environmental impact and the social implications for communities. Through the display of food waste data, our project intends to inspire behavior change among students and also provide valuable data for canteen management.

# 2.LITERATURE REVIEW

The Internet of Things (IoT) has opened up new possibilities in various domains, including healthcare, agriculture, logistics, and home automation. Our project focuses on an IoT-based object weighing system that combines several key components. In this literature survey, we explore existing research and applications related to these components and their integration into similar IoT projects.

A novel approach to food waste management using a combination of Internet of Things (IoT) and waste to energy conversion technologies. [1] The proposed system consists of a network of smart food waste bins that are equipped with sensors to monitor the level and type of food waste. The data collected from the sensors is transmitted to a central server using IoT technology. The central server analyzes the data and provides insights into the food waste generation patterns in the region. This information can then be used to optimize the collection and disposal of food waste.

The use of variety of IoT sensors to collect data on waste levels The data is then transmitted to a cloud server, where it is processed and used to generate alerts and reports. The system also includes a mobile app that allows users to view the status of waste bins in real time and report any problems[2].

[3]The IoT-based smart garbage and waste collection bin used IR for level detection, weight sensor, and Wi-Fi. Whenever IR detects the overweight, it alarmed the system and user to free up the smart bin.

This literature review delves into existing research and developments related to the components and technologies integrated into our IoT-based object weighing project. The project combines an Arduino UNO board, the working principle and applications of an Arduino board[4]. This also explores on how it can be used as a tool for study and research works. Arduino board can provide a quick tool in development of VLSI test bench especially of sensors. Main advantages are fast processing and easy interface.

Thingspeak platform to create a versatile and efficient weighing system a monitoring platform for a smart community, the monitoring platform was successfully implemented and was found functioning well[5].

Hong and colleagues propose an IoT-based smart garbage system[6] tailored for efficient food waste management. Their study showcases the potential of IoT technology in enhancing waste management processes .

Although focused on health monitoring, the study by R. Jai Ganesh and team demonstrates the diverse applications of IoT. It highlights the adaptability of IoT solutions in various domains, including food wastage monitoring [7].

Sam and his team present an IoT-based system for monitoring air and water quality. [8] While distinct from food wastage monitoring, this study showcases IoT's versatility in addressing environmental challenges .

Kaarthick and his team introduce an IoT-based autonomous environment monitoring and control system. While not directly related to food wastage, it demonstrates the broader applications of IoT technology in environmental monitoring [9].

This web publication by Manjunath and Shah explores an IoT-based food management system. [10].It exemplifies how IoT can be harnessed for food-related applications, aligning with the objectives of food wastage monitoring .

Gull and her team present an IoT-based smart garbage system for food waste management[11]. This research reinforces the relevance and growing interest in IoT solutions for addressing food wastage.

The paper by N. Gayathri and colleagues further highlights the significance of IoT-based smart garbage systems for efficient food waste management. The study contributes to the body of knowledge in this domain [12].

# 3.ANALYSIS

This chapter in the report gives a detailed analysis and explanation of the methodologies adopted in the proposed system along with its advantages. The software requirements specification section in the report discusses both hardware and software prerequisites needed for the project. It is further followed by the overall description of the flow of activities performed.

## 3.1 Existing System

The current canteen setup does not have any monitoring mechanism to track or visualize the amount of food wasted. In this case, we would like to highlight the lack of awareness among students and the absence of a means to measure or address the issue of food waste effectively.

## 3.2 Proposed System

To address the food wastage issue in the college canteen, we propose implementing a Food Wastage Monitoring System using IoT devices. The system will utilize smart weighing scales, load cells, RFID-enabled weighing systems, and IoT-enabled display units to measure the weight of food items and display it in real-time. The weight data will be saved using data logging devices for further analysis

## 3.3. Hardware and Software Requirement Specification

The software requirements are always subject to change when it comes to the extent of the accuracy the user desires or the flexibility in which the deployment is needed. This project can be made by using the following software and hardware which are enough for students' purposes in the industry or market.

Arduino UNO Board
LoadCell
Button
Buzzer
LED Display
Wifi Modular
Alink Board
Thingspeak platform

### 3.3.1. Purpose and Scope

I. **Reduce Food Wastage:** The system aims to significantly reduce food wastage in food service establishments by providing real-time data and alerts to restaurant staff. This empowers staff to make informed decisions, optimize food preparation, and minimize overproduction.

II. **Data Analysis:** Gather data on food wastage trends over time, allowing for detailed analysis and insights. This data can be used to implement further improvements and make data-driven decisions.

III. **User-Friendly Interface:** Provide a user-friendly interface for staff interaction with the system, ensuring ease of use and minimal training requirements.

IV. **Hardware Development:** Design and assembly of a hardware system that includes a load cell, button, buzzer, LED display, Arduino UNO board, WiFi module, and alignment board. This hardware will enable the measurement of food wastage and user interaction with the system.

V. **Software Development:** Development of software to control and manage the hardware components. This includes programming the Arduino UNO board to collect, process, and transmit data, as well as provide user interface functionality through LED displays and buttons.

#### 3.3.2. Overall Description

The software and hardware requirements for this project have been thoughtfully selected to a wide range of user needs, balancing accuracy and flexibility.

The development environment comprises essential tools like Arduino UNO Board, LoadCell, Button , Buzzer, LED Display, Wifi Modular, Alink Board. The Arduino UNO board processes the measured weight data and stores it for analysis.

If there is a significant change in the weight, indicating food wastage, the system processes this information for further action. The Food Wastage Monitoring System continuously measures food waste, and transmits data for analysis. The system empowers food service establishments to take proactive measures to reduce food wastage, improve operational efficiency, and contribute to environmental sustainability.

# 4.DESIGN

## 4.1 UML Diagrams

The UML (Unified Modeling Language) diagram provides a visual representation of the key components and their relationships within our Food Wastage Monitoring System. This diagram offers a high-level overview, aiding in the comprehension of the system's architecture and functionality.

### 4.1.1. Use Case Diagram

Use-case diagrams model the behavior of a system and help to capture the requirements of the system. Use-case diagrams describe the high-level functions and scope of a system. These diagrams also identify the interactions between the system and its actors.

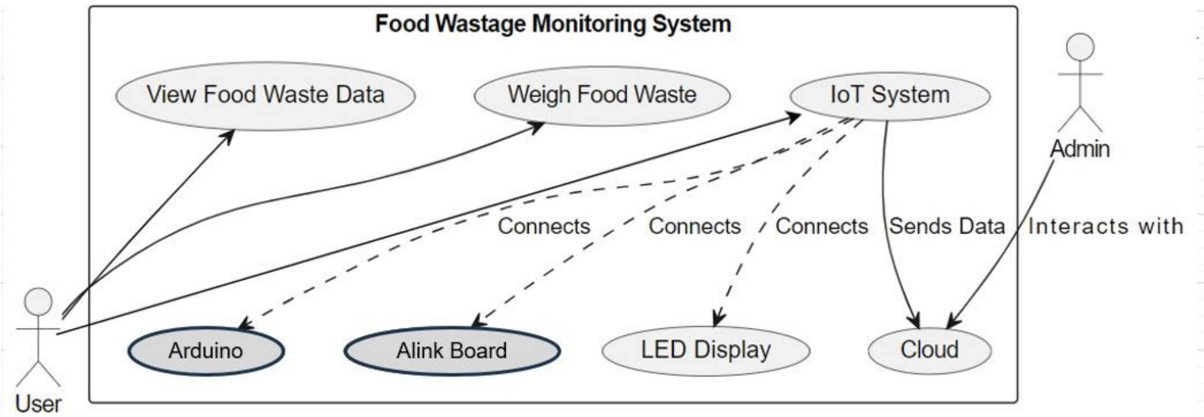



**Figure 4.1.1** Use Case diagram

### 4.1.2 Class Diagram:

A class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects.

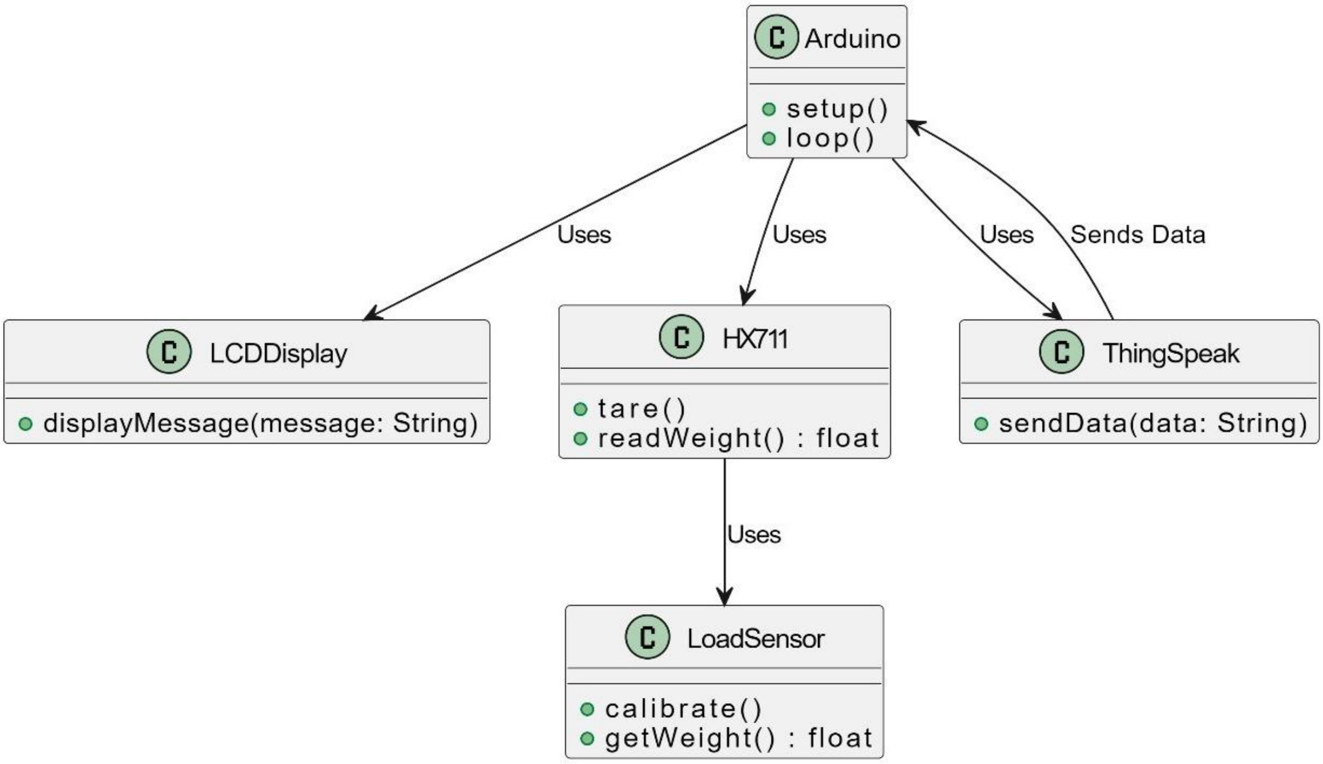



**Figure 4.1.2** Class Diagram

## 4.1.3 Activity Diagram

Activity diagram is another important diagram in UML to describe the dynamic aspects of the system. Activity diagram is basically a flowchart to represent the flow from one activity to another activity. The activity can be described as an operation of the system. The control flow is drawn from one operation to another.

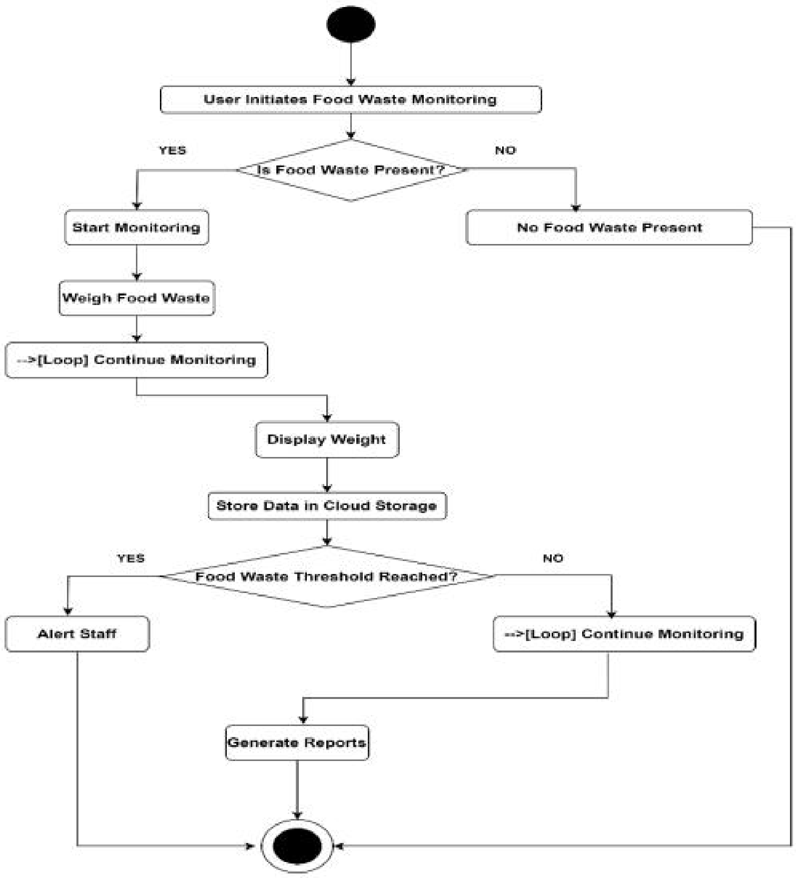



**Figure 4.1.3** Activity diagram

### 4.1.4 Sequence Diagram

A sequence diagram is a Unified Modeling Language (UML) diagram that illustrates the sequence of messages between objects in an interaction. A sequence diagram consists of a group of objects that are represented by lifelines, and the messages that they exchange over time during the interaction.

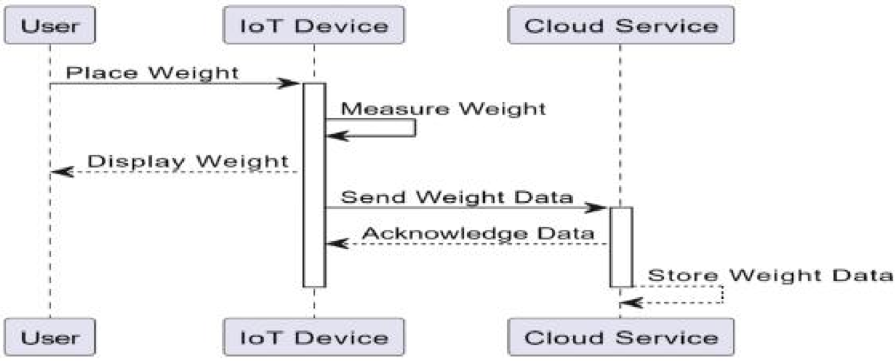



**Figure 4.1.4** Sequence Diagram

# 5.IMPLEMENTATION

The implementation of the project has been carried out in a step-by-step manner. A detailed description of each module is given below and it is followed by an introduction to the technologies used in implementing the project.

**5.1. Module Description**

The Food Wastage Monitoring System project can be broken down into several modules, each responsible for specific functions and components of the system. Here's a module description for the project:

I. Hardware Module:

This module encompasses all the physical hardware components of the system, including the load cell, button, buzzer, LED display, Arduino UNO board, WiFi module, and alignment board.The Hardware Module encompasses all the physical hardware components of the system, ensuring the proper functioning of the system. It includes components such as the load cell for measuring food waste, buttons for user input, a buzzer for feedback, an LED display for showing information, an Arduino UNO board as the micro controller, a WiFi module for connectivity, and an alignment board to ensure precise measurements.

II. Data Processing Module:

This module focuses on processing the data collected from the load cell. It involves data manipulation and storage for further analysis.The Data Processing Module focuses on efficiently processing the data collected from the load cell. It includes data manipulation techniques for calibration, filtering, and conversion to meaningful weight measurements. Additionally, this module is responsible for storing processed data for further analysis and historical records.

III. User Interface Module:

This module deals with the user interaction aspect of the system. It includes the interface elements such as buttons and LED displays.The User Interface Module deals with the user interaction aspect of the system. It includes interface elements such as buttons and LED displays to provide a user-friendly experience. Users can interact with the system through the buttons, and the LED display provides real-time information, such as weight measurements or system status.

IV. Data Transmission Module:

This module handles the communication between the system and external servers or dashboards. It utilizes the WiFi module for real-time data transmission.The Data Transmission Module is responsible for establishing and managing communication between the system and external servers or dashboards. It utilizes the WiFi module to transmit data in real-time to remote servers, enabling users to monitor food waste remotely. This module plays a crucial role in ensuring data availability and accessibility.

V. Data Analysis and Reporting Module:

This module is responsible for analyzing the data collected by the system to identify patterns, trends, and areas for waste reduction.The Data Analysis and Reporting Module is responsible for post-processing the collected data to extract valuable insights. It analyzes the data to identify patterns, trends, and areas for waste reduction. The module can generate reports, statistics, and visualizations that help users make informed decisions to reduce food waste, optimize resource usage, and contribute to sustainability efforts.

## 5.2. Introduction to Technologies Used

### 5.2.1 ARDUINO (MICRO CONTROLLER):

The Arduino is a family of microcontroller boards to simplify electronic design, prototyping and experimenting for artists, hackers, hobbyists, but also many professionals. Essentially a complete computer with CPU, RAM, Flash memory, and input/output pins, all on a single chip. Unlike, say, a Raspberry Pi, it's designed to attach all kinds of sensors, LEDs, small motors and speakers, servos, etc. directly to these pins, which can read in or output digital or analog voltages between 0 and 5 volts. The Arduino connects to your computer via USB, where you program it in a simple language (C/C++, similar to Java) from inside the free Arduino IDE by uploading your compiled code to the board. Once programmed, the Arduino can run with the USB link back to your computer, or stand-alone without it — no keyboard or screen needed, just power.

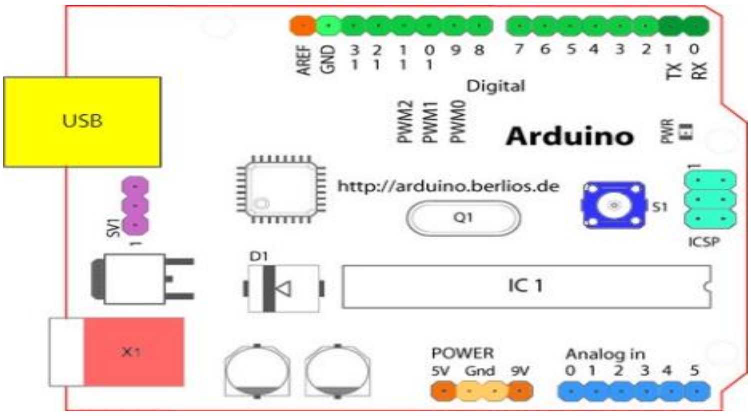



Figure 5.2.1 Structure of Arduino Board

### 5.2.2 Basic 16x 2 Characters LCD - Black on Green 5V:

This is a basic 16 character by 2 line display. Black text on Green background. Utilizes the extremely common HD44780 parallel interface chipset. Interface code is freely available. We will need ~11 general I/O pins to interface to this LCD screen.

**Figure 5.2.2 : LCD Display**

### 5.2.3 Load Cell:

Load cells are sensors that convert force (mass, torque) into electrical signals and output the electrical signals. Load cells are also called “load transducers.” In the dictionary, a load cell is described as a “weight measurement device necessary for electronic scales that display weights in digits.”

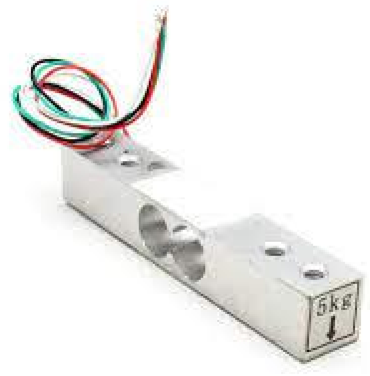



**Figure 5.2.3 : Load Cell**

### 5.2.4.Buzzer:

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, house hold appliances such as a microwave oven, or game shows

**Figure 5.2.4 : Buzzer**

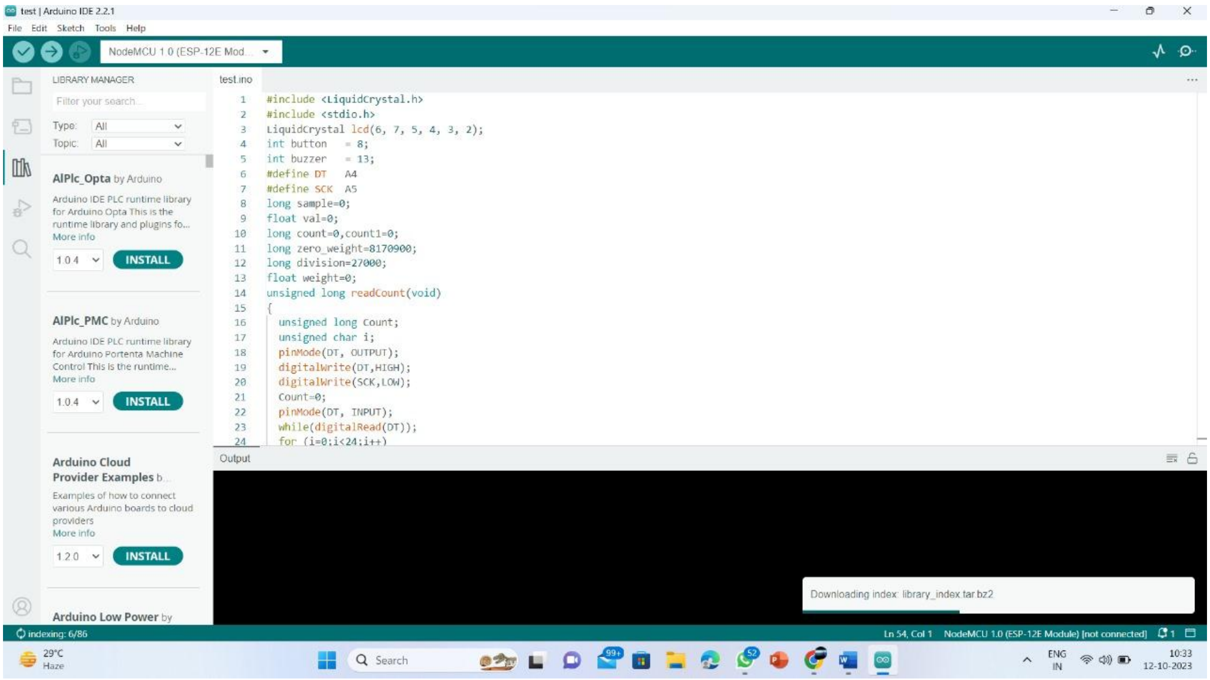
### 5.2.5 Wifi Module:

Wifi, is a mechanism for wirelessly connecting electronic devices. A device enabled with Ethernet, such as a personal computer, video game console, smartphone, digital audio player, can connect to the Internet via a wireless network access point.

**Figure 5.2.5 : WIFI Module**

### 5.2.6.Arduino IDE:

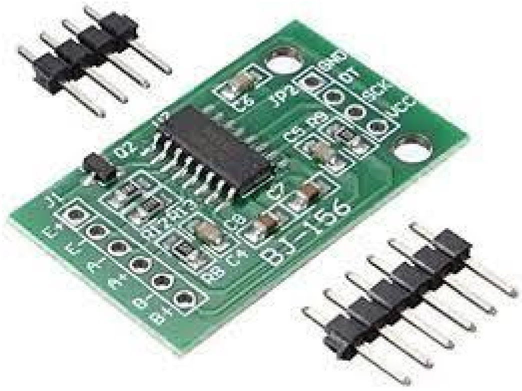
Arduino IDE (Integrated Development Environment) is a user-friendly software application designed for programming and developing applications for Arduino micro controller boards.




**5.2.6 Arduino IDE**

### 5.2.7 HX711:

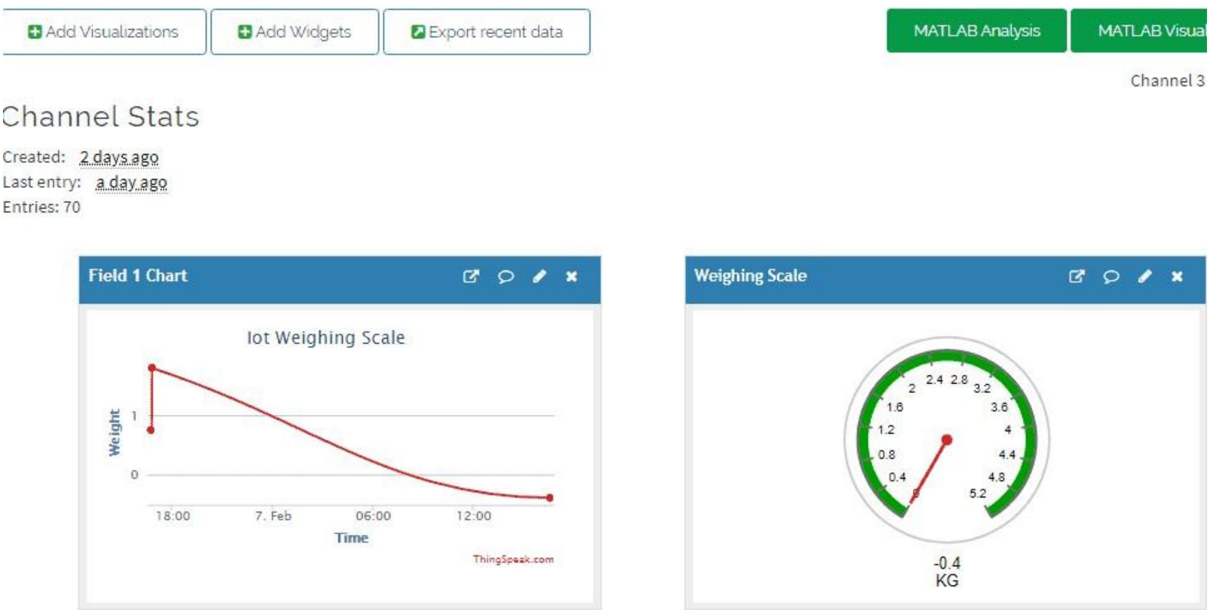
The HX711 is a precision 24-bit analog-to-digital converter (ADC) that is designed for weighing scales and industrial control applications to interface directly with a bridge sensor. It is specially made for amplifying signals from cells and reporting them to another microcontroller.



5.2.7 HX711

### 5.2.8 ThingSpeak :

ThingSpeak is an Internet of Things (IoT) data platform that simplifies the collection,storage, visualization, and analysis of sensor data from connected devices. It provides an easy-to-use cloud-based environment for developers and businesses to manage and make sense of IoT data. With ThingSpeak, users can create IoT applications and dashboards, visualize data trends, trigger alerts, and perform analytics, making it a versatile platform for IoT projects and applications.



**Pin description:**

| Pin No. | Name | Description |
|---|---|---|
| Pin no. 1 | **VSS** | Power supply (GND) |
| Pin no. 2 | **VCC** | Power supply (+5V) |
| Pin no. 3 | **VEE** | Contrast adjust |
| Pin no. 4 | **RS** | 0 = Instruction input<br>1 = Data input |
| Pin no. 5 | **R/W** | 0 = Write to LCD module<br>1 = Read from LCD module |
| Pin no. 6 | **EN** | Enable signal |
| Pin no. 7 | **D0** | Data bus line 0 (LSB) |
| Pin no. 8 | **D1** | Data bus line 1 |
| Pin no. 9 | **D2** | Data bus line 2 |
| Pin no. 10 | **D3** | Data bus line 3 |
| Pin no. 11 | **D4** | Data bus line 4 |
| Pin no. 12 | **D5** | Data bus line 5 |
| Pin no. 13 | **D6** | Data bus line 6 |
| Pin no. 14 | **D7** | Data bus line 7 (MSB) |

**Table 5.1: Character LCD pins with 1 Controller**

| Pin No. | Name | Description |
|---|---|---|
| Pin no. 1 | **D7** | Data bus line 7 (MSB) |
| Pin no. 2 | **D6** | Data bus line 6 |
| Pin no. 3 | **D5** | Data bus line 5 |
| Pin no. 4 | **D4** | Data bus line 4 |
| Pin no. 5 | **D3** | Data bus line 3 |
| Pin no. 6 | **D2** | Data bus line 2 |
| Pin no. 7 | **D1** | Data bus line 1 |
| Pin no. 8 | **D0** | Data bus line 0 (LSB) |
| Pin no. 9 | **EN1** | Enable signal for row 0 and 1 ($1^{st}$controller) |
| Pin no. 10 | **R/W** | 0 = Write to LCD module<br>1 = Read from LCD module |
| Pin no. 11 | **RS** | 0 = Instruction input<br>1 = Data input |
| Pin no. 12 | **VEE** | Contrast adjust |
| Pin no. 13 | **VSS** | Power supply (GND) |
| Pin no. 14 | **VCC** | Power supply (+5V) |
| Pin no. 15 | **EN2** | Enable signal for row 2 and 3 ($2^{nd}$controller) |
| Pin no. 16 | **NC** | Not Connected |

**Table 5.2: Character LCD pins with 2 Controller**

.

## 5.3. Code

```
#include <LiquidCrystal.h>
#include <stdio.h>
LiquidCrystal lcd(6, 7, 5, 4, 3, 2);
int button   = 8;
int buzzer   = 13;
#define DT   A4
#define SCK  A5
long sample=0;
float val=0;
long count=0,count1=0;
long zero_weight=8170900;
long division=27000;
float weight=0;
unsigned long readCount(void)
{
  unsigned long Count;
  unsigned char i;
  pinMode(DT, OUTPUT);
  digitalWrite(DT,HIGH);
  digitalWrite(SCK,LOW);
  Count=0;
  pinMode(DT, INPUT);
  while(digitalRead(DT));
  for (i=0;i<24;i++)
  {
    digitalWrite(SCK,HIGH);
    Count=Count<<1;
    digitalWrite(SCK,LOW);
    if(digitalRead(DT))
    Count++;
  }
  digitalWrite(SCK,HIGH);
  Count=Count^0x800000;
  digitalWrite(SCK,LOW);
  return(Count);
}
int sti=0;
String inputString = "";         // a string to hold incoming data
boolean stringComplete = false;  // whether the string is complete
void okcheck()
{
  unsigned char rcr;
```

```
  do{
      rcr = Serial.read();
    }while(rcr != 'K');
}
void beep()
{
  digitalWrite(buzzer, LOW);delay(3000);digitalWrite(buzzer, HIGH);delay(1000);
}
void things_send()
{
unsigned char recr;
 Serial.write("AT+CIPMUX=1\r\n");delay(2000);
 Serial.write("AT+CIPSTART=4,\"TCP\",\"184.106.153.149\",80\r\n");              delay(4000);
//OK  LINKED
 Serial.write("AT+CIPSEND=4,77\r\n");  delay(3000);
 Serial.write("GET https://api.thingspeak.com/update?api_key=HHIZCCX2L9WQBB70&");
}
void things_sendmulti(int fld1,int fld2,int fld3,int fld4,int fld5,int fld6)
{
unsigned char recr;
 Serial.write("AT+CIPMUX=1\r\n");delay(2000);
 Serial.write("AT+CIPSTART=4,\"TCP\",\"184.106.153.149\",80\r\n");              delay(4000);
//OK  LINKED
 Serial.write("AT+CIPSEND=4,142\r\n");  delay(3000);
 Serial.write("GET
https://api.thingspeak.com/update?api_key=HHIZCCX2L9WQBB70&field1=");converts(fld
1);
 Serial.write("&field2=");converts(fld2);
 Serial.write("&field3=");converts(fld3);
 Serial.write("&field4=");converts(fld4);
 Serial.write("&field5=");converts(fld5);
 Serial.write("&field6=");converts(fld6);
 Serial.write("\r\n\r\n");   delay(4000);
}
void things_done()
{
 Serial.write("\r\n\r\n");   delay(4000);
}
void setup()
{
 char ret;
 Serial.begin(9600);serialEvent();
 pinMode(buzzer, OUTPUT);
 pinMode(SCK, OUTPUT);
```

```
 pinMode(button, INPUT_PULLUP);
 digitalWrite(buzzer, HIGH);
 lcd.begin(16, 2);lcd.setCursor(0,0);
 lcd.print("   Welcome  ");
   delay(2500);
wifiinit();
   delay(2500);
          lcd.clear();
           lcd.setCursor(0,0);
          lcd.print("Wt:");  //3,0
   serialEvent();
}
int cntlmk=0;
void loop()
{
   count=0;
  count1=0;
  for(int rtp=0;rtp<10;rtp++)
     {
      count1 = readCount();
       delay(10);
     }
          count = (count/10);
      //lcd.setCursor(0,0);lcd.print(count);lcd.print("      ");
if(count <= 8325000){count = 8325000;}
count = (count - 8325000);
      if(count >= 3650)
        {
         weight = (count/3650) * 25;
        }
      else
        {
         weight = 0;
        }
      //count = (count - zero_weight);
      //if(count <= 0){count=0;}
      //weight = (count/division);
          weight = (weight - 1400);
      if(weight <= 0)
        {
         weight=0;
        }
      lcd.setCursor(3,0);lcd.print(weight);lcd.print("g   ");
          if(digitalRead(button) == LOW)
```

```
        {
         lcd.setCursor(0,1);lcd.print("Waste-Upload");
         beep();
            things_send();
            Serial.write("field1=");
            converts(weight);
            things_done();
         lcd.setCursor(0,1);lcd.print("                ");
        }
}
void serialEvent()
{
  while (Serial.available() < 0)
        {
        char inChar = (char)Serial.read();
         if(inChar == '*')
           {sti=1;
            inputString += inChar;
           }
         if(sti == 1)
           {
               inputString += inChar;
           }
         if(inChar == '#')
           {sti=0;
            stringComplete = true;
           }
        }
}
void wifiinit()
{
  Serial.write("AT\r\n");              delay(2000);
  Serial.write("ATE0\r\n");  okcheck();delay(2000);
  Serial.write("AT+CWMODE=3\r\n");              delay(2000);
  Serial.write("AT+CWJAP=\"iotserver\",\"iotserver123\"\r\n"); okcheck();
  Serial.write("AT+CIPMUX=1\r\n");delay(3000);//        okcheck();
  lcd.clear();
  lcd.print("Connected");
  delay(1000);
}
void converts(unsigned int value)
{
  unsigned int a,b,c,d,e,f,g,h;
      a=value/10000;
```

```
      b=value%10000;
      c=b/1000;
      d=b%1000;
      e=d/100;
      f=d%100;
      g=f/10;
      h=f%10;
      a=a|0x30;
      c=c|0x30;
      e=e|0x30;
      g=g|0x30;
      h=h|0x30;
   Serial.write(a);
   Serial.write(c);
   Serial.write(e);
   Serial.write(g);
   Serial.write(h);
}
void convertl(unsigned int value)
{
  unsigned int a,b,c,d,e,f,g,h;
      a=value/10000;
      b=value%10000;
      c=b/1000;
      d=b%1000;
      e=d/100;
      f=d%100;
      g=f/10;
      h=f%10;
      a=a|0x30;
      c=c|0x30;
      e=e|0x30;
      g=g|0x30;
      h=h|0x30;
   // lcd.write(a);
  // lcd.write(c);
   lcd.write(e);
   lcd.write(g);
   lcd.write(h);
}


void convertk(unsigned int value)
{
```

```
  unsigned int a,b,c,d,e,f,g,h;
      a=value/10000;
      b=value%10000;
      c=b/1000;
      d=b%1000;
      e=d/100;
      f=d%100;
      g=f/10;
      h=f%10;
      a=a|0x30;
      c=c|0x30;
      e=e|0x30;
      g=g|0x30;
      h=h|0x30;
  // lcd.write(a);
  // lcd.write(c);
  // lcd.write(e);
  // lcd.write(g);
   lcd.write(h);
}
```

## 5.4.Results and Discussion

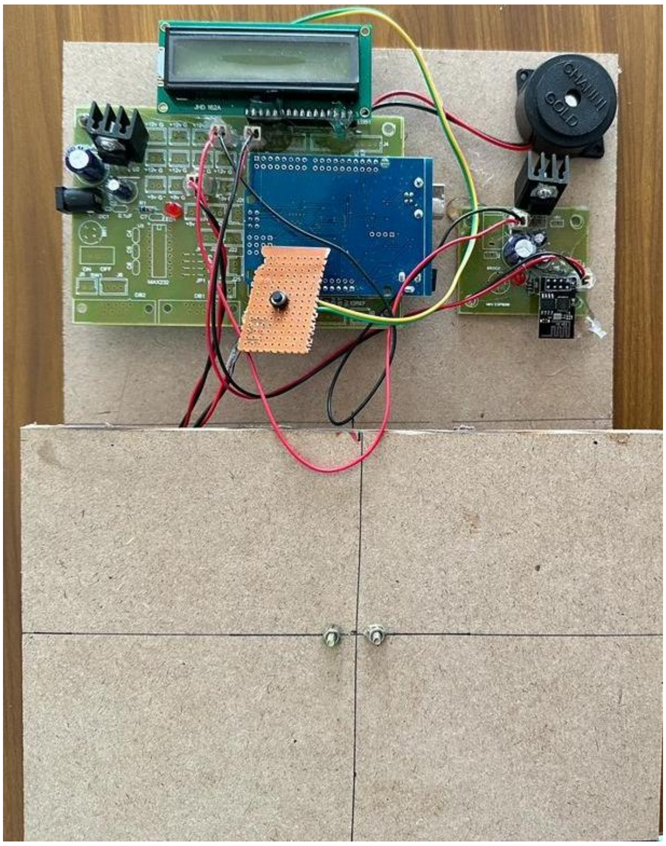


**Figure 5.4: Final Device**

The above Figure is the Final Device which consists of all the components described and it succesfullly measures the weight and sends it to the ThingSpeak Cloud Platform

## 5.5.Screenshots

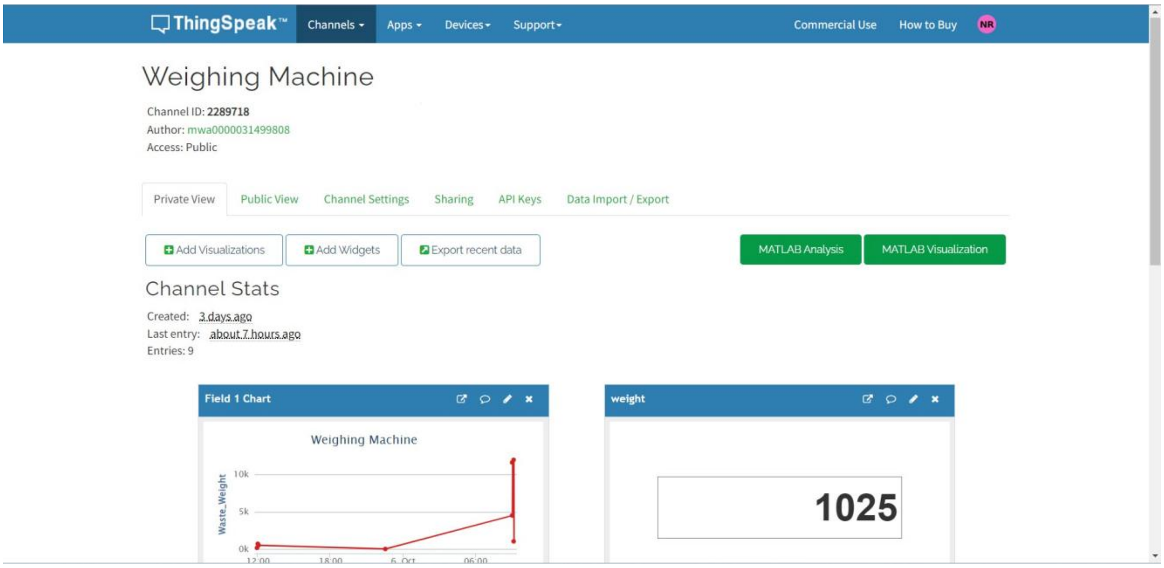



**Figure 5.5.1: Thingspeak Platform**

The above Figure is the platform which arduino send the weight data and this platform provide features like Visual representation, Displaying way in numeric or Guage form and also exports data in form of filetypes like JSON, XML, CSV.

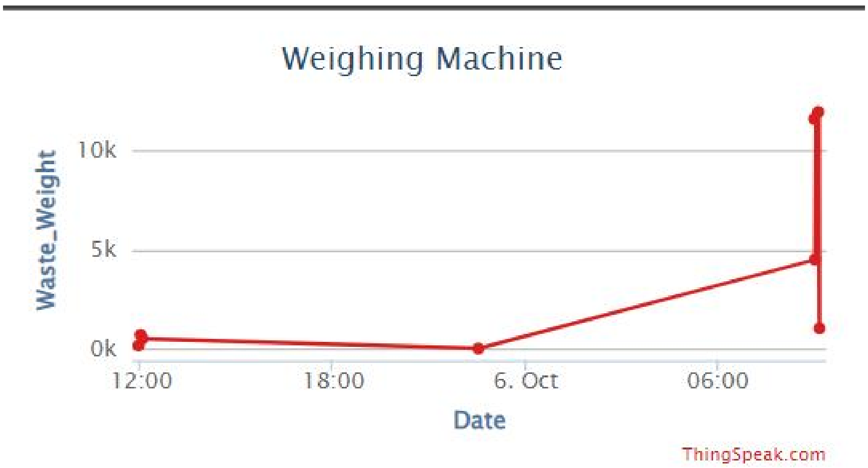



**Figure 5.5.2: Visual Represntation**

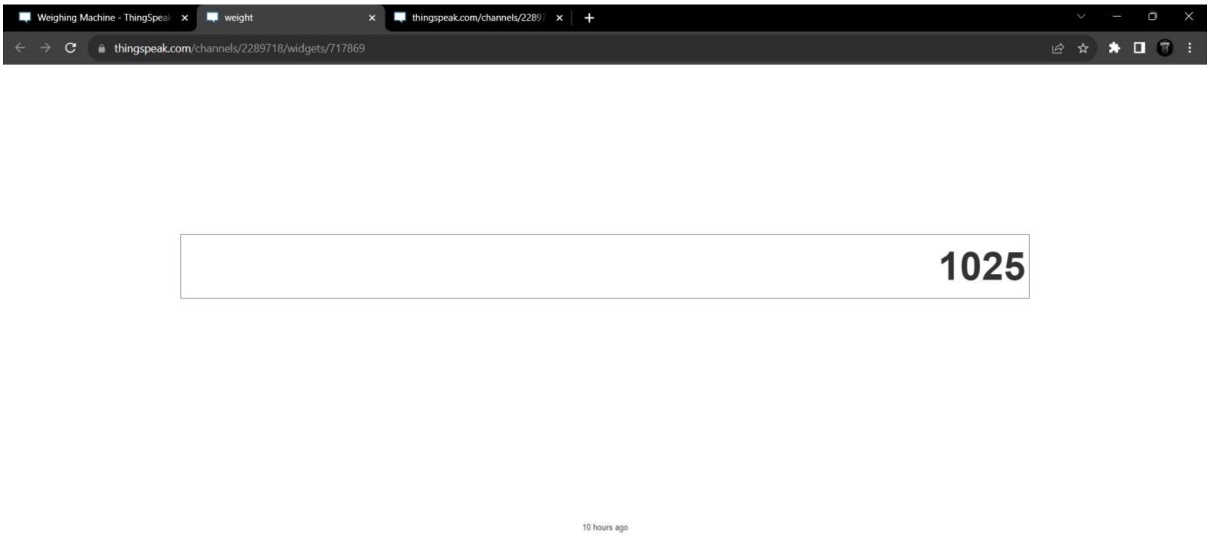



**Figure 5.5.3: Numeric Display**

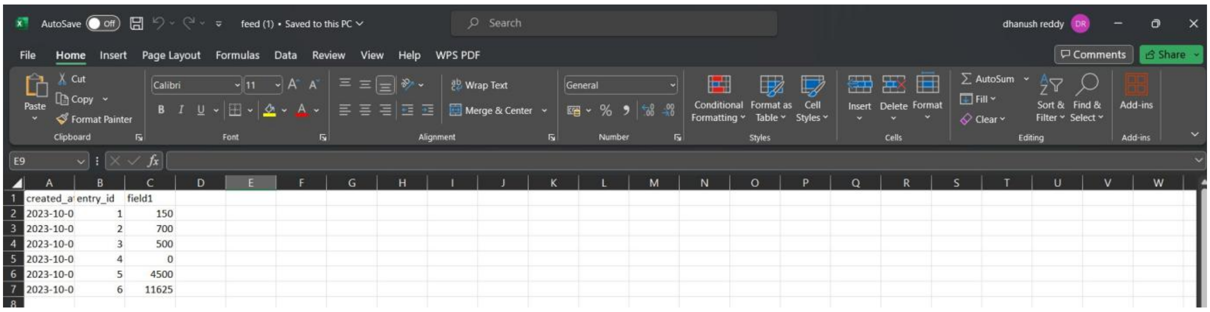



**Figure 5.5.4: Exported data in form of CSV file**

# 6.CONCLUSION

'Food Wastage Monitoring System for College Canteen' project reflects our dedication to solving a global issue: food wastage. We've combined technology, sustainability, and community involvement to create a practical solution that works.This project isn't just about high-tech gadgets; it's about doing our part to reduce food waste. We've shown that by working together and using smart solutions, we can make a big difference in the fight against food wastage."

Through the deployment of Internet of Things (IoT) devices, a cloud-based analytics platform, and a user-friendly interface, we have not only successfully monitored and quantified food wastage in our college canteen but also initiated a transformation in behavior and awareness among students and canteen staff. By shedding light on the extent of food wastage and its consequences, we have empowered our community to make informed decisions about food consumption and waste reduction.

# 7.FUTURE ENHANCEMENT

We recognize the potential for further improvements and expansions, including predictive analytics, mobile applications, and supplier integration. These developments will contribute to even more efficient and sustainable food management practices.In essence, our project serves as a model for addressing food wastage challenges in educational institutions and beyond. It underscores the transformative power of technology, the importance of community engagement, and the profound impact that sustainable initiatives can have on our environment and society as a whole. Collaborate with food suppliers to integrate their ordering and delivery systems with your monitoring system. This ensures that food deliveries are based on actual consumption data, minimizing overstocking. Enhance the analytics and reporting capabilities to provide deeper insights into food consumption patterns, waste hotspots, and cost savings.

These future enhancements will not only make your Food Wastage Monitoring System more effective but also extend its positive impact on sustainability, cost-efficiency, and community engagement.

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