PROJECT REPORT

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Project Report

Team ID	**NM2023TMID03891**
Project Name	**Smart city waste management with connected trashacan**

1. INTRODUCTION

1.1 Project Overview:

With the increasing population and industrialization of nations throughout the globe, waste has become a great concern for all of us. Over years, researchers figured that only waste management is not enough for its proper treatment and disposal techniques to preserve our environment and keeping it clean in this era of globalization. With the help of technology researchers have, introduced IoT based Smart Waste Management solutions and initiatives that ensures reduced amount of time and energy required to provide waste management services and reduce the amount of waste generated. Unfortunately, developing countries are not being able to implement those existing solutions due to many factors like socio-economic environment. Therefore, in this research we have concentrated our thought on developing a smart IoT based waste management system for developing countries like INDIA that will ensure proper disposal, collection, transportation and recycling of household waste with the minimum amount of resources being available

1.2 Purpose:

We amalgamate technology along with waste management in order to effectively create a safe and a hygienic environment. Smart waste management is about using technology and data to create a more efficient waste industry. Based on IoT (Internet of Things) technology, smart waste management aims to optimize resource allocation, reduce running costs, and increase the sustainability of waste services. This makes it possible to plan more efficient routes for the trash collectors who empty the bins, but also lowers the chance of any bin being full for over a week. A good level of coordination exists between the garbage collectors and the information supplied via technology. This makes them well aware of the existing garbage level and instigate them whenever the bins reach the threshold level. They are sent with alert messages so that they can collect the garbage on time without littering the surrounding area. The fill patterns of specific containers can be identified by historical data and managed accordingly in the long term. In addition to hardware solutions, mobile applications are used to overcome the challenges in the regular waste management system, such as keeping track of the drivers while they are operating on the field. Thus, smart waste management provides us with the most optimal way of managing the waste in an efficient manner using technology.

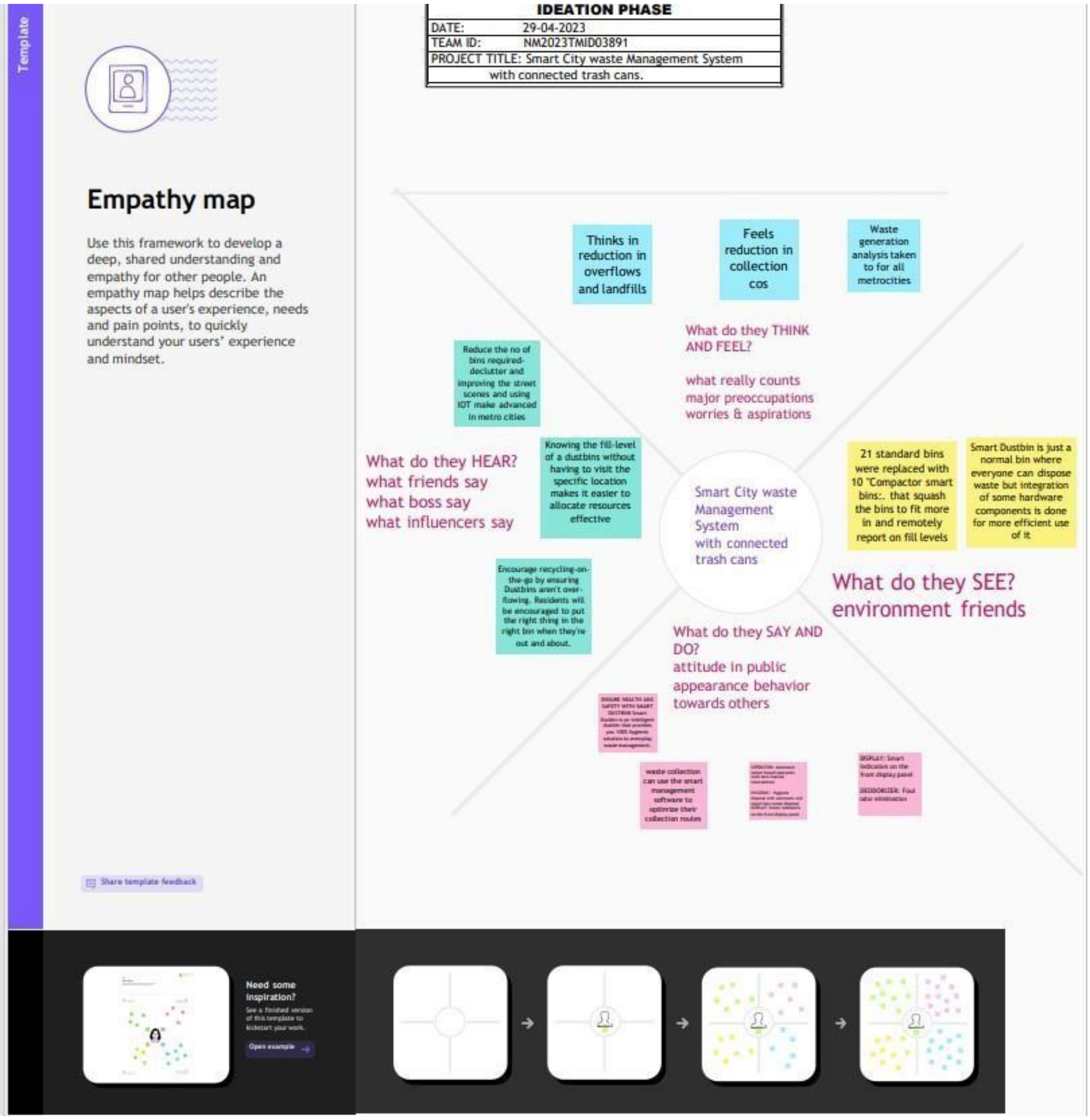
2. IDEATION & PROPOSED SOLUTION

2.1 Problem Statement Definition:

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes mefeel

PS-1	Municipal corporation authority	Get notified when the trash cans are full and be made aware of where the full cans are located.	Don't havethe facilities atthe moment	There is no toolavailable to determine the level of bins.	Frustrated
PS-2	Individual working for a private limited corporation	Get rid of the example of a surplus of waste	The trash cans are always filled	I occupy a metropolitan where there is acity is invariably crowd.	Worried

2.2 Empathy Map Canvas



IDEATION PHASE

DATE:	29-04-2023
TEAM ID:	NM2023TMID03891
PROJECT TITLE: Smart City waste Management System with connected trash cans.	

Template

Empathy map

Use this framework to develop a deep, shared understanding and empathy for other people. An empathy map helps describe the aspects of a user's experience, needs and pain points, to quickly understand your users' experience and mindset.

Thinks in reduction in overflows and landfills

Feels reduction in collection cos

Waste generation analysis taken to for all metrocities

What do they THINK AND FEEL?

what really counts
major preoccupations
worries & aspirations

Reduce the no of bins required-declutter and improving the street scenes and using IOT make advanced in metro cities

What do they HEAR?
what friends say
what boss say
what influencers say

Knowing the fill-level of a dustbins without having to visit the specific location makes it easier to allocate resources effective

Smart City waste Management System with connected trash cans

21 standard bins were replaced with 10 "Compactor smart bins:. that squash the bins to fit more in and remotely report on fill levels

Smart Dustbin is just a normal bin where everyone can dispose waste but integration of some hardware components is done for more efficient use of it

Encourage recycling-on-the-go by ensuring Dustbins aren't over-flowing. Residents will be encouraged to put the right thing in the right bin when they're out and about.

What do they SEE?
environment friends

What do they SAY AND DO?
attitude in public
appearance behavior
towards others

ENSURE HEALTH AND SAFETY WITH SMART DUSTBINS Smart Dustbin is an intelligent dustbin that provides you 100% hygienic solution to everyday waste management.

waste collection can use the smart management software to optimize their collection routes

[illegible]

DISPLAY: Smart indication on the front display panel

DEODORIZER: Foul odor elimination

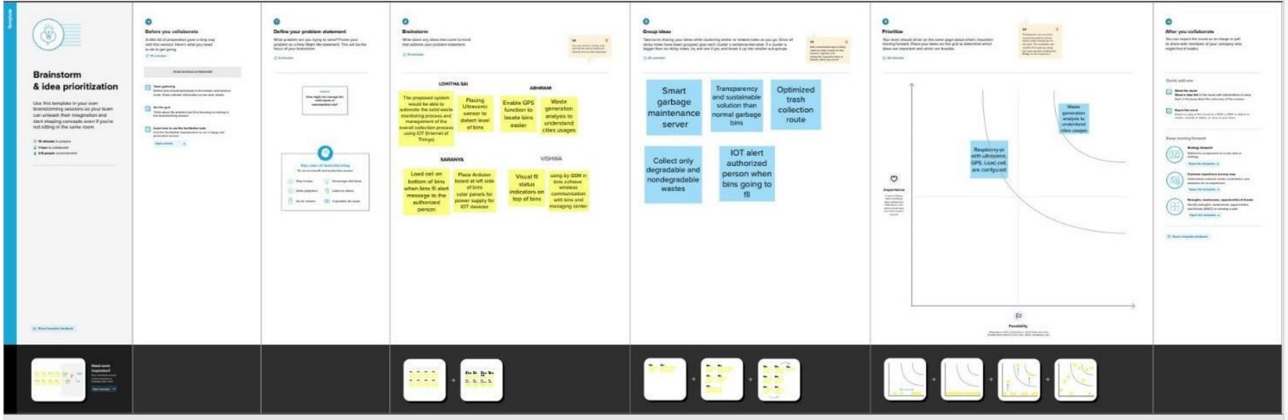
Share template feedback

Need some inspiration?

See a finished version of this template to kickstart your work.

Open example

2.3 Ideation & Brainstorming



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

Before you collaborate

Define your problem statement

Brainstorm

LOHITHA SAI

The proposed system would be able to automate the solid waste monitoring process and management of the overall collection process using IOT (Internet of Things)

Placing Ultrasonic sensor to detect level of bins

ABHIRAM

Enable GPS function to locate bins easier

Waste generation analysis to understand cities usages

SARANYA

Load cell on bottom of bins when bins fil alert message to the authorized person

Place Arduino board at left side of bins solar panels for power supply for IOT devices

VISHWA

Visual fil status indicators on top of bins

using by GSM in bins achieve wireless communication with bins and managing center

Group ideas

Smart garbage maintenance server

Transparency and sustainable solution than normal garbage bins

Optimized trash collection route

Collect only degradable and nondegradable wastes

IOT alert authorized person when bins going to fil

Prioritize

Raspberry-pi with ultrasonic, GPS, Load cell are configured

Waste generation analysis to understand cities usages

After you collaborate

2.4 Proposed Solution

S. No	Parameter	Description
1.	Problem Statement (Problem to be solved)	✔ The manual monitoring of wastes in trash cans is a laborious operation that requires additional time, money, and human labor ✔Unsafe trash disposal is generating problems for people. ✔Bad odor all around the place from uncollected trash or rubbish.
2.	Idea / Solution description	✔ This procedure uses a cloud connection and non-bio degradable wastes and an ultrasonic sensor to determine the level of a rubbish container ✔By developing an app, the company of a certain neighborhood inside a large metropolis will be able to check the trash cans to see if they are full or not.
3.	Novelty / Uniqueness	✔In contrast to the traditional ways for collecting trash cans, this strategy instructs us to utilize the transportation only when necessary. ✔Keeping an eye on the trash cans easier and less labor-intensive for humans.
4.	Social Impact / Customer Satisfaction	✔People can experience a clean atmosphere. ✔Reduces the amount of labor required from humans for waste disposal. ✔For a municipal corporation to monitor the cleanliness of different areas of the city, this proposal will be quite helpful.

5.	Business Model (Revenue Model)	✔By cutting back on unneeded transportation costs to pointless locations, this lowers a significantamount of fuel costs for city businesses. ✔This initiative intends to assistmunicipal corporation. ✔Provide a sanitary atmosphere.

3.REQUIREMENT ANALYSIS

3.1 Functional requirement

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)

FR-1	Real time bin monitoring.	The Dashboard shows statistics on the amount of fill in bins as it is being tracked by smart sensors. The application also forecasts when the bin will fill up based on past data in addition to the percentage of fill level, which is one of the features that even the finest waste management software lacks. As picks are also recognized by the sensors, you can determine when thebin was last emptied. You can get rid of the overflowing bins and cease collecting half-empty ones using real-time data and forecasts.
FR-2	Eliminate inefficient picks.	Get rid of the collection of half-empty trash cans. Picks are recognized by sensors. We can demonstrate to you how full the bins you collect are using real-time data on fill-levels and pick recognition.
FR-3	Plan waste collection routes.	Route planning for rubbish pickup is semi-automated using the tool. You are prepared to act and arrange for garbage collection based on the levels of bin fill that are now present and forecasts of approaching capacity. To find any discrepancies, compare the planned and actual paths.
FR-4	Adjust bin distribution.	Ensure the best possible bin distribution. Determine which regions have a dense or sparse distribution of bins. Ensure that each form of waste has a representative stand. You can make any required adjustments to bin position or capacity based on past data.
FR-5	Expensive bins.	We assist you in locating containers that increase collection prices. The tool determines a collection cost rating for each bin. The tool takes local average depo bin discharge into account. The tool determines the distance from depo-bin discharge and rates bins (1–10).
FR-6	Detailed bin inventory.	On the map, you can see every monitored bin and stand, and you can use Google Street View at any timeto visit them. On the map, bins or stands appear as green, orange, or red circles. The Dashboard displays information about each bin, including its capacity, trash kind, most recent measurement, GPS position, andpick up schedule.

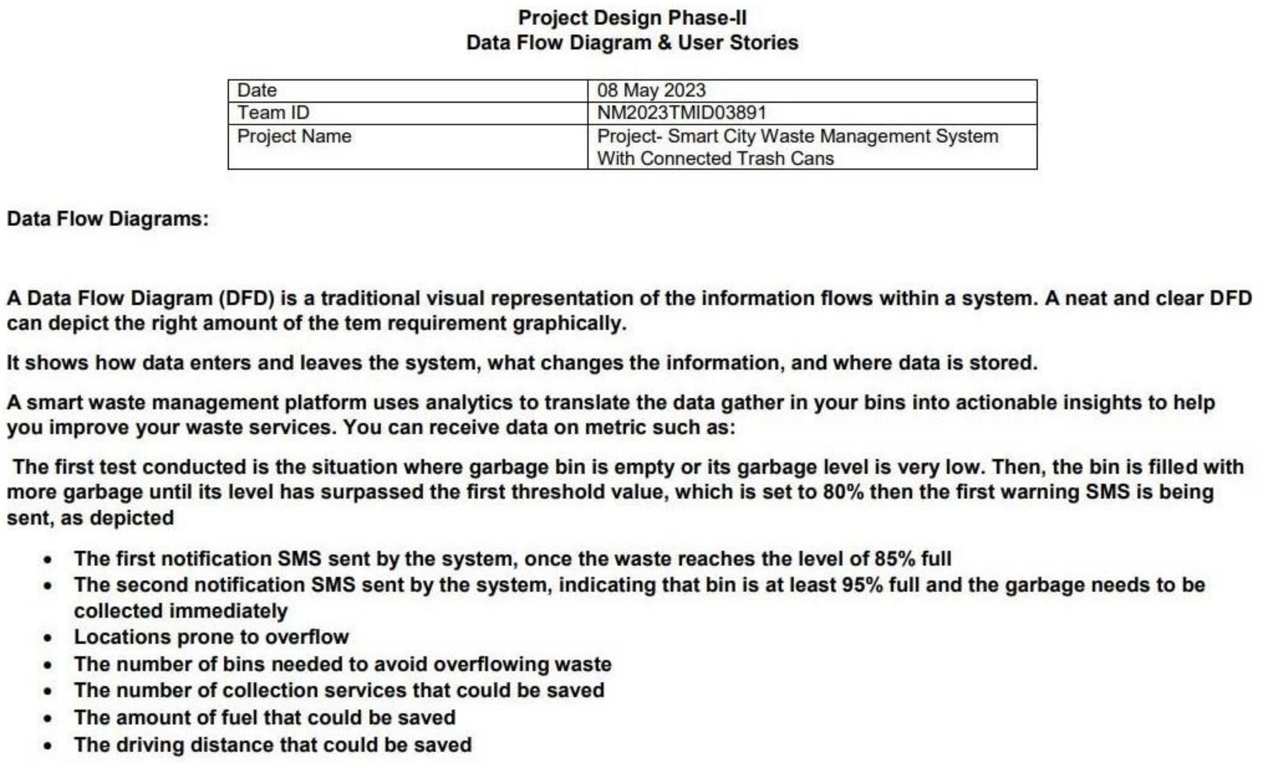
3.2 Non-Functional requirements

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Usability is a unique and significant perspective toexamine user needs, which may further enhance thedesign quality, according to IoT devices. Analyzing howwell people interact with a product may help designersbetter understand customers' prospective demands forwaste management, behavior, and experience in thedesign process when userexperience is at the Centre.
NFR-2	**Security**	Utilize recyclable bottles. Utilize reusable shopping bags. Spend responsibly and recycle Eat and drink in limited-use containers.
NFR-3	**Reliability**	Creating improved working conditions for garbage collectors and drivers is another aspect of smart waste management. Waste collectors will use their time more effectively by attending to bins that require service rather than travelling the same collection routes and servicing empty bins.
NFR-4	**Performance**	The Smart Sensors assessthe fill levelsin bins(alongwithother data) numerous times each day using ultrasonictechnology. The sensors feed data to Senone's SmartWaste Management Software System, a robust cloud based platform with data-driven daily operations and awaste management app, using a variety of IoT networks(NB-IoT, GPRS). As a consequence, customers receivedata-driven decision-making services, and garbagecollection routes, frequency, and truck loads areoptimized, resulting in at least a 30% decrease in routelength.
NFR-5	**Availability**	By creating and implementing robust hardware andgorgeous software, we enable cities, companies, andnations to manage garbage more intelligently.
NFR-6	**Scalability**	Using smart trash bins allows us to scale up and monitor the rubbish more efficiently while also reducing the number of bins needed in towns and cities.

4 PROJECT DESIGN

4.1 Data Flow Diagrams



Project Design Phase-II
Data Flow Diagram & User Stories

Date	08 May 2023
Team ID	NM2023TMID03891
Project Name	Project- Smart City Waste Management System With Connected Trash Cans

Data Flow Diagrams:

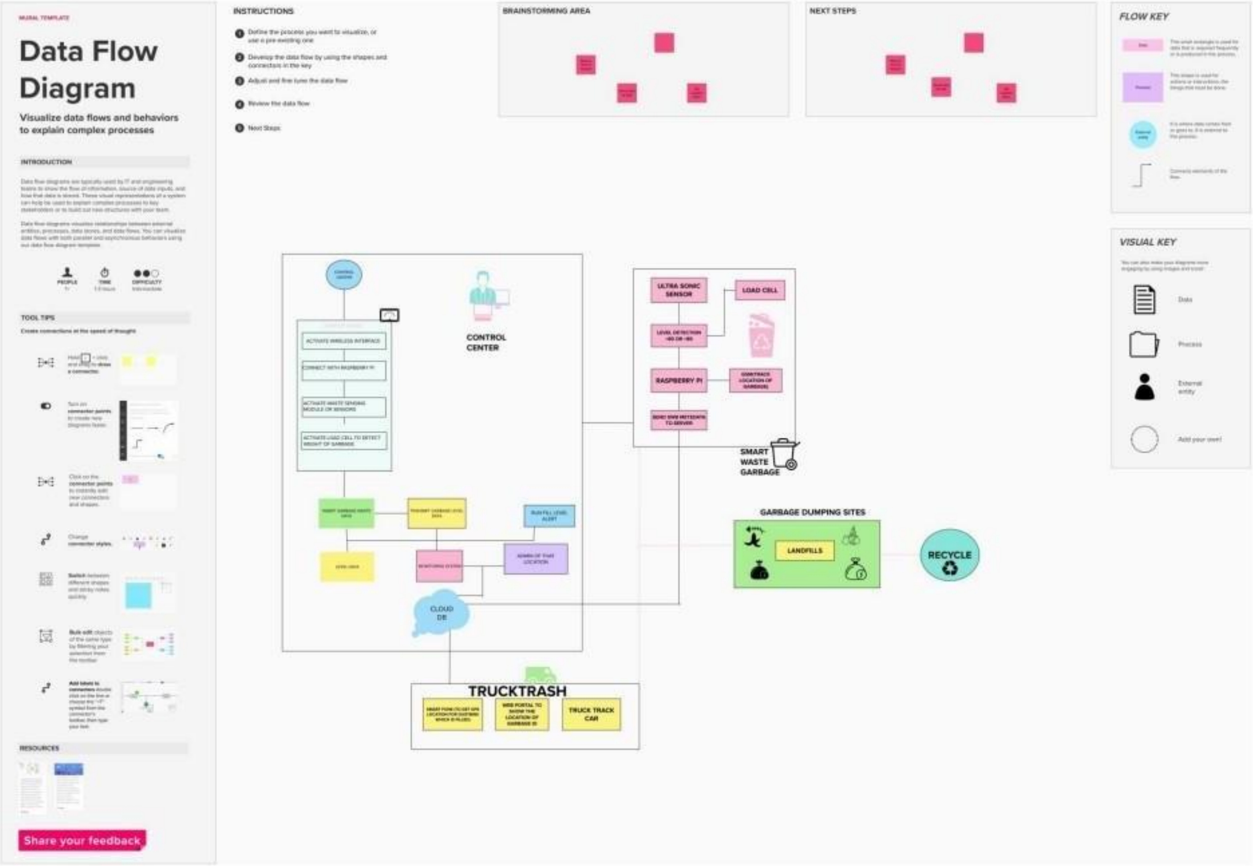
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the tem requirement graphically.

It shows how data enters and leaves the system, what changes the information, and where data is stored.

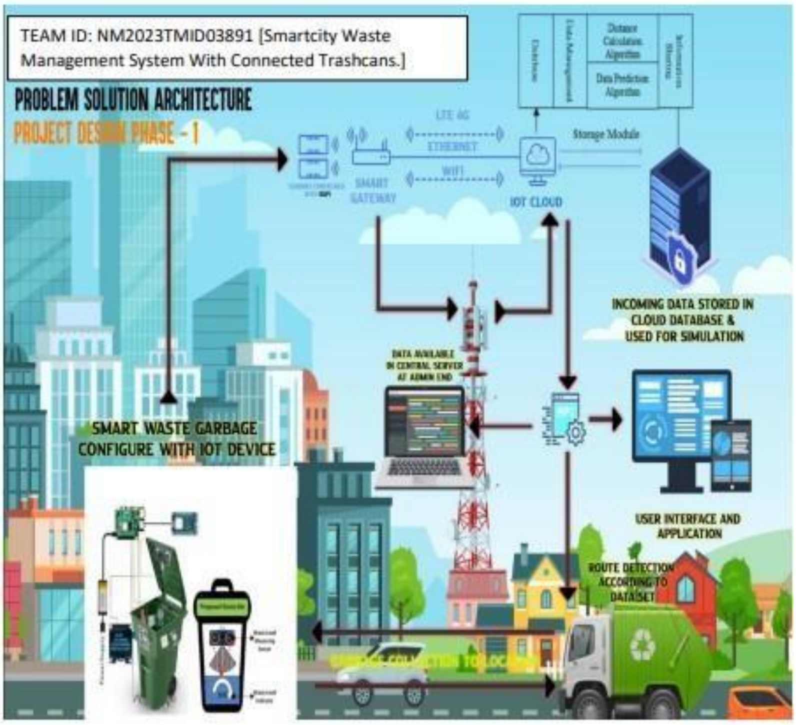
A smart waste management platform uses analytics to translate the data gather in your bins into actionable insights to help you improve your waste services. You can receive data on metric such as:

The first test conducted is the situation where garbage bin is empty or its garbage level is very low. Then, the bin is filled with more garbage until its level has surpassed the first threshold value, which is set to 80% then the first warning SMS is being sent, as depicted

- **The first notification SMS sent by the system, once the waste reaches the level of 85% full**
- **The second notification SMS sent by the system, indicating that bin is at least 95% full and the garbage needs to be collected immediately**
- **Locations prone to overflow**
- **The number of bins needed to avoid overflowing waste**
- **The number of collection services that could be saved**
- **The amount of fuel that could be saved**
- **The driving distance that could be saved**



4.2 Solution& Technical Architecture:


TEAM ID: NM2023TMID03891 [Smartcity Waste Management System With Connected Trashcans.]
PROBLEM SOLUTION ARCHITECTURE
PROJECT DESIGN PHASE - 1
Dashboard
Data Management
Distance Calculation Algorithm
Data Prediction Algorithm
Information Sharing
LTE 4G
ETHERNET
WIFI
SMART GATEWAY
IOT CLOUD
Storage Module
INCOMING DATA STORED IN CLOUD DATABASE & USED FOR SIMULATION
DATA AVAILABLE IN CENTRAL SERVER AT ADMIN END
SMART WASTE GARBAGE CONFIGURE WITH IOT DEVICE
USER INTERFACE AND APPLICATION
ROUTE DETECTION ACCORDING TO DATASET
GARBAGE COLLECTION TO LOCATION

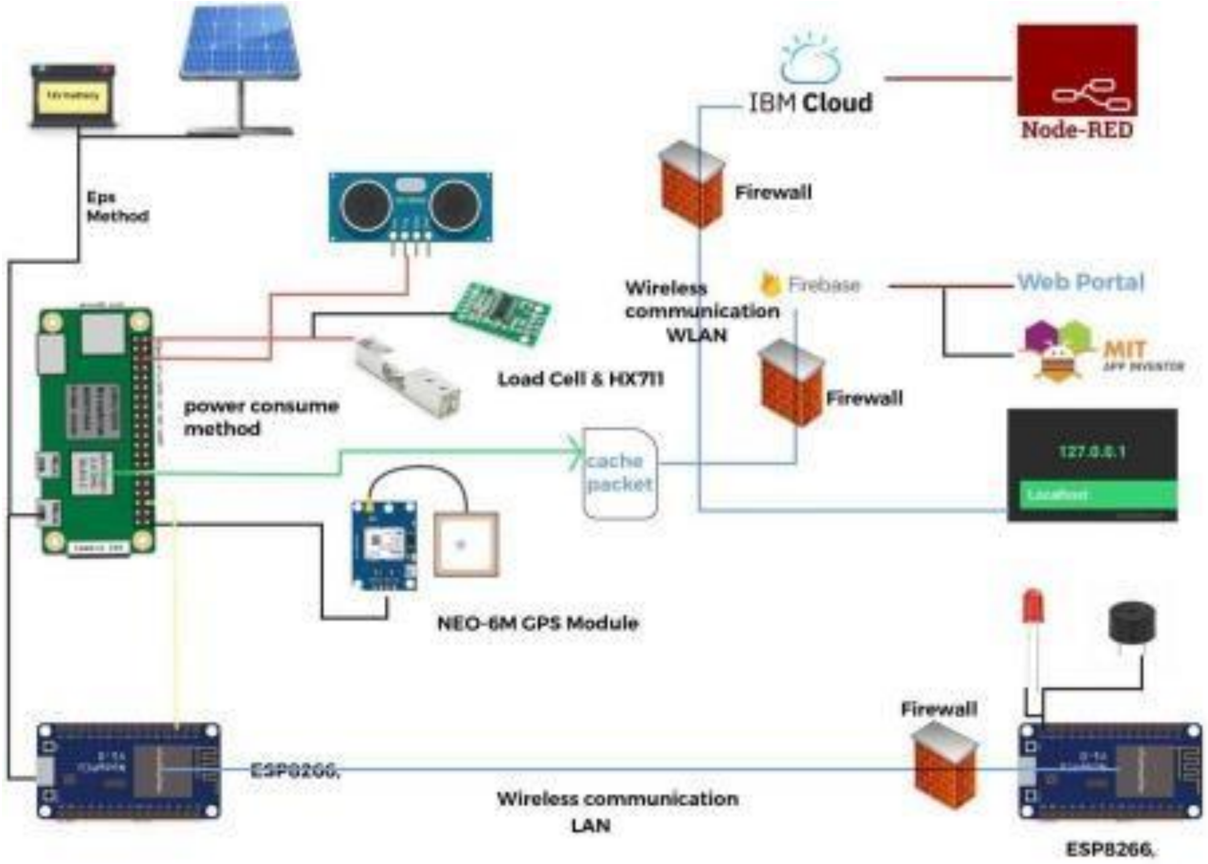


Table-1: Components & Technologies:

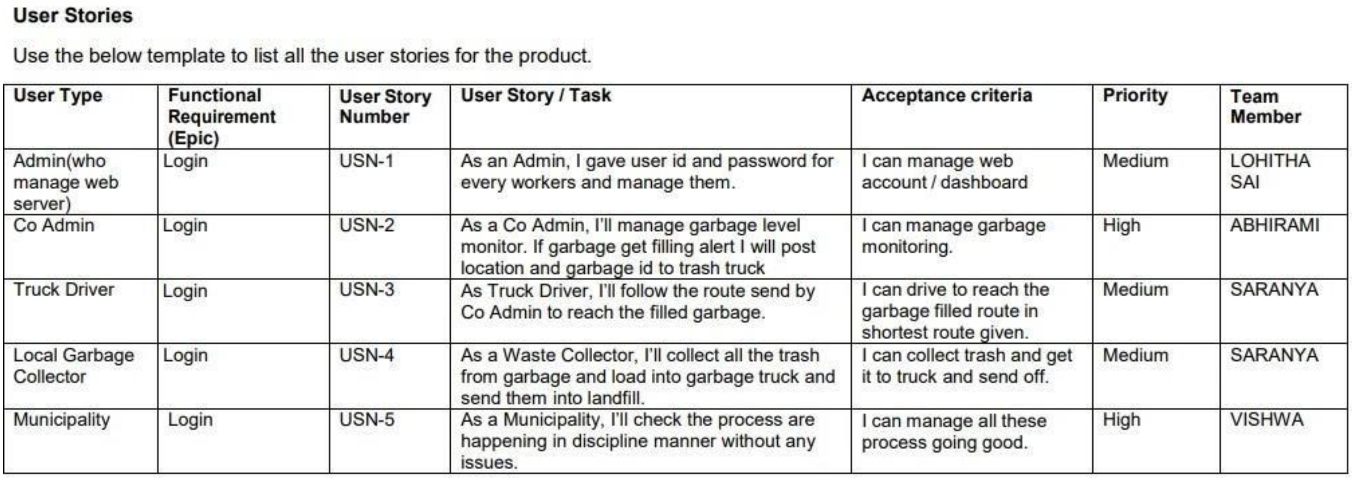
S.no	Component	Description	Technology
1.	User Interface	Mobile Application	HTML, CSS, JavaScript.
2.	Application Logic	Logic for a process in the application	Javascript
3.	Database	Data Type, Configurations etc.	Firebase, ibm cloud
4.	Cloud Database	Database Service on Cloud	IBM Cloud
5.	File Storage	File storage requirements	Local Filesystem and IBM cloud
6.	Infrastructure (Server / Cloud)	Application Deployment on CloudLocal Server Configuration	Local and Cloud Foundry

Table-2:Application Characteristics:

S.no	Characteristics	Description	Technology
1.	Open-Source Frameworks	GitHub	Internet hosting service

2.	Security Implementations	Application security: Veracode.	Network automation
3.	Scalable Architecture	It provides the room for expansion more databaseof smart bins added additionally can be updated.	Cloud storage
4.	Availability	As the system control is connected to web server itis available 24*7 and can be accessed whenever needed.	Server, Appleixe, reple
5.	Performance	Performance is high it uses 5mb caches	Wireless Sensor Network

4.3 User Stories



User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Team Member
Admin(who manage web server)	Login	USN-1	As an Admin, I gave user id and password for every workers and manage them.	I can manage web account / dashboard	Medium	LOHITHA SAI
Co Admin	Login	USN-2	As a Co Admin, I'll manage garbage level monitor. If garbage get filling alert I will post location and garbage id to trash truck	I can manage garbage monitoring.	High	ABHIRAMI
Truck Driver	Login	USN-3	As Truck Driver, I'll follow the route send by Co Admin to reach the filled garbage.	I can drive to reach the garbage filled route in shortest route given.	Medium	SARANYA
Local Garbage Collector	Login	USN-4	As a Waste Collector, I'll collect all the trash from garbage and load into garbage truck and send them into landfill.	I can collect trash and get it to truck and send off.	Medium	SARANYA
Municipality	Login	USN-5	As a Municipality, I'll check the process are happening in discipline manner without any issues.	I can manage all these process going good.	High	VISHWA

5.CODING AND SOLUTIONING:

```
# Project : Smart Waste Management
# Team ID : NM2023TMID03891

#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt
#include "Ultrasonic.h"
Ultrasonic ultrasonic(2, 4);
float distance;


void callback(char* subscribetopic, byte* payload, unsigned int
payloadLength);

//-------credentials of IBM Accounts------

#define ORG "64byv9"//IBM ORGANITION ID
#define DEVICE_TYPE "abcd"//Device type mentioned in ibm watson IOT Platform
#define DEVICE_ID "1234" //Device ID mentioned in ibm watson IOT Platform
#define TOKEN "12345678"     //Token
String data3;
//float h, t;
```

```
//-------- Customise the above values --------
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";// Server Name
char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and type of event perform and format in which data to be send
char subscribetopic[] = "iot-2/cmd/test/fmt/String";// cmd  REPRESENT command type AND COMMAND IS TEST OF FORMAT STRING
char authMethod[] = "use-token-auth";// authentication method
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id



//-----------------------------------------
WiFiClient wifiClient; // creating the instance for wificlient
PubSubClient client(server, 1883, callback ,wifiClient); //calling the predefined client id by passing parameter like server id,portand wificredential
void setup()// configureing the ESP32
{
  Serial.begin(115200);


  delay(10);
  Serial.println();
  wificonnect();
  mqttconnect();
}

void loop()// Recursive Function
{
  distance = ultrasonic.read(CM);

  Serial.print("Distance in CM: ");
  Serial.println(distance);
  delay(1000);

  PublishData(distance);
  delay(1000);
  if (!client.loop()) {
    mqttconnect();
  }
}



/*.....................................retrieving to
Cloud. ............................ */

void PublishData(float distance) {
  mqttconnect();//function call for connecting to ibm
  /*
     creating the String in in form JSon to update the data to ibm cloud
  */
  String payload = "{\"distance\":";
  payload += distance;

  payload += "}";


  Serial.print("Sending payload: ");
  Serial.println(payload);


  if (client.publish(publishTopic, (char*) payload.c_str())) {
    Serial.println("Publish ok");// if it sucessfully upload data on the cloud
then it will print publish ok in Serial monitor or else it will print publish
failed
  } else {
    Serial.println("Publish failed");
  }

}
void mqttconnect() {
  if (!client.connected()) {
    Serial.print("Reconnecting client to ");
    Serial.println(server);
    while (!!!client.connect(clientId, authMethod, token)) {
      Serial.print(".");
      delay(500);
    }

     initManagedDevice();
     Serial.println();
  }
}
void wificonnect() //function defination for wificonnect
```

```
{
  Serial.println();
  Serial.print("Connecting to ");

  WiFi.begin("Wokwi-GUEST", "", 6);//passing the wifi credentials to establish
the connection
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}

void initManagedDevice() {
  if (client.subscribe(subscribetopic)) {
    Serial.println((subscribetopic));
    Serial.println("subscribe to cmd OK");
  } else {
    Serial.println("subscribe to cmd FAILED");
  }
}

void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
{

  Serial.print("callback invoked for topic: ");
  Serial.println(subscribetopic);

  for (int i = 0; i < payloadLength; i++) {
    //Serial.print((char)payload[i]);
    data3 += (char)payload[i];
  }

  Serial.println("data: "+ data3);

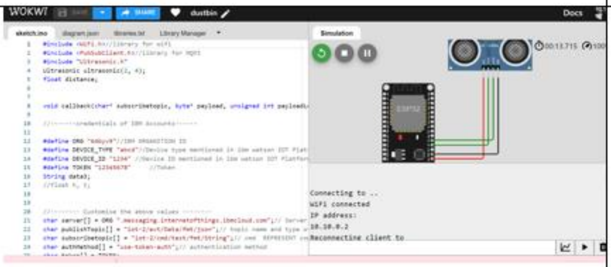
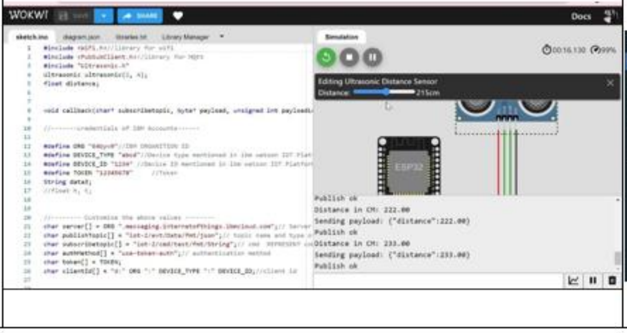
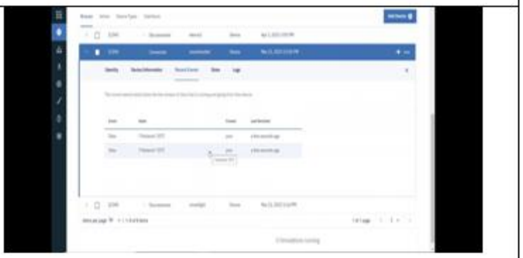
data3="";


}
```

6.RESULTS:

6.1 PERFORMANCE METRICS

Project team shall fill the following information in the performance testing template.

Parameter	Values	Screenshot
Metrics	 	

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char subscribetopic[] = "iot-2/cmd/test/fmt/String";// cmd  REPRESENT co
char authMethod[] = "use-token-auth";// authentication method
```

```
Connecting to ..
WiFi connected
IP address:
10.10.0.2
Reconnecting client to
```

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char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id
```

```
Publish ok
Distance in CM: 222.00
Sending payload: {"distance":222.00}
Publish ok
Distance in CM: 233.00
Sending payload: {"distance":233.00}
Publish ok
```

7. ADVANTAGES & DISADVANTAGES

ADVANTAGES:

· Reduction in Collection Cost
· No Missed Pickups
· Reduced Overflows
· Waste Generation Analysis
· CO2 Emission Reduction

DISADVANTAGES:

· System requires a greater number of waste bins for separate waste collection as per population in the city.
· This results into high initial cost due to expensive smart dustbins compare to other methods. · Sensor nodes used in the dustbins have limited memory size.

8.CONCLUSION

A Smart Waste Management system that is more effective than the one in use now is achievable by using sensors to monitor the filling of bins. Our conception of a "smart waste management system" focuses on monitoring waste management, offering intelligent technology for waste systems, eliminating human intervention, minimizing human time and effort, and producing a healthy and trash free environment. The suggested approach can be implemented in smart cities where residents have busy schedules that provide little time for garbage management. If desired, the bins might be put into place in a metropolis where a sizable container would be able to hold enough solid trash for a single unit. The price might be high.

9.FUTURE SCOPE

There are several future works and improvements for the proposed system, including the following:

1. Change the system of user authentication and atomic lock of bins, which would aid in protecting the bin from damage or theft.

2. The concept of green points would encourage the involvement of residents or end users, making the idea successful and aiding in the achievement of collaborative waste management efforts, thus fulfilling the idea of Swachh Bharath.

3. Having case study or data analytics on the type and times waste is collected on different days or seasons, making bin filling predictable and removing the reliance on electronic components, and fixing the coordinates.

4. Improving the Server's and Android's graphical interfaces

10.APPENDIX

Source Code

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# Team ID : NM2023TMID03891

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type AND COMMAND IS TEST OF FORMAT STRING
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predefined client id by passing parameter like server id,portand
wificredential
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void loop()// Recursive Function
{
  distance = ultrasonic.read(CM);

  Serial.print("Distance in CM: ");
  Serial.println(distance);
  delay(1000);

  PublishData(distance);
  delay(1000);
  if (!client.loop()) {
    mqttconnect();
  }
}



/*.....................................retrieving to
Cloud. ............................. */

void PublishData(float distance) {
  mqttconnect();//function call for connecting to ibm
  /*
     creating the String in in form JSon to update the data to ibm cloud
  */
  String payload = "{\"distance\":";
  payload += distance;

  payload += "}";


  Serial.print("Sending payload: ");
  Serial.println(payload);


  if (client.publish(publishTopic, (char*) payload.c_str())) {
    Serial.println("Publish ok");// if it sucessfully upload data on the cloud
then it will print publish ok in Serial monitor or else it will print publish
failed
  } else {
    Serial.println("Publish failed");
  }

}
void mqttconnect() {
  if (!client.connected()) {
    Serial.print("Reconnecting client to ");
    Serial.println(server);
    while (!!!client.connect(clientId, authMethod, token)) {
      Serial.print(".");
      delay(500);
    }

     initManagedDevice();
     Serial.println();
  }
}
void wificonnect() //function defination for wificonnect
```

```
{
  Serial.println();
  Serial.print("Connecting to ");

  WiFi.begin("Wokwi-GUEST", "", 6);//passing the wifi credentials to establish
the connection
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}

void initManagedDevice() {
  if (client.subscribe(subscribetopic)) {
    Serial.println((subscribetopic));
    Serial.println("subscribe to cmd OK");
  } else {
    Serial.println("subscribe to cmd FAILED");
  }
}

void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
{

  Serial.print("callback invoked for topic: ");
  Serial.println(subscribetopic);

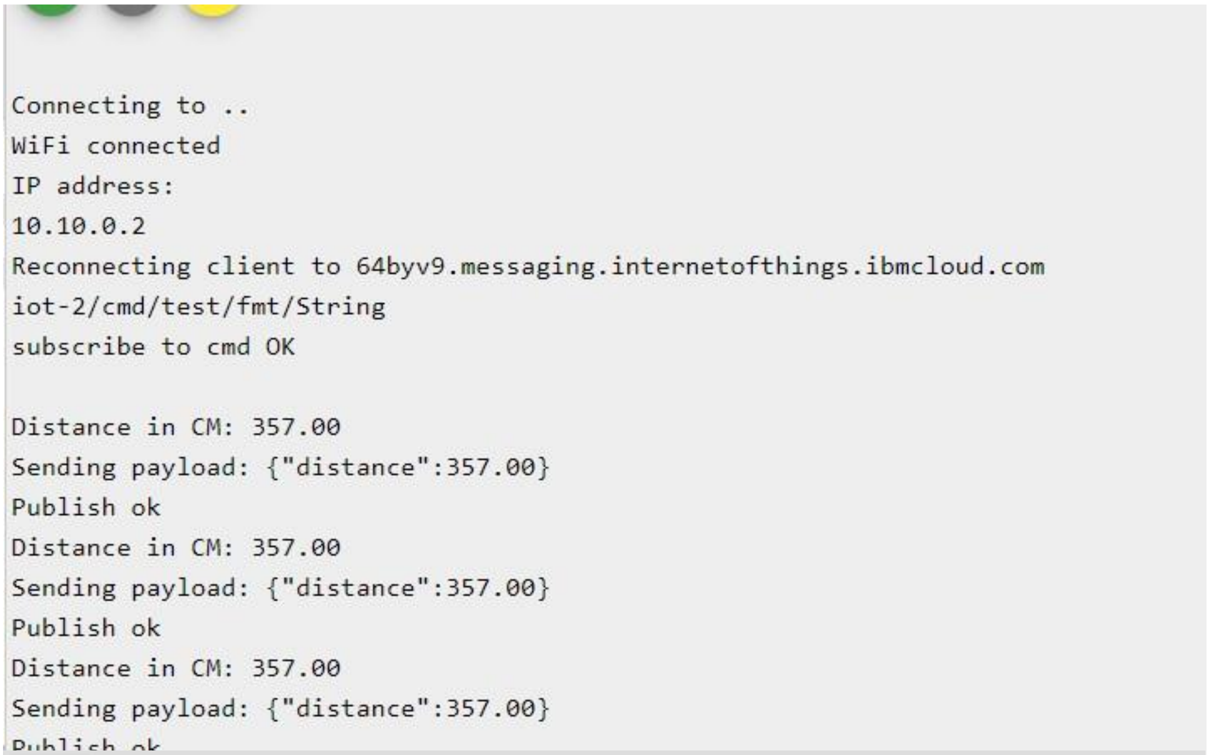
  for (int i = 0; i < payloadLength; i++) {
    //Serial.print((char)payload[i]);
    data3 += (char)payload[i];
  }

  Serial.println("data: "+ data3);

data3="";

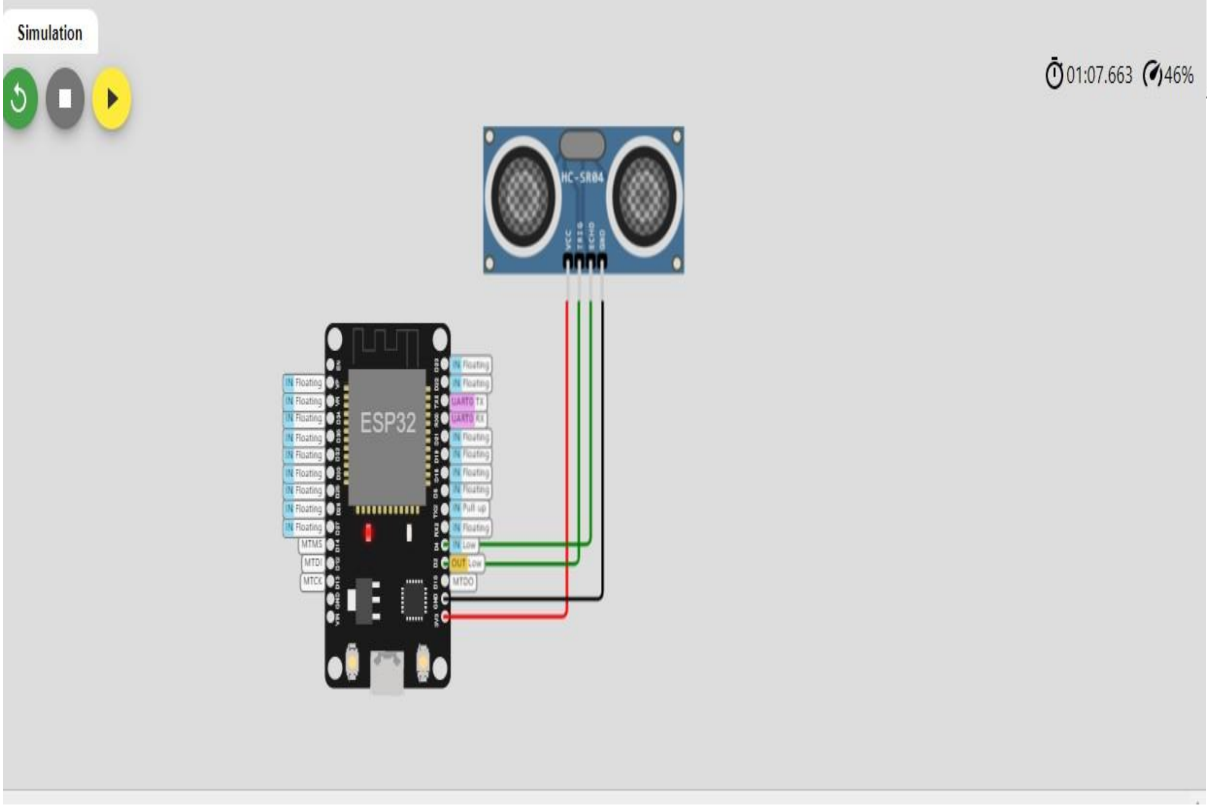

}
```

OUTPUT PICTURE



```
Connecting to ..
WiFi connected
IP address:
10.10.0.2
Reconnecting client to 64byv9.messaging.internetofthings.ibmcloud.com
iot-2/cmd/test/fmt/String
subscribe to cmd OK

Distance in CM: 357.00
Sending payload: {"distance":357.00}
Publish ok
Distance in CM: 357.00
Sending payload: {"distance":357.00}
Publish ok
Distance in CM: 357.00
Sending payload: {"distance":357.00}
Publish ok
```



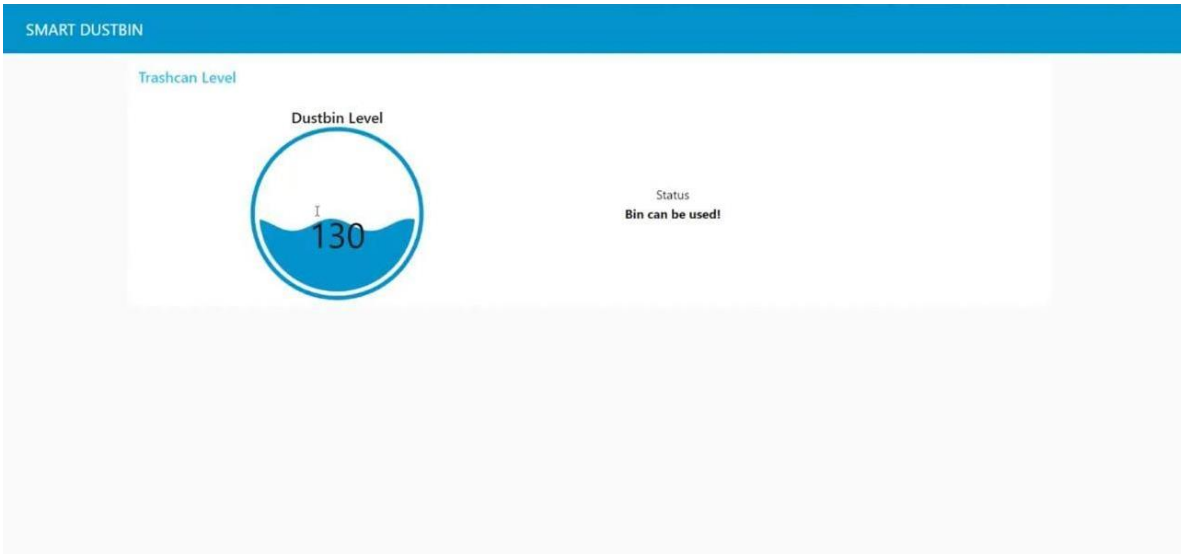
13.2 LINKS

GitHub Link: https://github.com/naanmudhalvan-SI/IBM--15483-1682322242

WOKWI LINK

https://wokwi.com/projects/365277346488244225

NODE RED:



SMART DUSTBIN

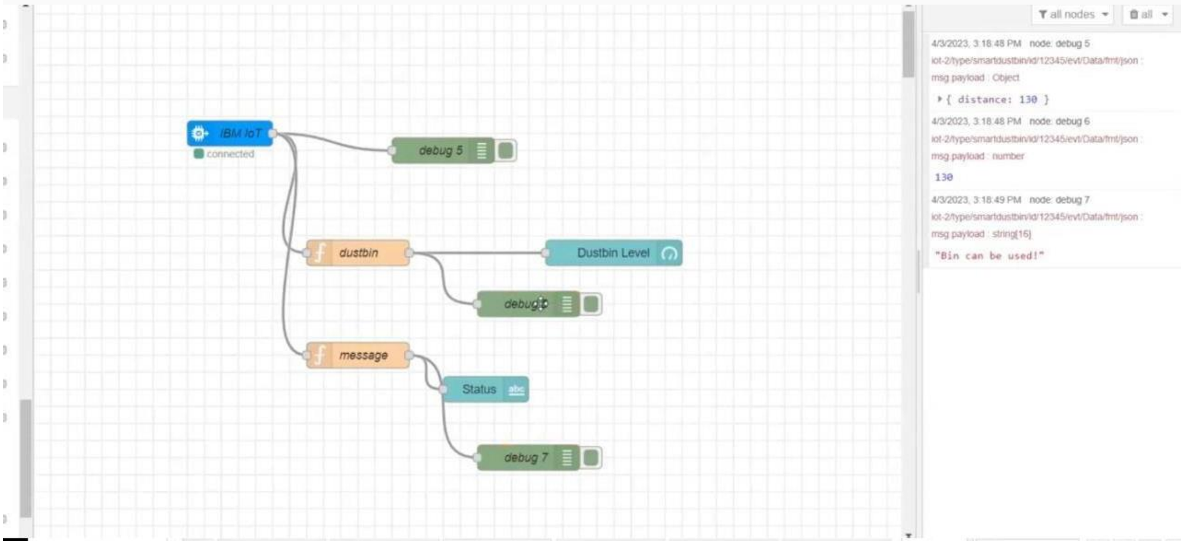
Trashcan Level

Dustbin Level

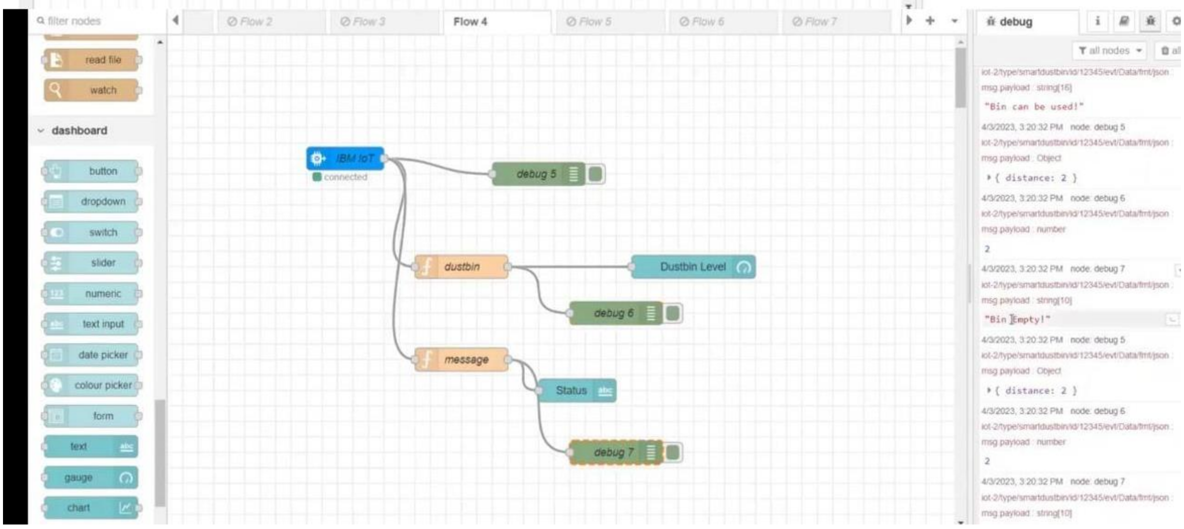
130

Status

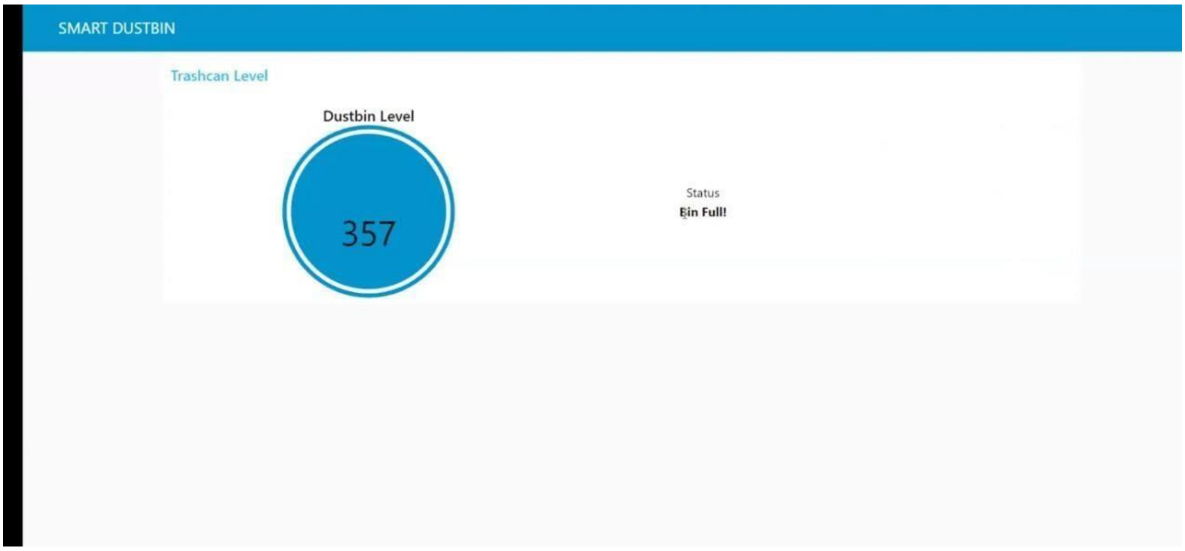
Bin can be used!



```
4/3/2023, 3:18:48 PM   node: debug 5
iot-2/type/smartdustbin/id/12345/evt/Data/fmt/json :
msg.payload : Object
▸{ distance: 130 }
4/3/2023, 3:18:48 PM   node: debug 6
iot-2/type/smartdustbin/id/12345/evt/Data/fmt/json :
msg.payload : number
130
4/3/2023, 3:18:49 PM   node: debug 7
iot-2/type/smartdustbin/id/12345/evt/Data/fmt/json :
msg.payload : string[16]
"Bin can be used!"
```



```
iot-2/type/smartdustbin/id/12345/evt/Data/fmt/json :
msg.payload : string[16]
"Bin can be used!"
4/3/2023, 3:20:32 PM   node: debug 5
iot-2/type/smartdustbin/id/12345/evt/Data/fmt/json :
msg.payload : Object
▸{ distance: 2 }
4/3/2023, 3:20:32 PM   node: debug 6
iot-2/type/smartdustbin/id/12345/evt/Data/fmt/json :
msg.payload : number
2
4/3/2023, 3:20:32 PM   node: debug 7
iot-2/type/smartdustbin/id/12345/evt/Data/fmt/json :
msg.payload : string[10]
"Bin Empty!"
4/3/2023, 3:20:32 PM   node: debug 5
iot-2/type/smartdustbin/id/12345/evt/Data/fmt/json :
msg.payload : Object
▸{ distance: 2 }
4/3/2023, 3:20:32 PM   node: debug 6
iot-2/type/smartdustbin/id/12345/evt/Data/fmt/json :
msg.payload : number
2
4/3/2023, 3:20:32 PM   node: debug 7
iot-2/type/smartdustbin/id/12345/evt/Data/fmt/json :
msg.payload : string[10]
```



SMART DUSTBIN

Trashcan Level

Dustbin Level

357

Status

Bin Full!