UTILIZATION OF TESTING TOOLS:

Date	19 November 2022
Team ID	PNT2022TMID28587
Project Name	Smart Waste Management System for Metropolitan Cities.

Hardware

Hardware	Recommended Requirements
Sensor Model (both Customer and collecting vehicles need 2 models)	Arduino Mega 2560
	NodeMCU board
	3 Ultrasonic sensors
	16 * 2 LCD Display Module with I2C Module
	LM 2596 DC-DC switch mode power supply
	12V Battery, Bread Board
Processor	Intel Core i3 processor 2.3GHz
Memory	2GB RAM or more
Internet	Minimum 512kbps wi-fi connection for the module Minimum
Disk Space	2 gigabytes (GB)

Software

Operating System	Microsoft Windows 7 Or above.
Code editor	Arduino IDE
Database	Google Firebase Real-time database
Web browser	Internet explorer/Fire Fox/Google Chrome

Testing

One of the important phases of software development lifecycle is testing and evaluation. In here following techniques are used for testing and evaluation of the system.

Unit Testing :

Unit testing is used as the first testing method. The main goal of the unit testing is to isolate each part of the program and to check the correctness of the code. The system is tested with the developed model. In the model there are three bins and one collection vehicle, So that it can be test whether the model sends data to the cloud. In this model there should be many bin locations and some collecting vehicles. But model provides only one bin location and one collecting vehicle. So that it needs changing the IDs with the coding of the model and send those data to the cloud by making bin locations virtually. Then it is created a map with virtual bin locations and few collection vehicles. Then it can be tested showing the bins and collecting vehicles in different locations.

Integration Testing :

Integration testing is done by combining all the individual modules of the garbage collection system. Here it is focused all the modules of the system.

System Testing :

The system testing is mainly done on the whole integrated system to make sure that the project that has been developed meets all the requirements. Each use case and functions will executed using data.

Test Case Description			
No	Test Case	Actual Output	Status
1	Put some litters into three bins while switch on Wi-Fi network	Create a document in fire store database with time stamp	Pass
2	Keep the bins empty	Create a document in fire store database with time stamp	Pass
3	Sends bin filling levels with time intervals	Sends data to the fire store database and create documents with relevant time intervals	Pass

4	Put some litters into three bins while switch off Wi-Fi network	It doesn’t create the document’s in the fire store database	Pass

Testing begins with the implementation, code is reviewed while developing stage for testing. Test plan is included all phases of testing and also used as a guide for the overall testing process. Before the system implementation, the test plan was designed. A test plan includes: test objectives, schedule and logistics, test strategies and especially test cases.

Test cases were created according to the designed test plan. That contains data, procedure, and expected result and represents which use to system or part of the system run. To reduce complexity of the testing process test cases were designed for each module independently.

Manual testing method and procedures are used for testing rather than automation tools and technologies**.**

After full testing cycle user can comment system was developed successfully and according to positive user reactions shows they accepted the system. When consider user acceptance test results all the functional requirements given by the client were fulfilled and the users can carry out their tasks effectively and efficiently with new system. Few minor modifications were made to the system according to the user feedback.