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A PROJECT REPORT

ON

"GEOLOCATION BASED ADVANCE WASTE COLLECTION"

Submitted to

UNIVERSITY OF MUMBAI

In Partial Fulfilment of the Requirement for the Award of

BACHELOR'S DEGREE IN
COMPUTER ENGINEERING
BY

CHOGLE SAIF ALI NAUSHAD SAJIDA	**12CO27**
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UNDER THE GUIDANCE OF
PROF. Mubashir Khan

DEPARTMENT OF COMPUTER ENGINEERING
Anjuman-I-Islam's Kalsekar Technical Campus
SCHOOL OF ENGINEERING & TECHNOLOGY
Plot No. 2 & 3, Sector - 16, Near Thana Naka,
Khandagaon, New Panvel - 410206

2020-2021

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A PROJECT II REPORT
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CERTIFICATE

This is certify that the project entitled

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submitted by

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is a record of bonafide work carried out by them, in the partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering (Computer Engineering) at ***Anjuman-I-Islam's Kalsekar Technical Campus, Navi Mumbai*** under the University of MUMBAI. This work is done during year 2020-2021, under our guidance.

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Project I Approval for Bachelor of Engineering

This project entitled ***GEOLOCATION BASED ADVANCE WASTE COLLECTION*** by ***Chogle Saif Ali Naushad, Ansari Hoida Mohammed Naeem, Lambe Maaz Muzaffer, Khalfe Sajjad Mohammed Shoukat*** is approved for the degree of ***Bachelor of Engineering in Department of Computer Engineering.***

Examiners

1. .....
2. .....

Supervisors

1. .....
2. .....

Chairman

.....

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Declaration

We declare that this written submission represents our ideas in our own words and where others ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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ABSTRACT

Everyday a huge amount of solid waste generates. It generates from various sources such as from industries, markets, house complexes, etc. This waste also varies in state and shape. As the human involvement is rising in nature, we have seen a rapid growth in solid waste in the world. Due to rise in solid waste, various problems have arisen in society.

To control such problems, a proper plan and management of solid waste is needed in society.Due to lack of planning and management of solid waste , huge number of regions have faced problems regarding waste management. The primary aim of sustainable solid waste management is to address concerns related to public health, environmental pollution, land use, resource management and socio-economic impacts associated with improper disposal of waste.

To reduce those problems and build a well-defined solid waste management, we have developed a "GEO-LOCATION BASED ADVANCE WASTE COLLECTION" system. This system focuses on optimization of entire solid waste management process. For a specific region or city, garbage bins are set to different locations in that city or respective region. An ultra sonic sensor is attached to every garbage bin. As soon as the garbage gets overflow from bin, this sensor sends a signal to a WiFi module which then send data to web application. Current status of garbage bin is monitored by management personnel. Selection of proper vehicle to collect waste from a site and to dump it on a dumping site is one of the task of the management personnel. The respective vehicle would lift the garbage and dump it on a dumping site through an optimized way. Management personnel can analyse vehicle trip reports for further evaluation. An application has developed for citizens to initiate a complaint regarding waste. They can further track the status of their complaints. This system is economically beneficial to the authorities because of its high efficiency and optimization.

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Chapter 1

Introduction

Solid-waste management, the collecting, treating, and disposing of solid material that is dis-carded because it has served its purpose or is no longer useful. Improper disposal of municipal solid waste can create unsanitary conditions, and these conditions in turn can lead to pollution of the environment and to outbreaks of vector-borne disease—that is, diseases spread by rodents and insects. The tasks of solid-waste management present complex technical challenges. They also pose a wide variety of administrative, economic, and social problems that must be managed and solved. To reduce those problems and build a well-defined solid waste management, we have developed a"GEO-LOCATION BASED ADVANCE WASTE COLLECTION"system.

This system focuses on optimization of entire solid waste management process. Waste collection sites is defined and mapped. In a timely manner, collection of waste can be done as soon as garbage gets full at waste collection site. Management personnel would select suitable vehicle for collection and transportation of garbage which would avoid unnecessary loops of vehicles.

As the solid waste being collected at waste collection site, the vehicle would dump the solid waste through an optimized way. Citizen's involvement is also a key parameter in achieving a sustainable waste management model. An android application have been developed that facilitates citizens to initiate a complaint, track their complaint. Through this involvement of citizens and authorities would create a sustainable solid waste management.

1.1 Purpose

Geo-Location Based Advance Waste Collection is a new way of managing solid waste of a region. This enables efficient and cost effective method of waste collection. Due to the inheritance of Geo-location of dust bins in a region, vehicle can

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easily monitor and collect solid waste. Solid waste management authorities can easily track the current status of dust bins due to sensors integrated to it. Citizens can initiate complaint through mobile application if they find any issue related to garbage around any public dustbin. This mobile application can also facilitate the service of tracking of complaints.

1.2 Project Scope

The scope of the proposed project is to maintain and monitor the solid waste of the town by the help of website dash board and also help to track the waste level of the city. And also provide the activeness of Waste management workers.

- This project helps to monitor the level of solid waste remotely and help to notify the worker for instance of waste level which provide greater accessibility to the dustbin.
- It provides location of dustbin to the user which are recorded in the database.
- It provides smart route for the garbage collector van which leads to reduction of fuel consuming and effective work.
- Provide work tracking platform for the workers.
- This project helps to maintain our city clean and minimize the pollution.

1.3 Project Goals and Objectives

1.3.1 Goals

- To provide efficient control over waste collection.
- To provide better user interface to citizens and waste management authorities.
- To provide flexible system to citizens.
- To provide more functionalities to citizens and waste management authorities.
- Keeping status of dust bins online.
- Promoting waste management services online.
- Providing complaint status of citizens online.
- User can use it from anywhere through mobile or computer.

1.3.2 Objectives

- To convert conventional solid waste collection system to a more dynamic, efficient one.
- Bridging the gap of communication between entities in solid waste management system.
- To prevent any slack by third party contractors.

1.4 Organization of Report

Chapter 1: Gives a brief introduction about our project.

Chapter 2 : Describes the literature review of the existing papers and the description about the application.

Chapter 3 : Discuss about the project planning and different roles and capability of the team members. Also talks about the budget of the project.

Chapter 4 : Describe the brief description of the srs and the other requirements of the project.

Chapter 5 : Shows the system design, functional requirements and different diagram of the project.

Chapter 6 : Shows Implementation of the websites and coding.

Chapter 7 : Shows the different testings performed and the problems faced. It also shows snapshots of the current working application.

Chapter 8 : Describes the closure to the book and tries to conclude the work in the project and also mentions the future scopes as to where it would be used Chapter.

Chapter 9 : Describes a steps guide about using the final report.

Chapter 2

Literature Survey

2.1 Optimization of municipal solid waste transportation byintegrating GIS analysis, equation-based, and agent-based model

Khanh Nguyen-Trong, Anh Nguyen-Thi-Ngoc, Doanh Nguyen-Ngoc,Van Dinh-Thi-Hai introduced 'Optimization of municipal solid waste transportation by integrating GIS analysis, equation-based, and agent-based model'. This system proposed that, the collection and transportation of municipal solid waste (MSW)can be divided into two steps. Firstly, the MSW, generated by different sources (S) (households,markets, offices and so on) is collected and conveyed to the nearest collection center (C). Each center is composed of a number of bins that have a same capacity (in m3). Then, vehicles that start from depot (D) move through collection centers following a scheduled route, collect MSW and finish at the landfill (L)[1].

2.1.1 Advantages of Paper

a. The position and the quantity (the number of bins) of each collection center are known.

b. The distance between nodes is known.

2.1.2 Disadvantages of Paper

a. Collection of solid waste will be done once in a day.

b. If garbage bins overloaded then until next day, it would not be collected.

2.1.3 How to overcome the problems mentioned in Paper

a. In our system, we will set notification function that will alert the system as soon as if any garbage bin gets full.

b. In result of this, appropriate transport vehicle will lift this garbage and will dump it.

2.2 The regional urban solid waste management system: A modelling approach

C. Caruso, A. Colomi and M. Paruccini, introduced 'The regional urban solid waste management system: A modelling approach'. The system is structured into the four phases of collection, transportation, processing and disposal. For the processing phase, the technologies of incineration, composting and recycling, the most commonly used ones; sanitary landfills are considered in the disposal phase. Overall, therefore, the technological choices refer to four different types of plants. A graph is the tool used to describe the geographical situation in which the location model is to be inserted. The nodes of the graph represent the zones into which the region is divided, and the arcs represent the transport network[2].

2.2.1 Advantages of Paper

a. The position and the quantity (the number of bins) of each collection center are known.

b. The distance between nodes is known.

2.2.2 Disadvantages of Paper

a. Collection of solid waste will be done once in a day.

b. If garbage bins overloaded then until next day, it would not be collected.

c. It does not provide real time environment analysis.

2.2.3 How to overcome the problems mentioned in Paper

a. In our system, we will set notification function that will alert the system as soon as if any garbage bin gets full.

b. In result of this, appropriate transport vehicle will lift this garbage and will dump it.

2.3 Solid waste management in Abuja, Nigeria

A. Imam, B. Mohammed, D.C. Wilson and C.R. Cheeseman introduced Solid waste management in Abuja, Nigeria.This system proposed number of recommendations, aimed at the development of an integrated and sustainable system for solid waste management in Abuja. It minimize costs, an improved waste storage and collection system. Vehicles involved in solid waste managements have been designed in accordance to local environment, aims to efficient collection of waste from sources

and transporting it the plants where further segregation of solid waste takes place. Segregated waste after several processes either be recyclable or may composed to fertilizers[3].

2.3.1 Advantages of Paper

a. This system focuses not only on the collection and transportation of solid waste to the disposal site but also it processes the entire solid waste through several technologies in order achieve and maintain recyclable chain.

2.3.2 Disadvantages of Paper

a. This system only focuses on collection, transportation, processing and disposal of solid waste.

b. It doesn't provide optimization and reliability in overall process.

c. This system unable to distinguish the optimized route to solid waste sources, processing plants and dumping grounds.

d. Real time state of waste sources is unpredictable, may exceed capacity of transporting vehicle in case of large waste collection.

2.3.3 How to overcome the problems mentioned in Paper

a. In our system, we will try to get real-time state of waste sources, which will leads to proper selection of transporting vehicle to avoid unnecessary loops of those vehicles.

b. Optimal route will reduce the economic stress on solid waste management.

2.4 Automatic Garbage Collection And Dumping System – A Novel Design Using Arduino And NI Myrio

Srilatha Madhunala, Hemalatha Rallapalli and Yashwanth Kumar T introduced Automatic Garbage Collection And Dumping System – A Novel Design Using Arduino And NI Myrio. Proposed method (Automated Garbage Collection and Dumping System) in this paper focuses on collecting and dumping garbage with the help of path planning. This system uses two types of garbage bins; Small Bins which are placed in static locations to collect garbage, Big Bin equipped to a movable platform. Big bin will move in its predefined path which is marked using a black line and collect garbage gathered in small bins in regular intervals. Whenever the big bin gets filled it moves to a predefined dumping yard location directly and dump the

garbage without any human interference. The big bin is controlled by NI myRIO supported by NI LabVIEW programming and small bins are controlled by Arduino UNO. Path identification, small bins identification and dumping yard identification are done with the help of IR sensors[4].

2.4.1 Advantages of Paper

a. Provide automation of waste collection and disposal by introducing robotic automation.

b. This system can be implemented in heavy crowded area without constant monitoring.

2.4.2 Disadvantages of Paper

a. High cost in developing and maintenance.

b. Complicated functioning.

2.4.3 How to overcome the problems mentioned in Paper

a. We can eliminate high cost entities to implement a simple and effective waste management system.

2.5 Recycling and recovery routes of plastic solid waste (PSW): A review

In this research paper, S.M. Al-Salem, P. Lettieri, J. Baeyens studied various recent progress in the recycling and recovery of PSW is reviewed. A special emphasis is paid on waste generated from polyolefinic sources, which makes up a great percentage of our daily single-life cycle plastic products.The four routes of PSW treatment are detailed and discussed covering primary (re-extrusion), secondary (mechanical), tertiary (chemical) and quaternary (energy recovery) schemes and technologies[5].

2.5.1 Advantages of Paper

a. For developing such a sustainable and effective plastic solid waste management, this document described various effective methods of managing it.

b. Provided a deep understanding of various stages of plastic solid waste processing.

2.5.2 Disadvantages of Paper

a. They have only research on this tools so there is no real implementation in this paper.

b. They have focused only on processing of plastic solid waste.

2.5.3 How to overcome the problems mentioned in Paper

a. Try to implement recommended system in real world.

b. Try to implement inherit all effective methods and recommendation in this paper.

2.6 Technical Review

Our system is based on a web application. The web application have been integrated with a mobile application.The solid waste site also comprises of some hardware to provide real-time status of data. Here are description of technologies.

- Bootstrap:
  Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains CSS- and (optionally) JavaScript-based design templatesfor typography, forms, buttons, navigation, and other interface components. Bootstrap is theseventh-most-starred project on GitHub, with more than 142,000 stars, behind freeCodeCamp(almost 312,000 stars) and marginally behind Vue.js framework.Bootstrap is a HTML, CSS JS-Library that focuses on simplifying the development of informative web pages (as opposed toweb apps). The primary purpose of adding it to a web project is to apply Bootstrap's choices ofcolor, size, font and layout to that project. As such, the primary factor is whether the developersin charge find those choices to their liking. Once added to a project, Bootstrap provides basicstyle definitions for all HTML elements. The result is a uniform appearance for prose, tablesand form elements across web browsers.

Figure 2.1: Bootstrap

- HTML
  HTML stands for Hyper Text Markup Language. It is used to design web pages using markup language. HTML is the combination of Hypertext and Markup language. Hypertext defines the link between the web pages. Markup language is used to define the text document within tag which defines the structure of web pages.[**?**]

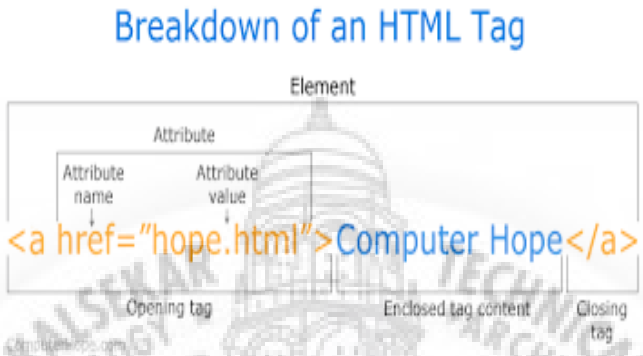

Figure 2.2: Html

- CSS
  Cascading Style Sheets, fondly referred to as CSS, is a simply designed language intended to simplify the process of making web pages presentable. CSS allows you to apply styles to web pages. More importantly, CSS enables you to do this independent of the HTML that makes up each web page.[**?**]

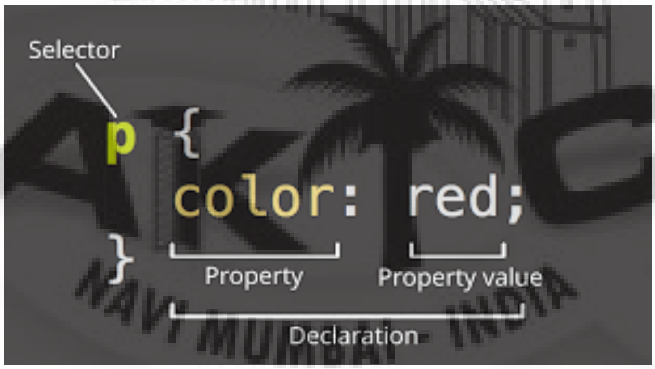

Figure 2.3: CSS

- JavaScript
  JavaScript, often abbreviated as JS, is a programming language that conforms to the ECMAScript specification. JavaScript is high-level, often just-in-time compiled, and multi-paradigm. It has curly-bracket syntax, dynamic typing, prototype-based object-orientation, and first-class functions.[**?**]

Figure 2.4: JavaScript

- jQuery
  jQuery is a JavaScript library designed to simplify HTML DOM tree traversal and manipulation, as well as event handling, CSS animation, and Ajax. It is free, open-source software using the permissive MIT License. As of May 2019, jQuery is used by 73 percent of the 10 million most popular websites. Web analysis indicates that it is the most widely deployed JavaScript library by a large margin, having at least 3 to 4 times more usage than any other JavaScript library.jQuery's syntax is designed to make it easier to navigate a document, select DOM elements, create animations, handle events, and develop Ajax applications. jQuery also provides capabilities for developers to create plug-ins on top of the JavaScript library. This enables developers to create abstractions for low-level interaction and animation, advanced effects and high-level, themeable widgets. The modular approach to the jQuery library allows the creation of powerful dynamic web pages and Web applications.

Figure 2.5: jQuery

- PHP
  PHP is a general-purpose scripting language especially suited to web development. It was originally created by Danish-Canadian programmer Rasmus Lerdorf in 1994. The PHP reference implementation is now produced by The PHP Group. PHP originally stood for Personal Home Page,[6] but it now stands for the recursive initialism PHP: Hypertext Preprocessor. PHP code is usually

processed on a web server by a PHP interpreter implemented as a module, a daemon or as a Common Gateway Interface (CGI) executable. On a web server, the result of the interpreted and executed PHP code – which may be any type of data, such as generated HTML or binary image data – would form the whole or part of an HTTP response. Various web template systems, web content management systems, and web frameworks exist which can be employed to orchestrate or facilitate the generation of that response.

Figure 2.6: PHP

- Flutter
  Flutter is an open-source UI software development kit created by Google. It is used to develop applications for Android, iOS, Linux, Mac, Windows, Google Fuchsia,[4] and the web from a single codebase.The major components of Flutter include: Dart platform, Flutter engine, Foundation library, Design-specific widgets. Flutter apps are written in the Dart language and make use of many of the language's more advanced features. Flutter's engine, written primarily in C++, provides low-level rendering support using Google's Skia graphics library. The Foundation library, written in Dart, provides basic classes and functions that are used to construct applications using Flutter, such as APIs to communicate with the engine. The Flutter framework contains two sets of widgets that conform to specific design languages: Material Design widgets implement Google's design language of the same name, and Cupertino widgets implement Apple's iOS Human interface guidelines.

Figure 2.7: Flutter

2.6.1 Advantages of Technology

- Bootstrap:
  Fewer Cross browser bugs. A consistent framework that supports major of all browsers and CSS compatibility fixes. Lightweight and customizable. Responsive structures and styles. Several JavaScript plugins using the jQuery [**?**].

- HTML:
  HTML is Easy to Learn and Use. It is Supported by all Browsers. IT is the Most Friendly Search Engine. It is Simple to Edit. It can Integrate Easily with Other Languages. It is Lightweight. It is Basic of all Programming Languages.

- CSS:
  Css is easier to maintain and update. Greater consistency in design. It have More formatting options. It is Lightweight code. Search engine optimization benefits due to CSS.

- JavaScript:
  Client-side JavaScript is very fast because it can be run immediately within the client-side browser. Unless outside resources are required, JavaScript is unhindered by network calls to a backend server. JavaScript is relatively simple to learn and implement. JavaScript is used everywhere on the web. JavaScript plays nicely with other languages and can be used in a huge variety of applications.

- jQuery:
  jQuery is quite popular with website developers because of its simplicity and ease of use. Most website developers find jQuery to be easy to learn and intuitive as the library is built using simpler and shorter codes. One of the characteristic benefits of using jQuery is the fact that it deals with many cross-browser issues and bugs that you would experience while developing using JavaScript only.

- PHP:
  Speed up custom web application development. Speed up custom web application development. No need to write additional code. Work with databases more efficiently. Automate common web development tasks. Protect websites from targeted security attacks. Perform unit testing efficiently. No need to increase web development cost.

- Flutter:
  Same UI and Business Logic in All Platforms. Reduced Code Development Time. Increased Time-to-Market Speed. Similar to Native App Performance. Custom, Animated UI of Any Complexity Available. Own Rendering Engine. Simple Platform-Specific Logic Implementation. The Potential Ability to Go Beyond Mobile.

2.6.2 Reasons to use this Technology

- Bootstrap:
  Along with being fully responsive, Bootstrap uses a special "mobile-first" approach to help you develop responsive, mobile-friendly websites.Bootstrap is equipped with a highly responsive 12-column fluid flexbox-based grid system (a grid system based on the flex display property, which allows you to display any content type in a fully customizable, responsive grid) that automatically scales up or down according to the screen resolution of a device. [**?**].

- HTML:
  HTML allows you to write clear and descriptive code, semantic code that allows you to easily separate meaning from style and content. HTML code ensures the proper formatting of text and images so that your Internet browser may display them as they are intended to look. Without HTML, a browser would not know how to display text as elements or load images or other elements. HTML also provides a basic structure of the page, upon which Cascading Style Sheets are overlaid to change its appearance.

- CSS:
  With CSS, we are able to create rules, and apply those rules to many elements within the website. CSS is Easy to Work. Css is easier to maintain and update.

- JavaScript:
  One language for frontend and backend programming. From writing less number of lines to re-using packages, there are many features that makes JavaScript development a breeze. Easy to Learn, faster to master. JavaScript has emerged as a flexible and powerful programming language, implemented consistently by various web browsers. Great Statistics.JavaScript has emerged are more versatile programming language than Java. It was due to many reasons — continuous

development, backend usage, multiple domain growth, ease of use, efficiency, tools etc.

- jQuery:
  jQuery is a lightweight, "write less, do more", JavaScript library. The purpose of jQuery is to make it much easier to use JavaScript on your website. jQuery takes a lot of common tasks that require many lines of JavaScript code to accomplish, and wraps them into methods that you can call with a single line of code.

- PHP:
  One of the major advantages of the PHP programming language is that it is accessible for free to web developers. It is executed at the server side that means it functions on the web server. Because of the open-source feature, PHP developer can learn about the scripting code in easily through online platforms.

- Flutter:
  Flutter provides easy and straightforward documentation with a large number of high-quality examples for reference. Developers who want to learn a new framework or a toolkit can opt for Flutter as it is easy to use and user-friendly language. Flutter allows you to build mobile apps for both platforms, including iOS and Android, with a single code base. Startups with a limited budget can spread their wings on all the major platforms with low development costs of Flutter apps.

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Chapter 3

Project Planning

3.1 Members and Capabilities

Table 3.1: Table of Capabilities

SR. No	Name of Member	Capabilities
1	Chogle Saif Ali	Front-end and Backend (Web App), Firebase, Hardware
2	Ansari Hoida	UI Design, Front-end
3	Lambe Maaz	Front-end and Backend(Android), Firebase
4	Khalfe Sajjad	UI Design, Backend, JS

Work Breakdown Structure

3.2 Roles and Responsibilities

Table 3.2: Table of Responsibilities

SR. No	Name of Member	Role	Responsibilities
1	Chogle Saif Ali	Team Leader	Database design, Back-end and Front-end Development Web App, Hardware integration
2	Ansari Hoida	Member	UI Desing, Font-end development and Documentation
3	Lambe Maaz	Member	Database design, Back-end and Front-end Development Android
4	Khalfe Sajjad	Member	UI design, Front-end Development Documentation

3.3 Assumptions and Constraints

3.3.1 Assumptions

- Solid waste will be collected as soon as dust bin gets full.
- Municipal authorities can monitor real time status of garbage.

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- Garbage collector vehicle will collect the solid waste as per routes directed by municipal authorities.
- Citizens can initiate complaints through a mobile application.
- Sensors associated with dust bins will work 24*7.
- Query will be resolve within 2 day.

3.3.2 Constraints

- Authentic User can only initiate complaints.
- Authentic vehicle driver can only get information about waste collection.
- Location must be shared to initiate a complaint regarding solid waste through mobile application.
- After successfully initiating a complaint, user can see complaint status.
- Citizen's complaints without registration on mobile application is forbidden.

3.4 Project Management Approach

- We are following Iterative approach in our project.

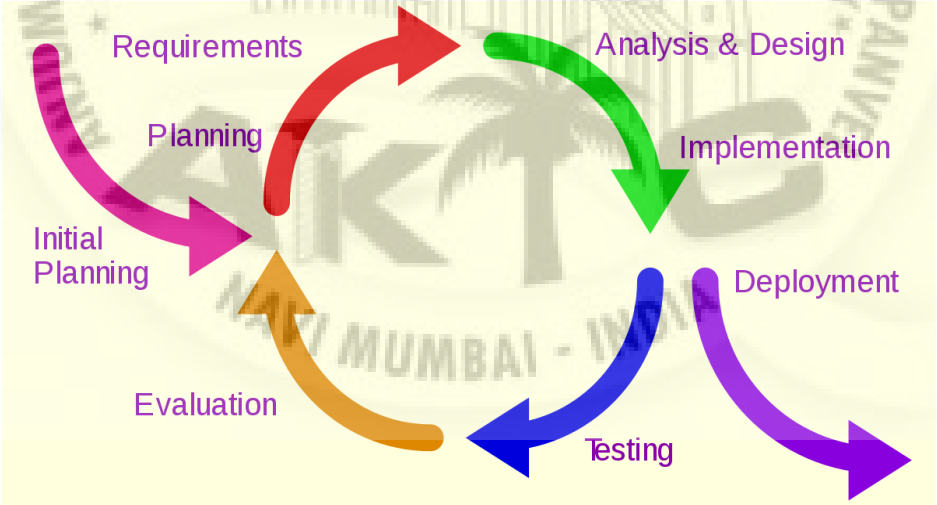


Figure 3.1: Iterative Approach

- Phases of Iterative approach are:

  a. Planning Requirements:
  In this phase, we planned the project approach and gathered requirements considering the geographical behaviour of area and target audience. In our

project, the target audiences are citizens of a particular muncipal corporation region. Citizens requirements are effective UI, easy management for initiating complaints, etc.

b. Analysis Design:
After the planning is complete, an analysis is performed to nail down the appropriate business logic, database models. In this phase, we perform analysis and design a right framework of the hardware integration, web application and mobile application that is to be developed.

c. Implementation:
With the planning and analysis out of the way, the actual implementation and coding process is done in this phase. All planning, specification, and design up to this point is implemented and coded here.

d. Testing:
Once this current build iteration has been coded and implemented, the next step is to go through a series of testing procedures to identify and locate any potential bugs or issues that have cropped up.

e. Evalution:
Once all prior stages have been completed, it is time for a thorough evaluation of development up to this stage. This allows the entire team, as well as clients or other outside parties, to examine where the project is at, where it needs to be, what can or should change, and so on

3.5 Ground Rules for the Project

a. Each team member have to work together with others member.

b. Each team member can share past experience with other members.

c. Each team member have to work on assigned task.

d. Members can share their idea.

e. Team members have to report daily to respective leader.

f. Talk softly with other members.

g. Participate in meeting.

h. Inform the leader about unavailability.

3.6 Project Budget

The budget for this project is very low as most of the tools we use are open source. Following are the budget for the project.

a. Operating System : Windows 10

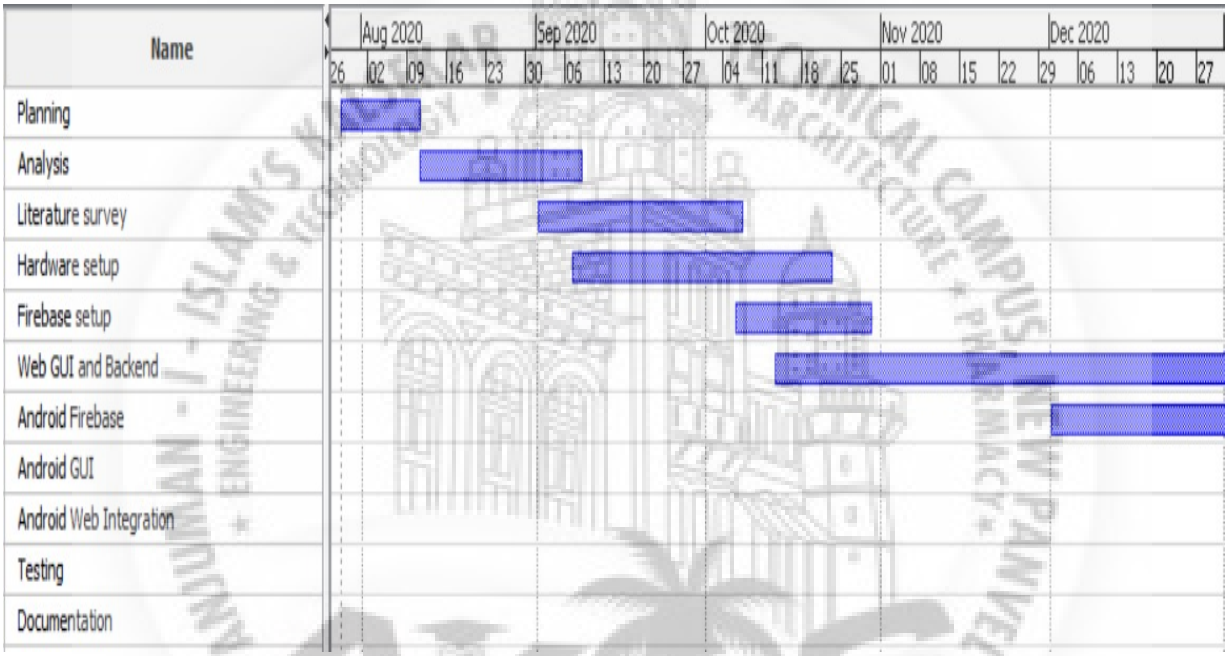
b. Programming Languages : JavaScript, PHP(Open Source)

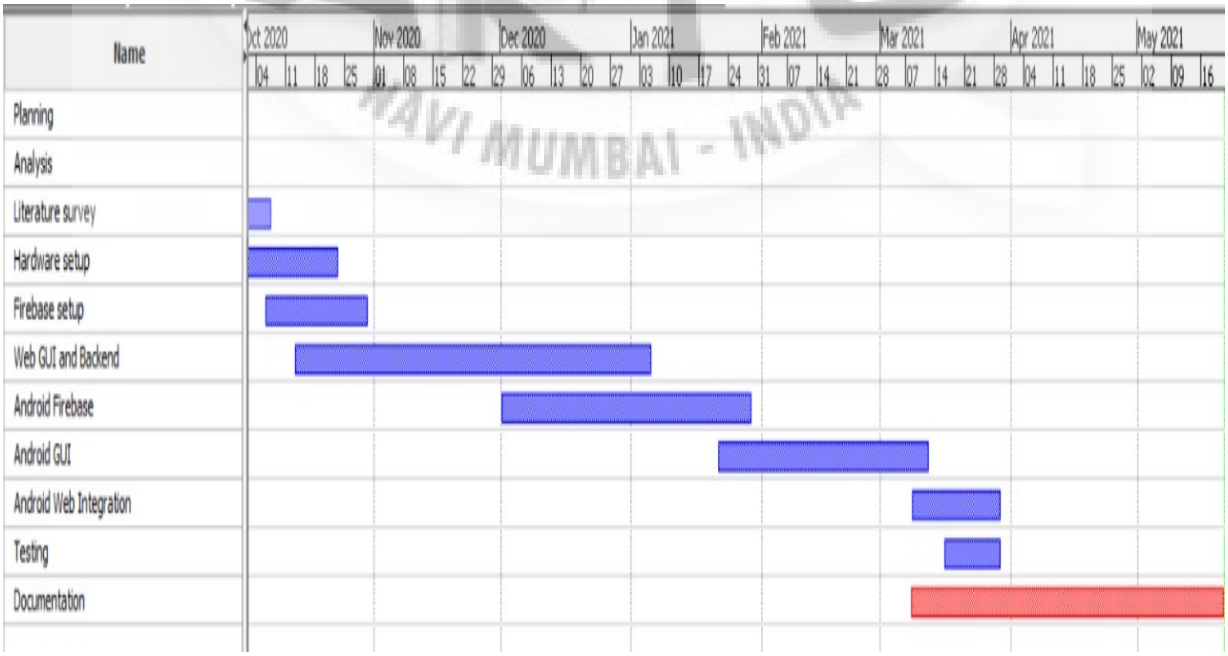
c. MySQL : Open Source

d. Frame Work : Bootstrap(Open Source)

e. Hardware : NodeMCU ESP8266 (Rs.399), Ultrasonic sensor (Rs.185),5v USB type A adapter (Rs.149).

3.7 Project Timeline





Chapter 4

Software Requirements Specification

4.1 Overall Description

4.1.1 Product Perspective

Geo-Location Based Advance Waste Collection will automate some of basic functionality of the solid waste management. The aim is to provide a web application to waste management authorities for monitoring whole waste management process. Citizens will also be provided with a mobile application to raise a complaint regarding solid waste. Waste management authorities be able to monitor location of every dust bins located in their respective region. As the garbage gets full in a dust bin, it will be collected by waste collection vehicle. Garbage could not get scattered because of its on-time collection.[1].

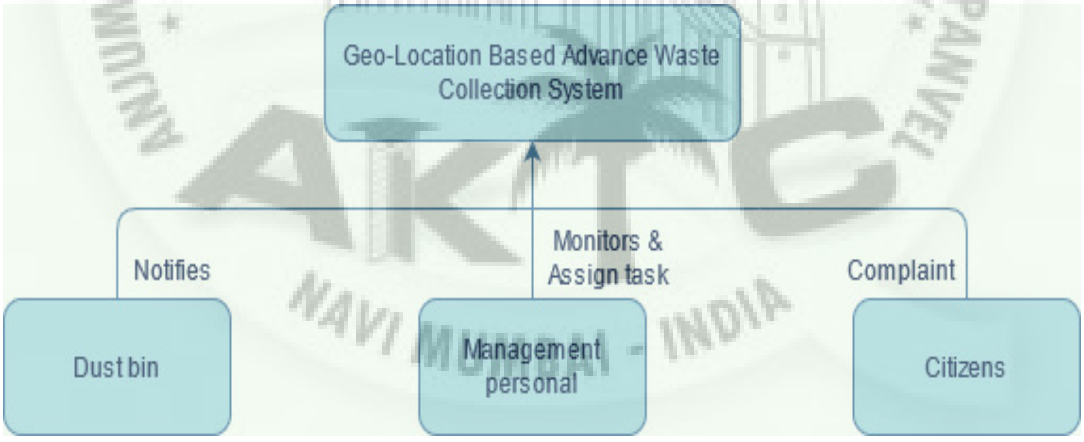


Figure 4.1: Major components of system

4.1.2 Product Features

Geo-Location Based Advance Waste Collection has many features like current status of solid waste in a dustbin can be obtained. Real time monitoring of dustbins across a region can be easily viewed in a web application. Waste collection vehicle will be notified directly by the solid waste management authority through a mobile application to collect solid waste from specific dust bin. Citizens can initiate

complaint if any discrepancy occurs around the dust bin. A mobile application is provided to the citizens to easily interact with solid waste management authority.

4.1.3 User Classes and Characteristics

Different users will use the product differently depending on their needs and hence, the user class will change according to the need of the user and who the user is that is solid waste management personnel, vehicle driver and citizens. But the basic characteristics of the classes remain the same where the citizens will primary interact with three main class of product that is registration, enter the required details, initiate complaint.The rest are less important according to this three class. The characteristics of the class will change according to the user.

- If the user is citizen he/she will interact with three main class that is registration, complaint details and initiate complaint.
- If the user is vehicle driver he/she will interact with three main class that is registration, trip information and end trip.
- If the user is solid waste management personnel, he/she will interact with three main class that is registration, dashboard and analysis of reports.

4.1.4 Operating Environment

The environment in which the system will operate is platform-independent. The only important software that the user will need is any web browser where the solid waste management personnel can use our system on web efficiently. An android phone is needed for mobile application. JavaScript, jQuery PHP is used. Html5, CSS3 and Bootstrap is used in Front end.

4.1.5 Design and Implementation Constraints

As the project comprises a web application, mobile application and hardware it was difficult to build front end and back-end simultaneously as the front end is incomplete without the back end added.

4.2 System Features

The major feature of our system is to provide a better management of solid waste. To automate the basic operations of solid waste management.

4.2.1 System Feature

- Real-time analysis of solid waste
- Real time reflection of solid waste status
- Complaint and Support mobile application for citizens

Description and Priority

- Real-time analysis of solid waste:
  This feature will enable solid waste management personnel to monitor real time status of all solid waste bins in their region.
- Real time reflection of solid waste status:
  This feature will enable solid waste bins to simultaneously send current state of dust bin(i.e. level of waste).
- Complaint and Support mobile application for citizens:
  This feature will allow citizens to initiate a complaint if they found any thing improper to solid waste.

Stimulus/Response Sequences

- For Authority personnel:
  a. The authority personnel will login to the system.
  b. They will monitor entire region for real-time solid waste information.
- For Vehicle Driver:
  a. The vehicle driver will be authorized to the system.
  b. The vehicle driver will login to the mobile application.
  c. They will receive information about solid waste collection.
  d. They will end trip after successful collection of solid waste.
- For Citizens:
  a. Citizens will login to the system.
  b. They will register a complaint if they found any and track the complaint status.

Functional Requirements

- The web application provides good graphical interface for the management personnel and a mobile application is designed to provide online services to citizens.
- The user can view the system any time.

Hardware Requirements

Hard disk: 50GB
RAM: 2GB
Components : NodeMCU ESP8266, Ultrasonic sensor, 5v USBtype A adapter

Software Reuirements

Operating system: Linux, Windows
Tool: Visual Studio Code
Framework : Bootstrap, Flutter Libraries: jQuery
Database: Firebase

4.3 External Interface Requirements

4.3.1 User Interfaces

User interface that will accessible through any internet browser the major ones being Google, Chrome and Internet Explorer, Mozilla Firefox. Through such software solid waste management personnel can access the sites and can take advantage of our Solid Waste Management System. Mobile application for citizens can be accessible through any android smartphone.

4.3.2 Hardware Interfaces

- NodeMCU ESP8266
- Ultrasonic sensor
- USB type A adapter

4.3.3 Software Interfaces

- Operating system: Linux, Windows, Android
- Tool: Visual Studio Code

- Framework : Bootstrap, Flutter
- Libraries: jQuery
- Database: Firebase

Through different operating system, developers can communicate with the Hardware such as laptop to develop a website. For writing developers can use Visual Studio code. We have been using Bootsrap framework. So in this, we are using different libraries to develop applications. Also we are using Html, CSS in frontend. In backend we are using JavaScript, jQuery, PHP and Firebase database.For mobile application, we have used Flutter SDK and firebase database.

4.3.4 Communications Interfaces

- The website support all type of browser.
- The interface between the database and the system will be done by using json file.

4.4 Nonfunctional Requirements

4.4.1 Performance Requirements

The system must be interactive and the delay involved must be less. When we connecting to the server the delay is because the data stored or manage online very safely.

4.4.2 Safety Requirements

If there is any damage to the servers then the whole system will go down. The database should be periodically maintained and have to keep upon it. The data which is updated by the user would be committed in the database.

4.4.3 Security Requirements

The major security requirements for the system will be the safeguarding of the user data from any kind of exploit. In order to protect the user data the data is not stored in local databases we will be storing in the cloud for better security.

Chapter 5

System Design

5.1 System Requirements Definition

GEOLOCATION BASED ADVANCE WASTE COLLECTION solves the problem for those solid waste collection unit that has large amount of solid waste. It helps to manage solid waste in efficient way as it does not delay in solid waste collection. GEOLOCATION BASED ADVANCE WASTE COLLECTION should provide functionalities like real-time monitoring and analysis of solid waste, its location, how to collect solid waste from any solid waste collection unit, how to track and solve citizen's complaints. Through the web application solid waste management personal can manage whole solid waste collection process. Citizens can interact with mobile application to register any complaint regarding solid waste.

5.1.1 Functional requirements

1. The system consisting of web application and mobile application provides a better User interface so that the management personal and citizens can easily interact with system.
2. Citizens can register a complaint and can track the complaint through the mobile application.
3. The system will be available 24*7 so that they can access it any time
4. Solid waste management personal can monitor whole region with current status of solid waste in dustbins.
5. There are various services available on the web application that user can interact.

Use-case Diagram

Use case diagram are usually referred to as behaviour diagram used to describe a set of actions(use case) that some system or systems(subject) should or can perform in collaboration with one or more external users of the system(actors). Each use case

should provide some observable and valuable result to the actors or other stakeholder of the system.

The below figure shows the use case diagram of our system which contains the following component.

- Authentication
- Real-time monitoring
- Selection of bins
- Send location
- Analysis of reports
- Registration
- Register complaint
- Capture photo
- Receipt generation
- Messages

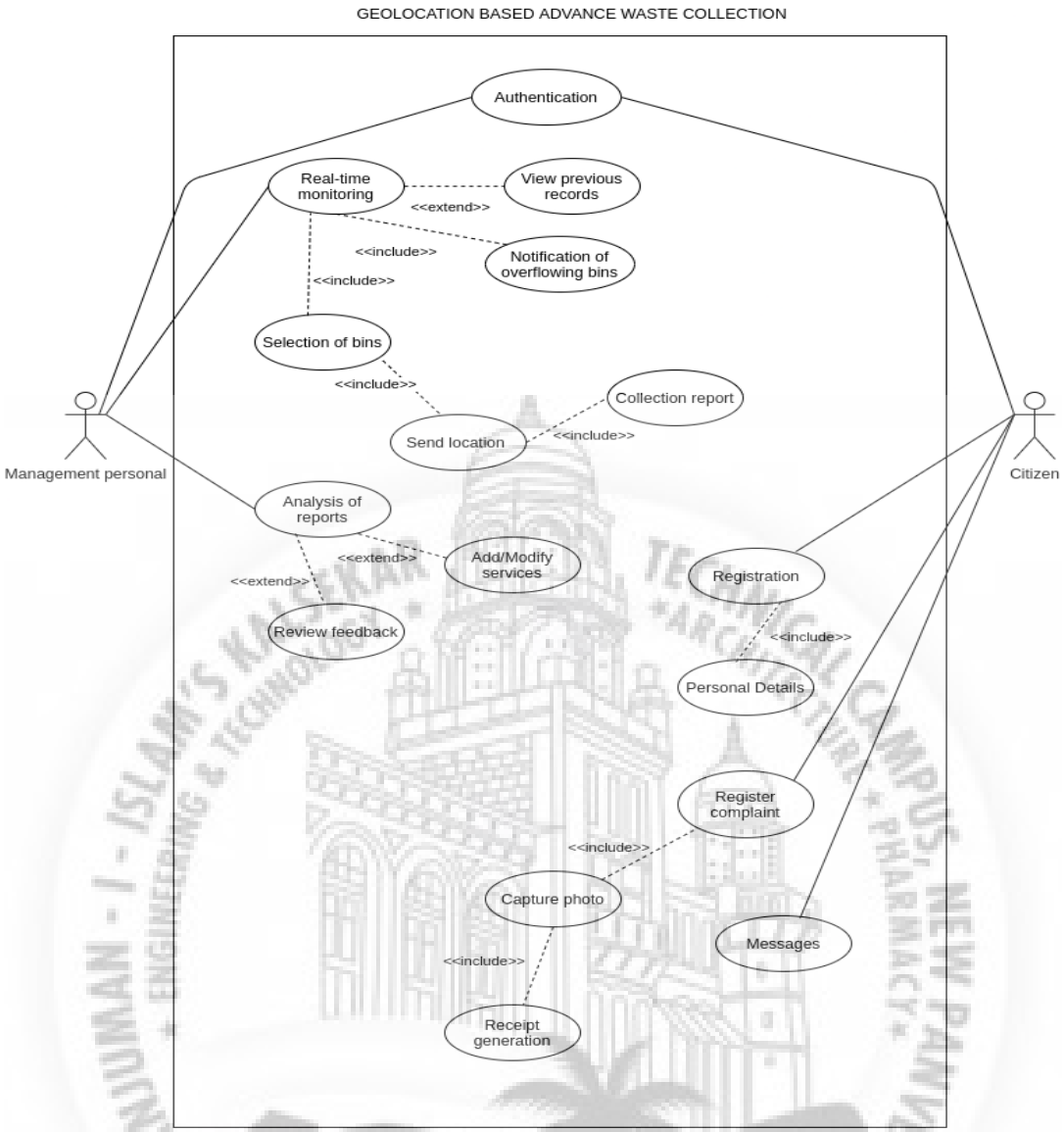


Figure 5.1: Usecase Diagram

Data-flow Diagram

DFD Level 0 : DFD Level 0 depicting main outcome of the system, Management personal will monitor the solid waste. Citizens will register complaints. Report analysis will be done by management personal. Complaint updates received by the citizens.

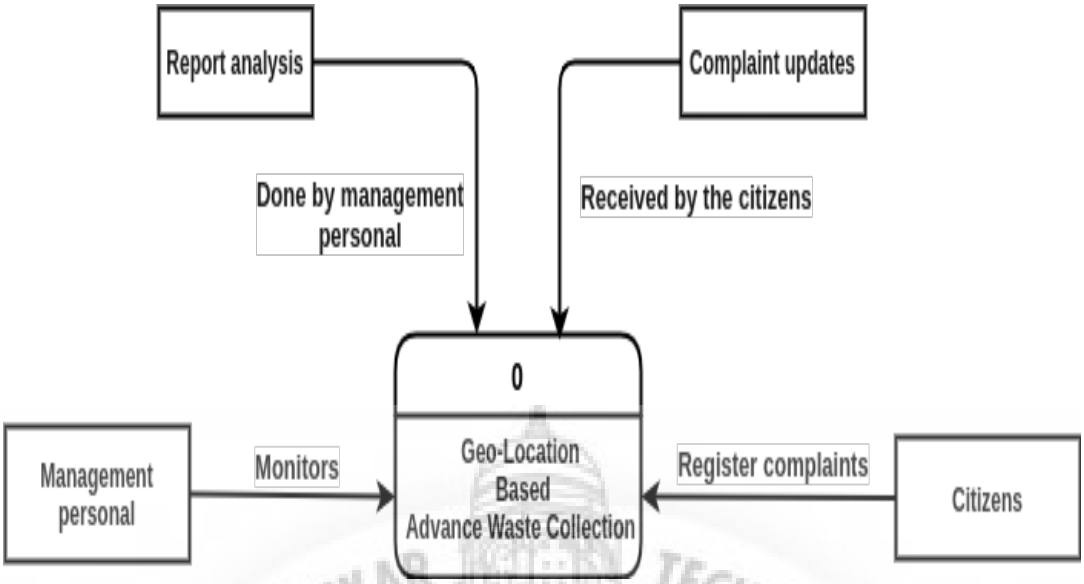


Figure 5.2: DFD Level 0 for GEOLOCATION BASED ADVANCE WASTE COLLECTION

DFD Level 1 : DFD Level 1 for GEOLOCATION BASED ADVANCE WASTE COLLECTION showing their main process flow in the system via registration details being stored into Database.

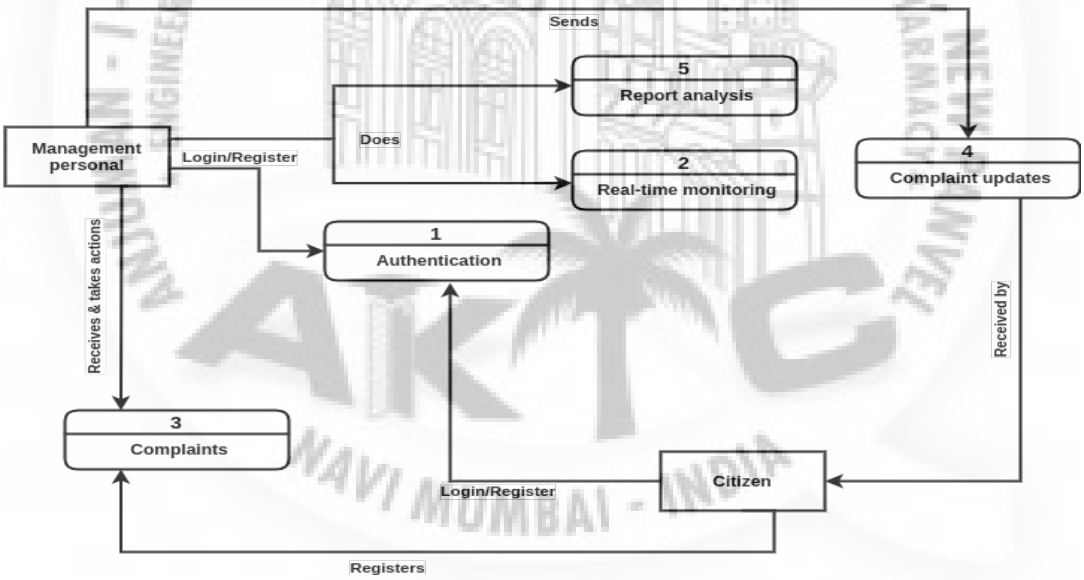


Figure 5.3: DFD Level 1 for GEOLOCATION BASED ADVANCE WASTE COLLECTION

DFD Level 2 : DFD Level 2 for shows detail login process flow in the system via authentication modules, from real-time monitoring to report analysis and the detail process of complaint registration.

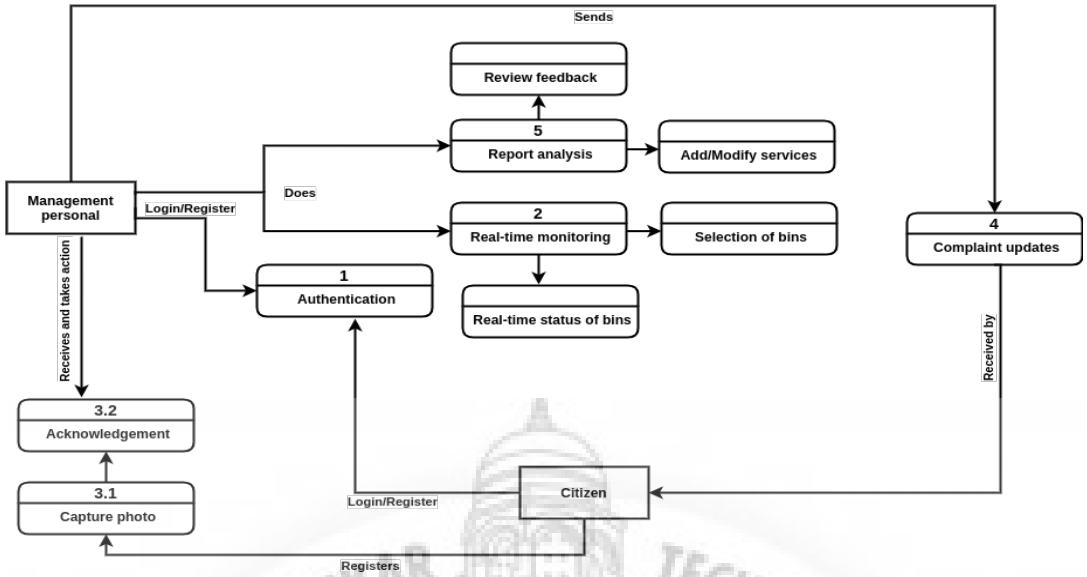


Figure 5.4: DFD Level 2 for GEOLOCATION BASED ADVANCE WASTE COLLECTION

5.1.2 System requirements (non-functional requirements)

These are non-functional system properties such as availability, performance and safety etc. They define functions of a system, services and operational constraints in detail.

a. Availability - Application will be available 24*7.

b. Usability - Application implementation is feasible using technologies that are accessible to the end-users.

c. Portability - The interfaces are compatible with Desktop.

d. Performance Efficiency -Application is able to perform well in a proper time constraint.

e. Multi User System -Application is able to consider the presence of more than one user in the same environment. All the features of the system operates properly for all users and provides proper transparency.

f. Time Efficiency - Time taken for the executing of system is less.

5.2 System Architecture Design

System architecture of our system gives the overview of the project.

- Citizens can register complaints on the mobile application.
- Management personal can monitor real-time solid waste status.

- Management personal can select bins that are exceeding their capacity to hold solid waste.
- Management personal can add or modify service.
- Management personal can review complaints and feedback.

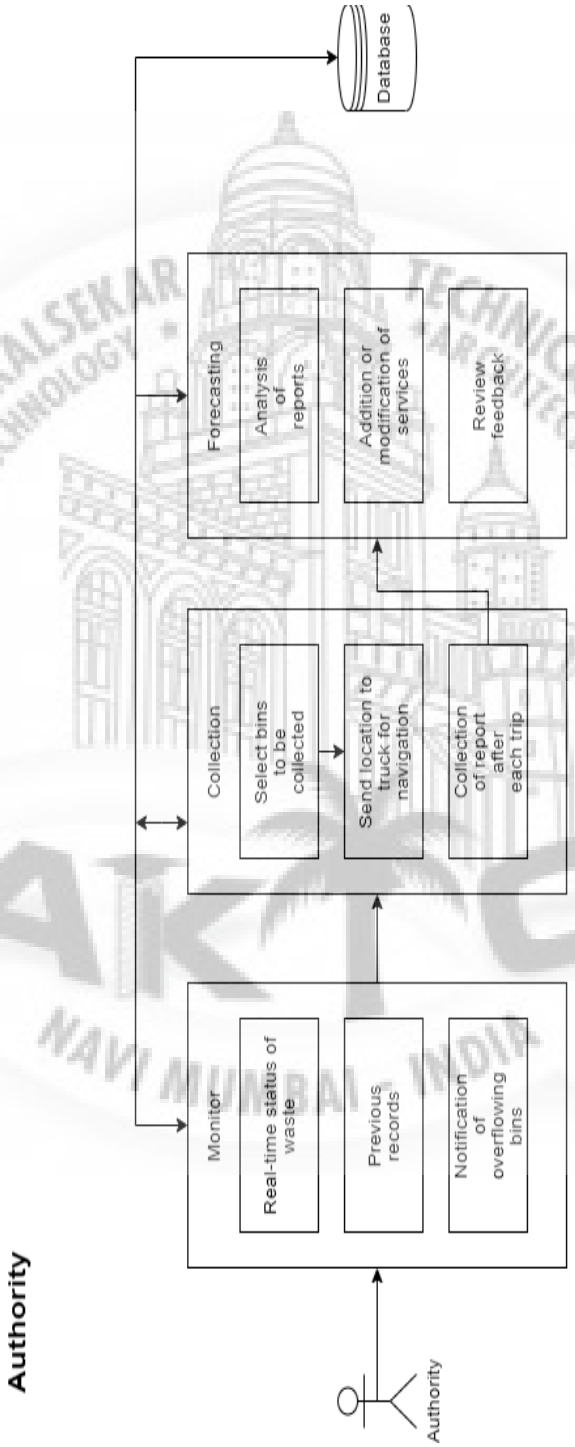


Figure 5.5: Authority view

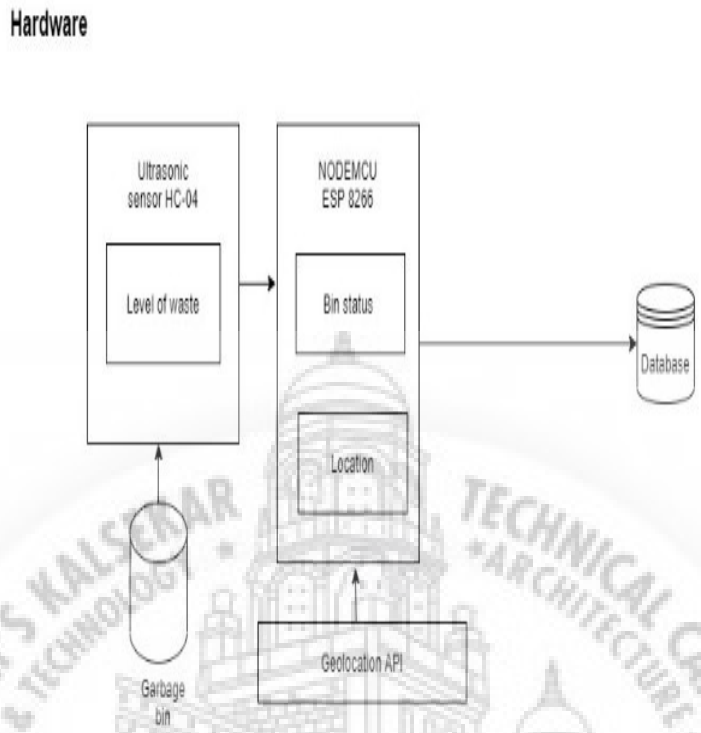


Figure 5.6: Hardware view

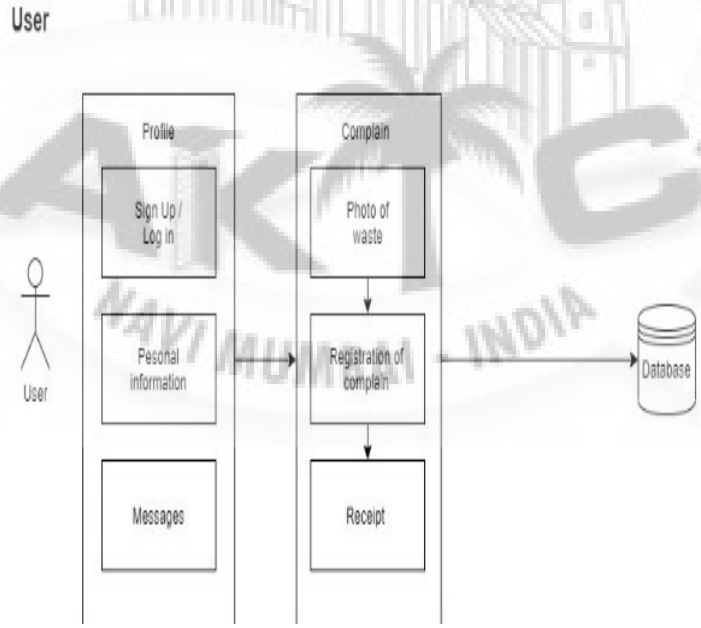


Figure 5.7: User view

5.3 Sub-system Development

Below Module describes how our system is working and tell what features are there in our system. Like real-time solid waste monitoring,selection of particular bin to be collected,registration of citizens' complaints, many more features. Our system consists of 3 modules:

5.3.1 Authority View

This is the first view of the system. This system is visible only to management personals. In this view, the management personals will be authenticated by the system. After that, the management personal can monitor real-time solid waste status of a specific region. As this system is online management personal can use it anytime. They can select particular bin to be collected after it gets full. The system has features such as real-time status of solid waste of a region. Previous records can be seen. This system shows real-time status of dustbins through three colors. If real-time dustbin color is green, it means the dustbin is empty. If real-time dustbin color is yellow, it means the dustbin is partially filled. If real-time dustbin color is red, it means the dustbin is full. This system also provide facility to select bins that is completely full for waste collection. The management personal notifies the vehicle driver to collect solid waste form specific area. The vehicle driver will notify to authority about solid waste collection. A management personal can add or modify services as per requirements. This system also has feature of complaint and feedback review.

5.3.2 Hardware View

This is the second view of the system. This system is visible at dustbin's location.The Ultrasonic sensor is attached to dustbin on the upper level to monitor distance of solid waste form top to beneath it. As soon as solid waste reaches to overflow, the sensor senses the solid waste at specific level and sends data to a WiFi module which is attached to the exterior part of the bin.

The WiFi module sends real-time solid waste status to web application. This makes the web application synchronous about solid waste status.

5.3.3 Citizen View

This is the third view of the system. This view is only available to the citizens. The responsibilities of the citizens include registration of complaints regarding solid waste bins and solid waste collection process. The citizens need to register on the mobile application. Registered citizens can initiate any complaint regarding solid

waste. While registering a complaint, citizens need to fill a complaint form. In the complaint form they need to capture image of any dustbin or any region that has huge amount of solid waste.

The citizens can also provide feedback to the solid waste management authority.

5.3.4 Activity Diagram

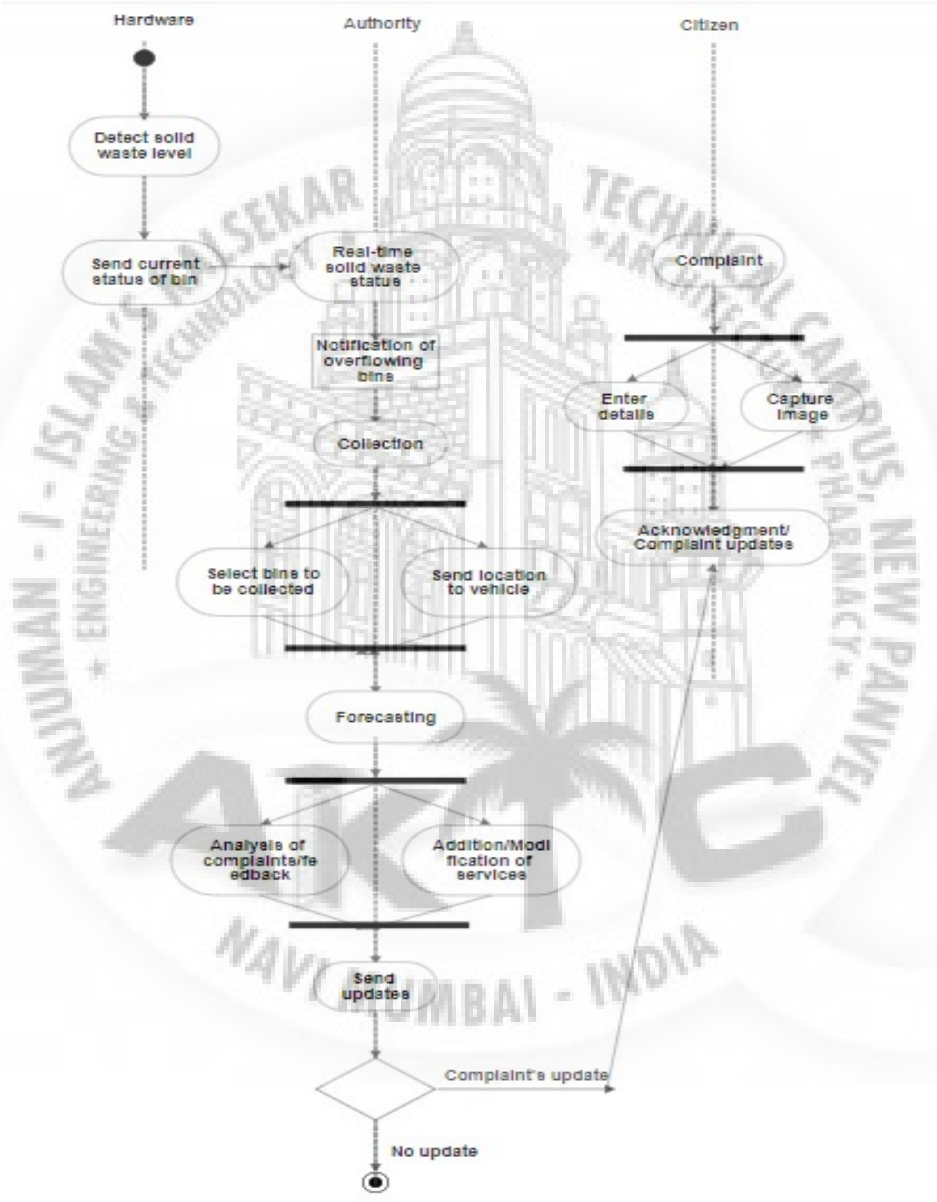


Figure 5.8: Activity Diagram for Geolocation Based Solid Waste Collection System

5.4 Systems Integration

System integration (SI) is an engineering process concerned with joining different components as one large system. SI is also used to add value to a system through

new functionalities provided by connecting functions of different systems. It ensures that each integrated subsystem functions as required.

5.4.1 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 system's classes, their attributes, operations, and the relationship among objects. Class diagram showing each modules interconnection and relation between how one module is interacting with others.

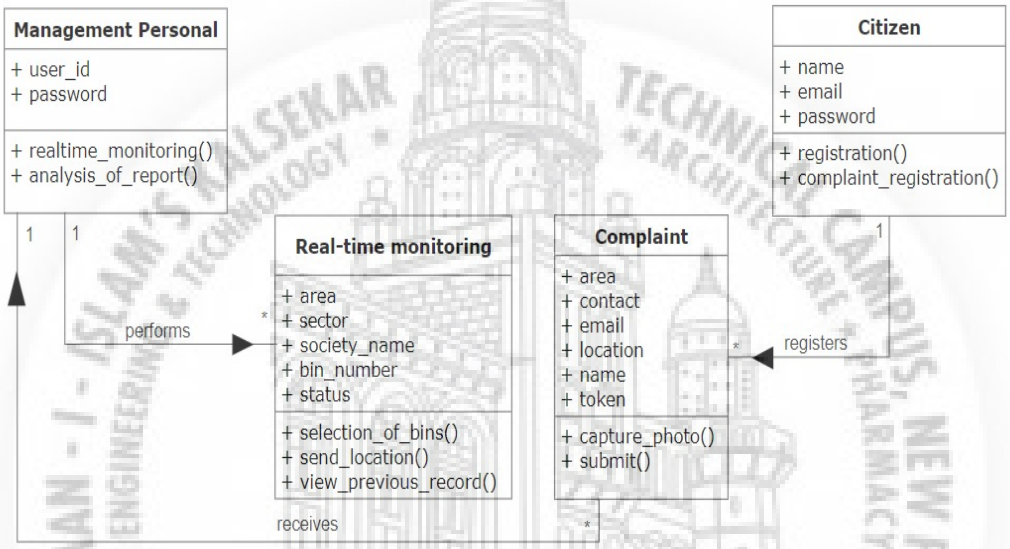


Figure 5.9: Class Diagram for Geolocation Based Solid Waste Collection System

5.4.2 Sequence Diagram

A sequence diagram is an interaction diagram that shows how objects operates with one another and in what order. It is a construct of a message sequence chart. The following figure describe the sequence diagram for Geolocation Based Solid Waste Collection System. It shows the sequence of hardware, management personal and citizen.

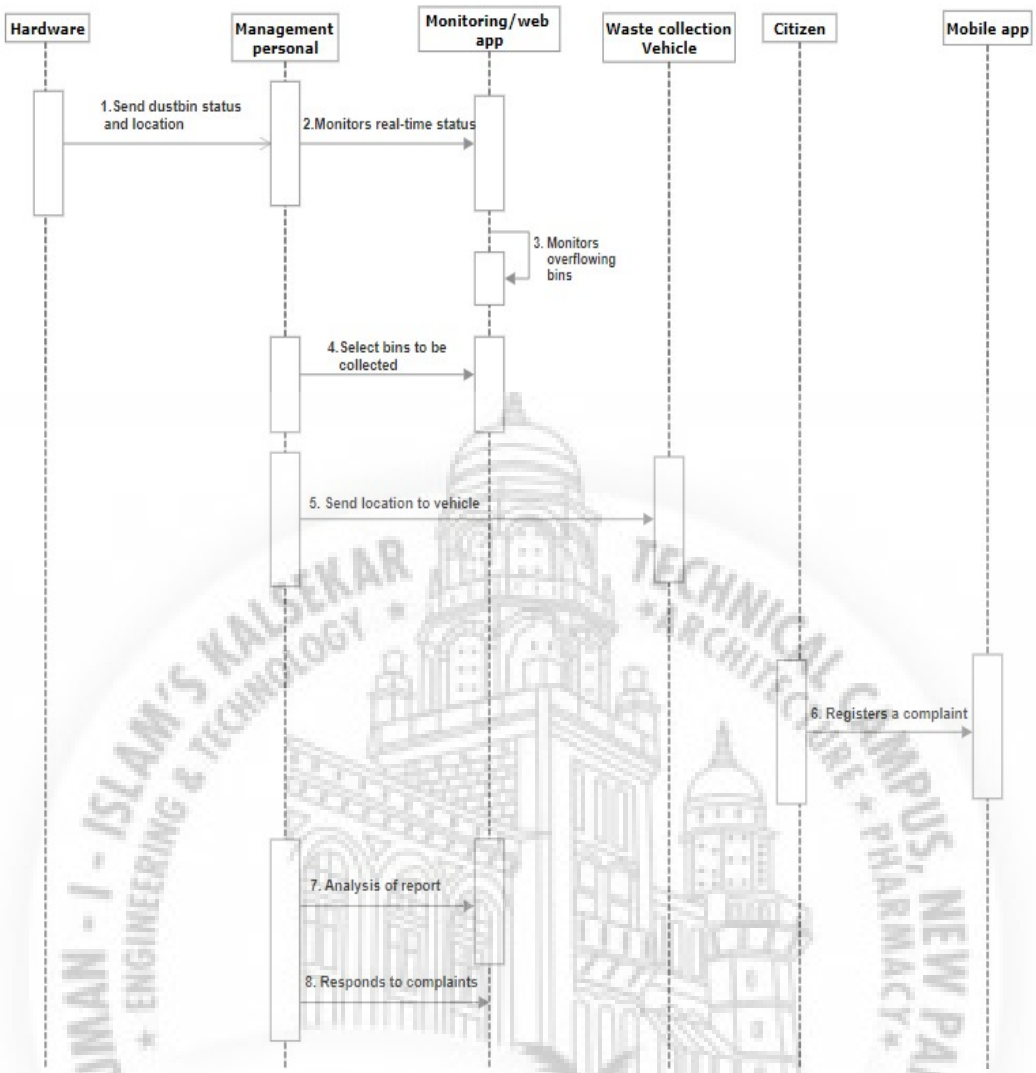


Figure 5.10: Sequence Diagram for Geolocation Based Solid Waste Collection

Chapter 6

Implementation

6.1 Module 1 - Authority View

This is the first view of the system. This system is visible only to management personals. In this view, the management personals will be authenticated by the system. After that, the management personal can monitor real-time solid waste status of a specific region. As this system is online management personal can use it anytime. They can select particular bin to be collected after it gets full. The system has features such as real-time status of solid waste of a region. Previous records can be seen. This system shows real-time status of dustbins through three colors. If real-time dustbin color is green, it means the dustbin is empty. If real-time dustbin color is yellow, it means the dustbin is partially filled. If real-time dustbin color is red, it means the dustbin is full. This system also provide facility to select bins that is completely full for waste collection. The management personal notifies the vehicle driver to collect solid waste form specific area. The vehicle driver will notify to authority about solid waste collection. A management personal can add or modify services as per requirements. This system also has feature of complaint and feedback review.

- index.php

```
#home
<head>
<link rel="icon" href="img/icon.png" type="image/icon">

</head>

    <main>
<link rel="stylesheet" href="bootstrap/css/bootstrap.css">
<link rel="stylesheet" href="css/style.css">



        <div class="row">
                <div class="col-12">
                <article class="login">

            <div class="card ">
```

```
            <?php


            if (isset($_SESSION["loginid"])) {


    ?>
             <h1>LOGGED IN! </h1>
            <h2> <a href="bookticket.php"> Click here to go to dashboard</a></h2
                >


        <?php
            }
            else{
                ?>

<div class="box">     <div class="logo_space"><br>

                <img src="img/logo.png" alt="" class="logo-img" >


            </div>

                <div class="form_space">
                <form  action="login.php" method="POST">
                  <label for="loginid">Login Id: </label>
                    <input type="text" name="loginid" id="loginid" placeholder="
                        Enter your Login" required /><br><br>
                  <label for="password">  Password: </label>
                    <input type="password" name="password" id="password"
                        placeholder="Enter your password" required /><br><br>
                    <input type="submit" name="submit" id="submit" value="login"
                        >


            </form></div> </div>
            <?php
            }

        ?>

            </div>
          </main>
            </article>

  </div>
            </div>


     </div>




         </main>
</body>

</html>
```

- admin.php

```
#administration window
<!doctype html>
<html lang="en">

<?php

session_start();

include("../db_connect.php");

?>


<head>
    <meta charset="utf-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta http-equiv="Content-Language" content="en">
    <meta http-equiv="Content-Type" content="text/html; charset=utf-8"/>
    <title>GoBin</title>
    <meta name="viewport" content="width=device-width, initial-scale=1, maximum-scale=1, user-scalable=no, shrink-to-fit=no" />
    <meta name="description" content="This is an example dashboard created using build-in elements and components.">
    <meta name="msapplication-tap-highlight" content="no">
    <link rel="icon" href="../img/icon.png" type="image/icon">


    <script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-app.js"></script>

<!-- If you enabled Analytics in your project, add the Firebase SDK for Analytics -->
<script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-analytics.js"></script>

<!-- Add Firebase products that you want to use -->
<script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-auth.js"></script>
<script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-firestore.js"></script>
<script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-database.js"></script>

<script src="https://code.jquery.com/jquery-3.6.0.js" integrity="sha256-H+K7U5CnXl1h5ywQfKtSj8PCmoN9aaq30gDh27Xc0jk=" crossorigin="anonymous"></script>



    <<link href="https://unpkg.com/bootstrap-table@1.18.3/dist/bootstrap-table.min.css" rel="stylesheet">

  <script src="https://unpkg.com/bootstrap-table@1.18.3/dist/bootstrap-table.min.js"></script>
<script>



// Your web app's Firebase configuration
```

```
// For Firebase JS SDK v7.20.0 and later, measurementId is optional
// Initialize Cloud Firestore through Firebase
firebase.initializeApp({
  apiKey: "AIzaSyDcoaTJr1K6PfTy8ylKI_9-m4j7VtPH8t8",
authDomain: "nodemce.firebaseapp.com",
databaseURL: "https://nodemce.firebaseio.com",
projectId: "nodemce",
storageBucket: "nodemce.appspot.com",
messagingSenderId: "284670480170",
appId: "1:284670480170:web:0b9a03e6f635b4cbcf9853",
measurementId: "G-G7STTWM1NK"
});
firebase.analytics();
var db = firebase.firestore();




function buildTable(data){
      var table = document.getElementById('myTable');
      var row=data.data();
      var row = `<tr>

            <td>${row.name}</td>
            <td >${row.complaintId}</td>
            <td>${row.area}</td>
            <td>${row.sector}</td>
            </tr>`
          table.innerHTML += row
     /*let console.log(doc.data());
      for (var i = 0; i < data.length; i++){
      }
      */
  }

db.collection("complaints").get().then(function(querySnapshot) {
  querySnapshot.forEach(function(doc) {
      // doc.data() is never undefined for query doc snapshots
      //console.log(doc.id, " => ", doc.data());
      buildTable(doc);

  });
});









</script>

</script>

<link href="./main.css" rel="stylesheet"></head>
<body>
```

```
<div class="app-container app-theme-white body-tabs-shadow fixed-sidebar fixed-header">
    <div class="app-header header-shadow">
        <div class="app-header__logo">
            <div class=" "> <img src="../img/logo.png" alt="" style="width:130px;"> </div>
            <div class="header__pane ml-auto">
                <div>
                    <button type="button" class="hamburger close-sidebar-btn hamburger--elastic" data-class="closed-sidebar">
                        <span class="hamburger-box">
                            <span class="hamburger-inner"></span>
                        </span>
                    </button>
                </div>
            </div>
        </div>
        <div class="app-header__mobile-menu">
            <div>
                <button type="button" class="hamburger hamburger--elastic mobile-toggle-nav">
                    <span class="hamburger-box">
                        <span class="hamburger-inner"></span>
                    </span>
                </button>
            </div>
        </div>
        <div class="app-header__menu">
            <span>
                <button type="button" class="btn-icon btn-icon-only btn btn-primary btn-sm mobile-toggle-header-nav">
                    <span class="btn-icon-wrapper">
                        <i class="fa fa-ellipsis-v fa-w-6"></i>
                    </span>
                </button>
            </span>
        </div>    <div class="app-header__content">

            <div class="app-header-right">
                <div class="header-btn-lg pr-0">
                    <div class="widget-content p-0">
                        <div class="widget-content-wrapper">
                            <div class="widget-content-left">
                                <div class="btn-group">
                                    <a data-toggle="dropdown" aria-haspopup="true" aria-expanded="false" class="p-0 btn">
                                        <img width="42" class="rounded-circle" src="../img/super.png" alt="">
                                        <i class="fa fa-angle-down ml-2 opacity-8"></i>
                                    </a>
                                    <div tabindex="-1" role="menu" aria-hidden="true" class="dropdown-menu dropdown-menu-right">
                                        <button type="button" tabindex="0" class="dropdown-item">User Account</button>
                                        <button type="button" tabindex="0" class="dropdown-item">Settings </
```

```
                                        button>
155
156                                     <button type="button" tabindex="0"
                                            class="dropdown-item">Actions</
                                            button>
157                                     <a href="../logout.php"> <div
                                            tabindex="-1" class="dropdown-
                                            divider"></div>
158                                      <button type="button" tabindex="0"
                                             class="dropdown-item" > Logout
                                             </a></button>
159                                 </div>
160                             </div>
161                         </div>
162                         <div class="widget-content-left  ml-3 header-
                                user-info">
163                             <div class="widget-heading">
164                                 <?php
165
166                                 $curruser=$_SESSION['loginid'];
167                                 $sql = mysqli_query($conn,"select * from
                                        users where loginid='$curruser'");
168                                 $row = mysqli_fetch_array($sql);
169                                 echo    $row['f_name'] ;
170
171                             ?>
172                             </div>
173                             <div class="widget-subheading">
174                              User
175                             </div>
176                         </div>
177                         <div class="widget-content-right header-user-
                                info ml-3">
178                             </button>
179                         </div>
180                     </div>
181                 </div>
182             </div>        </div>
183     </div>
184 </div>
185
186
187     <div class="app-main">
188         <div class="app-sidebar sidebar-shadow">
189             <div class="app-header__logo">
190                 <div class="logo-src"></div>
191                 <div class="header__pane ml-auto">
192                     <div>
193                         <button type="button" class="hamburger close-
                                sidebar-btn hamburger--elastic" data-class="
                                closed-sidebar">
194                             <span class="hamburger-box">
195                                 <span class="hamburger-inner"></span>
196                             </span>
197                         </button>
198                     </div>
199                 </div>
200             </div>
201             <div class="app-header__mobile-menu">
202                 <div>
203                     <button type="button" class="hamburger hamburger--
```

```
                        elastic mobile-toggle-nav">
204                     <span class="hamburger-box">
205                         <span class="hamburger-inner"></span>
206                     </span>
207                 </button>
208             </div>
209         </div>
210         <div class="app-header__menu">
211             <span>
212                 <button type="button" class="btn-icon btn-icon-only
                        btn btn-primary btn-sm mobile-toggle-header-nav"
                    >
213                     <span class="btn-icon-wrapper">
214                         <i class="fa fa-ellipsis-v fa-w-6"></i>
215                     </span>
216                 </button>
217             </span>
218         </div>    <div class="scrollbar-sidebar">
219             <div class="app-sidebar__inner">
220             <ul class="vertical-nav-menu">
221                 <li class="app-sidebar__heading">Dashboards</li>
222                 <li>
223                     <a href="index.php"  class="mm-active">
224                         <i class="metismenu-icon pe-7s-rocket"
                            ></i>
225                     Home
226                         </a>
227                 </li>
228
229                 <li>
230                     <a href="map.php" >
231                         <i class="metismenu-icon pe-7s-display2"
                            ></i>
232                     Realtime Monitoring
233                     </a>
234                 </li>
235
236                 <li>
237                     <a href="requests.php">
238                         <i class="metismenu-icon pe-7s-display2"
                            ></i>
239                     Complaints
240                     </a>
241                 </li>
242
243
244             </ul>
245             </div>
246         </div>
247     </div>    <div class="app-main__outer">
248         <div class="app-main__inner">
249             <div class="app-page-title">
250                 <div class="page-title-wrapper">
251                     <div class="page-title-heading">
252                         <div class="page-title-icon">
253                             <i class="pe-7s-wallet icon-gradient bg-
                                plum-plate">
254                             </i>
255                         </div>
256                         <div> <?php
257                           echo $row['f_name'].$row['l_name'];
```

```
                    ?>
                        <div class="page-title-subheading">GoBin
                            - A step towards cleaner
                            neighborhood
                        </div>
                    </div>
                </div>
                <br> <br>
            </div>      <br>     <div class="row">
                <div class="col-md-6 col-xl-4">
                    <div class="card mb-3 widget-content bg-grow-
                        early">
                        <div class="widget-content-wrapper text-
                            white">
                            <div class="widget-content-left">
                                <div class="widget-heading">Total
                                    Complaint</div>
                                <div class="widget-subheading">List
                                    of completed Queries</div>
                            </div>
                            <div class="widget-content-right">
                                <div class="widget-numbers text-
                                    white"><span>1296</span></div>
                            </div>
                        </div>
                    </div>
                </div>
                <div class="col-md-6 col-xl-4">
                    <div class="card mb-3 widget-content bg-grow-
                        early">
                        <div class="widget-content-wrapper text-
                            white">
                            <div class="widget-content-left">
                                <div class="widget-heading">Pending
                                    Complaint</div>
                                <div class="widget-subheading">New
                                    Complaints</div>
                            </div>
                            <div class="widget-content-right">
                                <div class="widget-numbers text-
                                    white"><span> 20</span></div>
                            </div>
                        </div>
                    </div>
                </div>
                <div class="col-md-6 col-xl-4">
                    <div class="card mb-3 widget-content bg-grow-
                        early">
                        <div class="widget-content-wrapper text-
                            white">
                            <div class="widget-content-left">
                                <div class="widget-heading">
                                    Completed Log</div>
                                <div class="widget-subheading">Data
                                    about old compaints</div>
                            </div>
                            <div class="widget-content-right">
                                <div class="widget-numbers text-
                                    white"><span>1250</span></div>
                            </div>
                        </div>
```

```
                                    </div>
                                </div>

                            </div>



 <div class="row">
<div class="col-lg-12">
    <div class="main-card mb-3 card">
        <div class="card-body"><h5 class="card-title">Recent Requests</h5>

        <table id="table" data-height="460"
        >

  <thead>
    <tr>
      <th data-field="name">Name</th>
      <th data-field="area">Area</th>
      <th data-field="complaintId">ComplaintID</th>
      <th data-field="contact">Contact</th>
      <th data-field="email">E-mail</th>
      <th data-field="location">Location</th>
      <th data-field="sector">Sector</th>
      <th data-field="status">Status</th>
      <th data-field="token">Token</th>
    </tr>
  </thead>
</table>
        </div>
    </div>
</div>
                        </div>
                <script src="http://maps.google.com/maps/api/js?sensor=true"></
                    script>
        </div>
    </div>
<script type="text/javascript" src="./assets/scripts/main.js"></script>

<script>
  var $table = $('#table')
  firebase.analytics();
  var db = firebase.firestore();

          /* function buildTable(data){
                  var table = document.getElementById('myTable');
                  var row=data.data();

              let console.log(doc.data());
                  for (var i = 0; i < data.length; i++){



                  }

                }
                  */

                db.collection("complaints").get().then(function(querySnapshot) {
                var data = [];
```

```
                querySnapshot.forEach(function(doc) {
                    // doc.data() is never undefined for query doc snapshots
                    //console.log(doc.id, " => ", doc.data());
                data = getComplaint(doc,data);
                });
                $table.bootstrapTable({data:data});

});


  function getComplaint(CompData,data) {
   console.log(CompData.data(),data);
    var data1 = CompData.data();
    console.log(data1);
    data.push(data1);
    return data;
  }

</script>
<script type="application/javascript">
   function logout(){


 window.location.href = '../index.php"';



            }


</script>
</body>
</html>
```

- map.php

```
#real-time solid waste status
<!DOCTYPE html>
<html lang="en">

<?php



include("../db_connect.php");
session_start();

?>


<head>
    <meta charset="utf-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta http-equiv="Content-Language" content="en">
    <meta http-equiv="Content-Type" content="text/html; charset=utf-8"/>
```

```
    <title>GoBin</title>
    <meta name="viewport" content="width=device-width, initial-scale=1, maximum-scale=1, user-scalable=no, shrink-to-fit=no" />
    <meta name="description" content="This is an example dashboard created using build-in elements and components.">
    <meta name="msapplication-tap-highlight" content="no">
    <link href="./main.css" rel="stylesheet">
    <link href="./custom_style.css" rel="stylesheet">


<!-- The core Firebase JS SDK is always required and must be listed first -->

  <!-- Firebase App (the core Firebase SDK) is always required and must be listed first -->
  <script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-app.js"></script>

  <!-- If you enabled Analytics in your project, add the Firebase SDK for Analytics -->
  <script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-analytics.js"></script>

  <!-- Add Firebase products that you want to use -->
  <script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-auth.js"></script>
  <script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-firestore.js"></script>
  <script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-database.js"></script>

<script>
  // Your web app's Firebase configuration
  // For Firebase JS SDK v7.20.0 and later, measurementId is optional
  var firebaseConfig = {
    apiKey: "AIzaSyDcoaTJr1K6PfTy8ylKI_9-m4j7VtPH8t8",
    authDomain: "nodemce.firebaseapp.com",
    databaseURL: "https://nodemce.firebaseio.com",
    projectId: "nodemce",
    storageBucket: "nodemce.appspot.com",
    messagingSenderId: "284670480170",
    appId: "1:284670480170:web:0b9a03e6f635b4cbcf9853",
    measurementId: "G-G7STTWM1NK"
  };
  // Initialize Firebase
  firebase.initializeApp(firebaseConfig);
  firebase.analytics();
</script>


    <script src="https://polyfill.io/v3/polyfill.min.js?features=default"></script>
    <script
      src="https://maps.googleapis.com/maps/api/js?key=AIzaSyCGfJeFb6eHdbay-ZaY_ACXkxERMV0ANtQ&callback=initMap&libraries=&v=weekly&style=element:labels%7Cvisibility:off&style=feature:administrative.land_parcel%7Cvisibility:off&style=feature:administrative.neighborhood%7Cvisibility:off"
      defer
    ></script>
</script>

```

```
67
68      <script src=./map.js> </script>
69      <style type="text/css">
70
71      </style>
72          <link rel="icon" href="../img/icon.png" type="image/icon">
73
74
75
76  </head>
77  <body>
78
79      <div class="app-container app-theme-white body-tabs-shadow fixed-sidebar
            fixed-header">
80          <div class="app-header header-shadow">
81              <div class="app-header__logo"> <div class=" "> <img src="../img/logo
                    .png" alt="" style="width:130px;"> </div>
82                  <div class="header__pane ml-auto">
83                      <div>
84                          <button type="button" class=" close-sidebar-btn
                                hamburger--elastic" data-class="closed-sidebar">
85                              <span class="hamburger-box">
86                                  <span class="hamburger-inner"></span>
87                              </span>
88                          </button>
89                      </div>
90                  </div>
91              </div>
92              <div class="app-header__mobile-menu">
93                  <div>
94                      <button type="button" class="hamburger hamburger--elastic
                            mobile-toggle-nav">
95                          <span class="hamburger-box">
96                              <span class="hamburger-inner"></span>
97                          </span>
98                      </button>
99                  </div>
100             </div>
101             <div class="app-header__menu">
102                 <span>
103                     <button type="button" class="btn-icon btn-icon-only btn btn-
                            primary btn-sm mobile-toggle-header-nav">
104                         <span class="btn-icon-wrapper">
105                             <i class="fa fa-ellipsis-v fa-w-6"></i>
106                         </span>
107                     </button>
108                 </span>
109             </div>    <div class="app-header__content">
110
111                 <div class="app-header-right">
112                     <div class="header-btn-lg pr-0">
113                         <div class="widget-content p-0">
114                             <div class="widget-content-wrapper">
115                                 <div class="widget-content-left">
116                                     <div class="btn-group">
117                                         <a data-toggle="dropdown" aria-haspopup=
                                                "true" aria-expanded="false" class="
                                                p-0 btn">
118                                             <img width="42" class="rounded-
                                                    circle" src="../img/super.png"
                                                    alt="">
```

```
                                        <i class="fa fa-angle-down ml-2
                                            opacity-8"></i>
                                    </a>
                                    <div tabindex="-1" role="menu" aria-
                                        hidden="true" class="dropdown-menu
                                        dropdown-menu-right">
                                        <button type="button" tabindex="0"
                                            class="dropdown-item">User
                                            Account</button>
                                        <button type="button" tabindex="0"
                                            class="dropdown-item">Settings</
                                            button>

                                        <button type="button" tabindex="0"
                                            class="dropdown-item">Actions</
                                            button>
                                        <a href="../logout.php"> <div
                                            tabindex="-1" class="dropdown-
                                            divider"></div>
                                         <button type="button" tabindex="0"
                                          class="dropdown-item" > Logout
                                          </a></button>
                                    </div>
                                </div>
                            </div>
                            <div class="widget-content-left  ml-3 header-
                                user-info">
                                <div class="widget-heading">
                                    <?php


                                    $curruser=$_SESSION['loginid'];
                                    $sql = mysqli_query($conn,"select * from
                                        users where loginid='$curruser'");
                                    $row = mysqli_fetch_array($sql);
                                    echo   $row['f_name'] ;

                                ?>
                                </div>
                                <div class="widget-subheading">
                                 User
                                </div>
                            </div>
                            <div class="widget-content-right header-user-
                                info ml-3">
                                </button>
                            </div>
                        </div>
                    </div>
                </div>          </div>
        </div>
    </div>          <div class="ui-theme-settings">

        <div class="theme-settings__inner">
            <div class="scrollbar-container">
                <div class="theme-settings__options-wrapper">
                    <h3 class="themeoptions-heading">Layout Options
                    </h3>
                    <div class="p-3">
                        <ul class="list-group">
                            <li class="list-group-item">
```

```
                                    <div class="widget-content p-0">
                                        <div class="widget-content-wrapper">
                                            <div class="widget-content-left mr-3
                                                ">
                                                <div class="switch has-switch
                                                    switch-container-class" data
                                                    -class="fixed-header">
                                                    <div class="switch-animate
                                                        switch-on">
                                                        <input type="checkbox"
                                                            checked data-toggle=
                                                            "toggle" data-
                                                            onstyle="success">
                                                    </div>
                                                </div>
                                            </div>
                                            <div class="widget-content-left">
                                                <div class="widget-heading">
                                                    Fixed Header
                                                </div>
                                                <div class="widget-subheading">
                                                    Makes the header top fixed,
                                                    always visible!
                                                </div>
                                            </div>
                                        </div>
                                    </div>
                                </li>
                                <li class="list-group-item">
                                    <div class="widget-content p-0">
                                        <div class="widget-content-wrapper">
                                            <div class="widget-content-left mr-3
                                                ">
                                                <div class="switch has-switch
                                                    switch-container-class" data
                                                    -class="fixed-sidebar">
                                                    <div class="switch-animate
                                                        switch-on">
                                                        <input type="checkbox"
                                                            checked data-toggle=
                                                            "toggle" data-
                                                            onstyle="success">
                                                    </div>
                                                </div>
                                            </div>
                                            <div class="widget-content-left">
                                                <div class="widget-heading">
                                                    Fixed Sidebar
                                                </div>
                                                <div class="widget-subheading">
                                                    Makes the sidebar left fixed
                                                    , always visible!
                                                </div>
                                            </div>
                                        </div>
                                    </div>
                                </li>
                                <li class="list-group-item">
                                    <div class="widget-content p-0">
                                        <div class="widget-content-wrapper">
                                            <div class="widget-content-left mr-3
```

```
                                        ">
205                                     <div class="switch has-switch
                                            switch-container-class" data
                                            -class="fixed-footer">
206                                         <div class="switch-animate
                                                switch-off">
207                                             <input type="checkbox"
                                                    data-toggle="toggle"
                                                     data-onstyle="
                                                    success">
208                                         </div>
209                                     </div>
210                                 </div>
211                                 <div class="widget-content-left">
212                                     <div class="widget-heading">
                                            Fixed Footer
213                                     </div>
214                                     <div class="widget-subheading">
                                            Makes the app footer bottom
                                            fixed, always visible!
215                                     </div>
216                                 </div>
217                             </div>
218                         </div>
219                     </li>
220                 </ul>
221             </div>
222
223
224
225
226             <h3 class="themeoptions-heading">
227                 <div>Main Content Options</div>
228                 <button type="button" class="btn-pill btn-shadow btn
                        -wide ml-auto active btn btn-focus btn-sm">
                        Restore Default
229                 </button>
230             </h3>
231             <div class="p-3">
232                 <ul class="list-group">
233                     <li class="list-group-item">
234                         <h5 class="pb-2">Page Section Tabs
235                         </h5>
236                         <div class="theme-settings-swatches">
237                             <div role="group" class="mt-2 btn-group"
                                    >
238                                 <button type="button" class="btn-
                                        wide btn-shadow btn-primary btn
                                        btn-secondary switch-theme-class
                                        " data-class="body-tabs-line">
239                                     Line
240                                 </button>
241                                 <button type="button" class="btn-
                                        wide btn-shadow btn-primary
                                        active btn btn-secondary switch-
                                        theme-class" data-class="body-
                                        tabs-shadow">
242                                     Shadow
243                                 </button>
244                             </div>
245                         </div>
```

```
                                </li>
                            </ul>
                        </div>
                    </div>
                </div>
            </div>
        </div>          <div class="app-main">
            <div class="app-sidebar sidebar-shadow">
                <div class="app-header__logo">
                    <div class="logo-src"></div>
                    <div class="header__pane ml-auto">
                        <div>
                            <button type="button" class="hamburger close-
                                sidebar-btn hamburger--elastic" data-class="
                                closed-sidebar">
                                <span class="hamburger-box">
                                    <span class="hamburger-inner"></span>
                                </span>
                            </button>
                        </div>
                    </div>
                </div>
                <div class="app-header__mobile-menu">
                    <div>
                        <button type="button" class="hamburger hamburger--
                            elastic mobile-toggle-nav">
                            <span class="hamburger-box">
                                <span class="hamburger-inner"></span>
                            </span>
                        </button>
                    </div>
                </div>
                <div class="app-header__menu">
                    <span>
                        <button type="button" class="btn-icon btn-icon-only
                            btn btn-primary btn-sm mobile-toggle-header-nav"
                            >
                            <span class="btn-icon-wrapper">
                                <i class="fa fa-ellipsis-v fa-w-6"></i>
                            </span>
                        </button>
                    </span>
                </div>    <div class="scrollbar-sidebar">
                    <div class="app-sidebar__inner">
                    <ul class="vertical-nav-menu">
                            <li class="app-sidebar__heading">Dashboards</li>
                            <li>
                                <a href="index.php" >
                                    <i class="metismenu-icon pe-7s-rocket"
                                        ></i>
                                Home
                                </a>
                            </li>

                            <li>
                                <a href="map.php"  class="mm-active">
                                    <i class="metismenu-icon pe-7s-display2"
                                        ></i>
                                Realtime Monitoring
                                </a>
                            </li>
```

```
                                    <li>
                                        <a href="requests.php">
                                            <i class="metismenu-icon pe-7s-display2"
                                                ></i>
                                            Complaints
                                        </a>
                                    </li>

                                                                    </ul>
                                                                        </div>
                                </div>
                            </div>
                              <div class="app-main__outer">
                                <div id="filter">
                                <form method="post">
                                <label for="area">area:</label>
      <select name="area" id="area" onChange="changeArea(this.value);">
        <option  value="Vashi" Selected>Vashi</option>
        <option value="Sanpada" Selected>Sanpada</option>
        <option value="Nerul" Selected>Nerul</option>
        <option value="Belapur" Selected>Belapur</option>
        <option value="Kharghar" Selected>Kharghar</option>

       </select>


      <label for="sector">Sector:</label>


    <select name="sector" id="sector"  onChange="getSect();">
        <option value="" disabled selected></option>
     </select>


                                </form>
                                </div>
                               <div id="map" ></div>


                                </div>


<script type="text/javascript" src="./assets/scripts/main.js"></script>

<script type="application/javascript">
    function logout(){


   window.location.href = '../index.php"';
```

```
359
360                 }
361
362
363
364 </script>
365
366
367 <script>
368
369
370 </script>
371 </body>
372 </html>
```

- requests.php

```
1  # Complaints of citizens
2  <!DOCTYPE html>
3  <html lang="en">
4
5  <?php
6
7
8
9  include("../db_connect.php");
10 session_start();
11
12 ?>
13
14
15 <head>
16     <meta charset="utf-8">
17     <meta http-equiv="X-UA-Compatible" content="IE=edge">
18     <meta http-equiv="Content-Language" content="en">
19     <meta http-equiv="Content-Type" content="text/html; charset=utf-8"/>
20     <title>GoBin</title>
21     <meta name="viewport" content="width=device-width, initial-scale=1, maximum-
           scale=1, user-scalable=no, shrink-to-fit=no" />
22     <meta name="description" content="This is an example dashboard created using
           build-in elements and components.">
23     <meta name="msapplication-tap-highlight" content="no">
24     <link href="./main.css" rel="stylesheet">
25
26
27 <script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-app.js"></script>
28
29   <!-- If you enabled Analytics in your project, add the Firebase SDK for
         Analytics -->
30   <script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-analytics.js"
         ></script>
31
32   <!-- Add Firebase products that you want to use -->
33   <script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-auth.js"></
         script>
34   <script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-firestore.js"
         ></script>
35   <script src="https://www.gstatic.com/firebasejs/8.1.1/firebase-database.js"></
         script>
```

```
36
37
38    <script src="https://code.jquery.com/jquery-3.5.1.js"></script>
39
40    <<link href="https://unpkg.com/bootstrap-table@1.18.3/dist/bootstrap-table.min
          .css" rel="stylesheet">
41
42  <script src="https://unpkg.com/bootstrap-table@1.18.3/dist/bootstrap-table.min.
        js"></script>
43     </body>
44
45  <script>
46
47
48
49     // Your web app's Firebase configuration
50     // For Firebase JS SDK v7.20.0 and later, measurementId is optional
51  // Initialize Cloud Firestore through Firebase
52  firebase.initializeApp({
53       apiKey: "AIzaSyDcoaTJr1K6PfTy8ylKI_9-m4j7VtPH8t8",
54     authDomain: "nodemce.firebaseapp.com",
55     databaseURL: "https://nodemce.firebaseio.com",
56     projectId: "nodemce",
57     storageBucket: "nodemce.appspot.com",
58     messagingSenderId: "284670480170",
59     appId: "1:284670480170:web:0b9a03e6f635b4cbcf9853",
60     measurementId: "G-G7STTWM1NK"
61  });
62
63  </script>
64
65      <script src=./map.js> </script>
66      <style type="text/css">
67        /* Always set the map height explicitly to define the size of the div
68         * element that contains the map. */
69        #map {
70          height: 100%;
71        }
72
73        /* Optional: Makes the sample page fill the window. */
74        html,
75        body {
76          height: 100%;
77          margin: 0;
78          padding: 0;
79        }
80        .selected {
81      background-color: brown;
82      color: #FFF;
83  }
84
85      </style>
86          <link rel="icon" href="../img/icon.png" type="image/icon">
87
88
89
90  </head>
91  <body>
92
93      <div class="app-container app-theme-white body-tabs-shadow fixed-sidebar
          fixed-header">
```

```
94          <div class="app-header header-shadow">
95              <div class="app-header__logo">
96              <div class=" "><img src="../img/logo.png" alt="" style="width:130px;
                    "> </div>
97                  <div class="header__pane ml-auto">
98                      <div>
99                          <button type="button" class=" close-sidebar-btn
                                hamburger--elastic" data-class="closed-sidebar">
100                             <span class="hamburger-box">
101                                 <span class="hamburger-inner"></span>
102                             </span>
103                         </button>
104                     </div>
105                 </div>
106             </div>
107         <div class="ui-theme-settings">
108
109             <div class="theme-settings__inner">
110                 <div class="scrollbar-container">
111                     <div class="theme-settings__options-wrapper">
112                         <h3 class="themeoptions-heading">Layout Options
113                         </h3>
114                         <div class="p-3">
115                             <ul class="list-group">
116                                 <li class="list-group-item">
117                                     <div class="widget-content p-0">
118                                         <div class="widget-content-wrapper">
119                                             <div class="widget-content-left mr-3
                                                    ">
120                                                 <div class="switch has-switch
                                                        switch-container-class" data
                                                        -class="fixed-header">
121                                                     <div class="switch-animate
                                                            switch-on">
122                                                         <input type="checkbox"
                                                                checked data-toggle=
                                                                "toggle" data-
                                                                onstyle="success">
123                                                     </div>
124                                                 </div>
125                                             </div>
126                                             <div class="widget-content-left">
127                                                 <div class="widget-heading">
                                                        Fixed Header
128                                                 </div>
129                                                 <div class="widget-subheading">
                                                        Makes the header top fixed,
                                                        always visible!
130                                                 </div>
131                                             </div>
132                                         </div>
133                                     </div>
134                                 </li>
135                                 <li class="list-group-item">
136                                     <div class="widget-content p-0">
137                                         <div class="widget-content-wrapper">
138                                             <div class="widget-content-left mr-3
                                                    ">
139                                                 <div class="switch has-switch
                                                        switch-container-class" data
                                                        -class="fixed-sidebar">
```

```
                                        <div class="switch-animate
                                            switch-on">
                                            <input type="checkbox"
                                                checked data-toggle=
                                                "toggle" data-
                                                onstyle="success">
                                        </div>
                                    </div>
                                </div>
                                <div class="widget-content-left">
                                    <div class="widget-heading">
                                        Fixed Sidebar
                                    </div>
                                    <div class="widget-subheading">
                                        Makes the sidebar left fixed
                                        , always visible!
                                    </div>
                                </div>
                            </div>
                        </div>
                    </li>
                    <li class="list-group-item">
                        <div class="widget-content p-0">
                            <div class="widget-content-wrapper">
                                <div class="widget-content-left mr-3
                                    ">
                                    <div class="switch has-switch
                                        switch-container-class" data
                                        -class="fixed-footer">
                                        <div class="switch-animate
                                            switch-off">
                                            <input type="checkbox"
                                                data-toggle="toggle"
                                                 data-onstyle="
                                                success">
                                        </div>
                                    </div>
                                </div>
                                <div class="widget-content-left">
                                    <div class="widget-heading">
                                        Fixed Footer
                                    </div>
                                    <div class="widget-subheading">
                                        Makes the app footer bottom
                                        fixed, always visible!
                                    </div>
                                </div>
                            </div>
                        </div>
                    </li>
                </ul>
            </div>



            <h3 class="themeoptions-heading">
                <div>Main Content Options</div>
                <button type="button" class="btn-pill btn-shadow btn
                    -wide ml-auto active btn btn-focus btn-sm">
                    Restore Default
```

```
                    </button>
                </h3>
                <div class="p-3">
                    <ul class="list-group">
                        <li class="list-group-item">
                            <h5 class="pb-2">Page Section Tabs
                            </h5>
                            <div class="theme-settings-swatches">
                                <div role="group" class="mt-2 btn-group"
                                    >
                                    <button type="button" class="btn-
                                        wide btn-shadow btn-primary btn
                                        btn-secondary switch-theme-class
                                        " data-class="body-tabs-line">
                                        Line
                                    </button>
                                    <button type="button" class="btn-
                                        wide btn-shadow btn-primary
                                        active btn btn-secondary switch-
                                        theme-class" data-class="body-
                                        tabs-shadow">
                                        Shadow
                                    </button>
                                </div>
                            </div>
                        </li>
                    </ul>
                </div>
            </div>
        </div>
    </div>
</div>        <div class="app-main">
    <div class="app-sidebar sidebar-shadow">
        <div class="app-header__logo">
            <div class="logo-src"></div>
            <div class="header__pane ml-auto">
                <div>
                    <button type="button" class="hamburger close-
                        sidebar-btn hamburger--elastic" data-class="
                        closed-sidebar">
                        <span class="hamburger-box">
                            <span class="hamburger-inner"></span>
                        </span>
                    </button>
                </div>
            </div>
        </div>
        <div class="app-header__mobile-menu">
            <div>
                <button type="button" class="hamburger hamburger--
                    elastic mobile-toggle-nav">
                    <span class="hamburger-box">
                        <span class="hamburger-inner"></span>
                    </span>
                </button>
            </div>
        </div>
        <div class="app-header__menu">
            <span>
                <button type="button" class="btn-icon btn-icon-only
                    btn btn-primary btn-sm mobile-toggle-header-nav"
```

```
                    >
231                  <span class="btn-icon-wrapper">
232                      <i class="fa fa-ellipsis-v fa-w-6"></i>
233                  </span>
234              </button>
235          </span>
236      </div>    <div class="scrollbar-sidebar">
237          <div class="app-sidebar__inner">
238              <ul class="vertical-nav-menu">
239                  <li class="app-sidebar__heading">Dashboards</li>
240                  <li>
241                      <a href="index.php" >
242                          <i class="metismenu-icon pe-7s-rocket"
                                ></i>
243                       Home
244                          </a>
245                      </li>
246
247                      <li>
248                          <a href="map.php" >
249                              <i class="metismenu-icon pe-7s-display2"
                                    ></i>
250                              Realtime Monitoring
251                           </a>
252                      </li>
253
254                      <li>
255                          <a href="requests.php" class="mm-active">
256                              <i class="metismenu-icon pe-7s-display2"
                                    ></i>
257                              Complaints
258                          </a>
259                      </li>
260
261
262              </ul>
263          </div>
264      </div>
265  </div>
266    <div class="app-main__outer">
267
268
269      <div class="app-main__inner">
270          <div class="app-page-title">
271              <div class="page-title-wrapper">
272                  <div class="page-title-heading">
273                      <div class="page-title-icon">
274                          <i class="pe-7s-wallet icon-gradient bg-
                                plum-plate">
275                          </i>
276                      </div>
277                      <div> All Complaints
278                          <div class="page-title-subheading">GoBin
                                - Towards a clearner neighborhood
279                          </div>
280                      </div>
281                  </div>
282                <br> <br>
283          </div>       <br>
284
285
```

```
286
287
288  <div class="row">
289 <div class="col-lg-12">
290     <div class="main-card mb-3 card limit">
291         <div class="card-body"><h5 class="card-title">Requests Status</h5>
292
293         <div id="text"></div>
294
295         <table id="table" data-height="460"
296         data-checkbox-header="false"
297   data-click-to-select="true"
298
299   data-pagination="true"
300   data-show-columns-search="true"
301   data-show-columns="true"
302   data-show-refresh="true"
303   data-show-columns-toggle-all="true"
304   data-search-on-enter-key="true">
305
306   <thead>
307     <tr>
308     <th data-field="state" data-checkbox="true"></th>
309       <th data-field="name" class="name"> Name</th>
310       <th data-field="area">Area</th>
311
312       <th data-field="contact">Contact</th>
313       <th data-field="email">E-mail</th>
314       <th data-field="location">Location</th>
315
316       <th data-field="token">Token</th>
317
318     </tr>
319   </thead>
320 </table>
321
322
323         </div>
324     </div>
325 </div>
326
327
328                                 </div>
329                             </div>
330                         </div>    </div>
331                 <script src="http://maps.google.com/maps/api/js?sensor=true"></
                        script>
332         </div>
333     </div>
334
335
336
337
338
339 <script>
340   var $table = $('#table')
341   firebase.analytics();
342   var db = firebase.firestore();
343
344           /* function buildTable(data){
345                   var table = document.getElementById('myTable');
```

```
                    var row=data.data();

                let console.log(doc.data());
                    for (var i = 0; i < data.length; i++){



                    }

                }
                  */

                db.collection("complaints").get().then(function(querySnapshot) {
                var data = [];
                querySnapshot.forEach(function(doc) {
                    // doc.data() is never undefined for query doc snapshots
                    //console.log(doc.id, " => ", doc.data());

                 data = getComplaint(doc,data);


                });
                $table.bootstrapTable( {data:data});

});


  function getComplaint(CompData,data) {
   //console.log(CompData.data(),data);
    var data1 = CompData.data();
// console.log(data1);
    data.push(data1);
    return data;
  }

</script>
<script type="text/javascript" src="./assets/scripts/main.js"></script>

<script type="application/javascript">
   function logout(){
     <?php



 header("location:../index.php");

   ?>
            }



</script>


<script>
/*
$(function() {
    $(document).on("click",".fetch",function () {
        var getselectedvalues=$("#table input:checked").parents("tr ").children
            (".name");
```

```
406             for(i=0;i<getselectedvalues.length;i++){
407           alert(getselectedvalues[i].innerHTML);
408
409             }
410
411
412
413
414
415         })
416
417 })
418  */
419 </script>
420
421 </body>
422 </html>
```

6.2 Module 2 - Hardware View

This is the second view of the system. This system is visible at dustbin's location.The Ultrasonic sensor is attached to dustbin on the upper level to monitor distance of solid waste form top to beneath it. As soon as solid waste reaches to overflow, the sensor senses the solid waste at specific level and sends data to a WiFi module which is attached to the exterior part of the bin.

The WiFi module sends real-time solid waste status to web application. This makes the web application synchronous about solid waste status.

- Ultrasonicewithfirebaseas.ino

```
1
2
3  #include <FirebaseESP8266.h>
4
5  #include <ESP8266WiFi.h>
6  #include <SoftwareSerial.h>
7
8  #include <ArduinoJson.h>
9   #include <ESP8266HTTPClient.h>
10
11 // Set these to run example.
12 #define FIREBASE_HOST "nodemce.firebaseio.com"
13 #define FIREBASE_AUTH "bkY5sW3gfBs2K7bpI4nDoSUaKV65Ic1I4BxZXQQ5"
14 #define WIFI_SSID "Galaxy A10s7646"
15 #define WIFI_PASSWORD "uber7252"
16
17 String myString;
18 #define TRIGGERPIN D1
19 #define ECHOPIN    D2
20  FirebaseData firebaseData;
21 void setup()
22 {
23   // Debug console
24   Serial.begin(9600);
25 pinMode(TRIGGERPIN, OUTPUT);
26   pinMode(ECHOPIN, INPUT);
27
28
29   // connect to wifi.
30
31   WiFi.begin(WIFI_SSID, WIFI_PASSWORD);
32   Serial.print("connecting");
33   while (WiFi.status() != WL_CONNECTED)
34       {
35     Serial.print(".");
36     delay(500);
37       }
38   Serial.println();
39   Serial.print("connected: ");
40   Serial.println(WiFi.localIP());
41
42   Firebase.begin(FIREBASE_HOST, FIREBASE_AUTH);
43
44
```

```
45
46 }
47
48 void loop()
49 {
50  long duration, distance;
51   digitalWrite(TRIGGERPIN, LOW);
52   delayMicroseconds(3);
53
54   digitalWrite(TRIGGERPIN, HIGH);
55   delayMicroseconds(12);
56
57   digitalWrite(TRIGGERPIN, LOW);
58   duration = pulseIn(ECHOPIN, HIGH);
59   distance = (duration/2) / 29.1;
60   Serial.print(distance);
61   Serial.println("Cm");
62
63 int myString = distance;
64
65 if (Firebase.setInt(firebaseData, "/Distance", myString)) {     // On successful
     Write operation, function returns 1
66                 Serial.println("Value Uploaded Successfully");
67                 Serial.print("Val = ");
68                 Serial.println(myString);
69                 Serial.println("\n");
70
71
72                 delay(200);
73
74       }
75
76 else {
77     Serial.println(firebaseData.errorReason());
78   }
79
80 }
```

6.3 Module 3 - Citizen View

This is the third view of the system. This view is only available to the citizens. The responsibilities of the citizens include registration of complaints regarding solid waste bins and solid waste collection process. The citizens need to register on the mobile application. Registered citizens can initiate any complaint regarding solid waste. While registering a complaint, citizens need to fill a complaint form. In the complaint form they need to capture image of any dustbin or any region that has huge amount of solid waste.

The citizens can also provide feedback to the solid waste management authority.

- SignUp.dart

```
#Citizen registration
import 'package:flutter/material.dart';
import 'package:firebase_auth/firebase_auth.dart';
import 'package:google_fonts/google_fonts.dart';
//import 'HomePage.dart';
//import 'Login.dart';

class SignUp extends StatefulWidget {
  @override
  _SignUpState createState() => _SignUpState();
}

class _SignUpState extends State<SignUp> {
  FirebaseAuth _auth = FirebaseAuth.instance;
  final GlobalKey<FormState> _formKey = GlobalKey<FormState>();

  String _name, _email, _password, _user;

  checkAuthentication() async {
    _auth.authStateChanges().listen((user) async {
      if (user != null) {
        Navigator.pushReplacementNamed(context, "/");
      }
    });
  }

  @override
  void initState() {
    super.initState();
    this.checkAuthentication();
  }

  signUp() async {
    if (_formKey.currentState.validate()) {
      _formKey.currentState.save();

      try {
        UserCredential userCredential = await _auth
            .createUserWithEmailAndPassword(email: _email, password: _password);
        if (userCredential != null) {
          //UserUpdateInfo updateuser = UserUpdateInfo();
          //updateuser.displayName = _name;
```

```
          //userCredential.updateProfile(updateuser);
          await _auth.currentUser.updateProfile(displayName: _name);
        }
      } catch (e) {
        showError(e.message);
      }
    }
  }

  showError(String errormessage) {
    showDialog(
        context: context,
        builder: (BuildContext context) {
          return AlertDialog(
            title: Text('ERROR'),
            content: Text(errormessage),
            actions: <Widget>[
              FlatButton(
                  onPressed: () {
                    Navigator.of(context).pop();
                  },
                  child: Text('OK'))
            ],
          );
        });
  }

  @override
  Widget build(BuildContext context) {
    return Scaffold(
        appBar: AppBar(
          title: Text('Gobin'),
          backgroundColor: Color.fromRGBO(123, 180, 49, 1),
        ),
        body: SingleChildScrollView(
          child: Container(
            child: Column(
              children: <Widget>[
                Container(
                  height: 400,
                  child: Image(
                    image: AssetImage("images/home.JPG"),
                    fit: BoxFit.contain,
                  ),
                ),
                Container(
                  child: Form(
                    key: _formKey,
                    child: Column(
                      children: <Widget>[
                        Container(
                          child: TextFormField(
                              validator: (input) {
                                if (input.isEmpty) return 'Enter Name';
                              },
                              decoration: InputDecoration(
                                  contentPadding: EdgeInsets.only(
                                      left: 23, top: 15, bottom: 23),
                                  border: OutlineInputBorder(
                                    borderRadius:
                                        BorderRadius.all(Radius.circular(90.0)),
```

```
                    borderSide: BorderSide.none,
                  ),
                  filled: true,
                  fillColor: Colors.grey[350],
                  hintText: "Name",
                  hintStyle: GoogleFonts.lato(
                    color: Colors.black26,
                    fontSize: 18,
                    fontWeight: FontWeight.w800,
                  ),
                  prefixIcon: Icon(Icons.accessibility)),
              onSaved: (input) => _name = input),
        ),
        SizedBox(
          height: 20.0,
        ),
        Container(
          child: TextFormField(
              validator: (input) {
                if (input.isEmpty) return 'Enter Email';
              },
              decoration: InputDecoration(
                  contentPadding: EdgeInsets.only(
                      left: 23, top: 15, bottom: 23),
                  border: OutlineInputBorder(
                    borderRadius:
                        BorderRadius.all(Radius.circular(90.0)),
                    borderSide: BorderSide.none,
                  ),
                  filled: true,
                  fillColor: Colors.grey[350],
                  hintText: 'Email',
                  hintStyle: GoogleFonts.lato(
                    color: Colors.black26,
                    fontSize: 18,
                    fontWeight: FontWeight.w800,
                  ),
                  prefixIcon: Icon(Icons.email)),
              onSaved: (input) => _email = input),
        ),
        SizedBox(
          height: 20.0,
        ),
        Container(
          child: TextFormField(
              validator: (input) {
                if (input.length < 6)
                  return 'Provide Minimum 6 Character';
              },
              decoration: InputDecoration(
                contentPadding: EdgeInsets.only(
                    left: 23, top: 15, bottom: 23),
                border: OutlineInputBorder(
                  borderRadius:
                      BorderRadius.all(Radius.circular(90.0)),
                  borderSide: BorderSide.none,
                ),
                filled: true,
                fillColor: Colors.grey[350],
                hintText: 'Password',
                hintStyle: GoogleFonts.lato(
```

```
                                color: Colors.black26,
                                fontSize: 18,
                                fontWeight: FontWeight.w800,
                              ),
                              prefixIcon: Icon(Icons.lock),
                            ),
                            obscureText: true,
                            onSaved: (input) => _password = input),
                      ),
                      SizedBox(height: 30),
                      // ignore: deprecated_member_use
                      RaisedButton(
                        padding: EdgeInsets.fromLTRB(70, 10, 70, 10),
                        onPressed: signUp,
                        child: Text('SignUp',
                            style: TextStyle(
                                color: Colors.white,
                                fontSize: 20.0,
                                fontWeight: FontWeight.bold)),
                        color: Colors.blue,
                        shape: RoundedRectangleBorder(
                          borderRadius: BorderRadius.circular(20.0),
                        ),
                      )
                    ],
                  ),
                ),
              ),
            ],
          ),
        ),
      ));
  }
}
```

- Login.dart

```
import 'package:flutter/material.dart';
import 'package:firebase_auth/firebase_auth.dart';
import 'package:google_fonts/google_fonts.dart';

//0import 'package:cleanbin/HomePage.dart';
//import 'package:cleanbin/SignUp.dart';

class Login extends StatefulWidget {
  @override
  _LoginState createState() => _LoginState();
}

class _LoginState extends State<Login> {
  final FirebaseAuth _auth = FirebaseAuth.instance;
  final GlobalKey<FormState> _formKey = GlobalKey<FormState>();

  String _email, _password, user;

  checkAuthentification() async {
    _auth.authStateChanges().listen((user) {
      if (user != null) {
```

```
        Navigator.pushReplacementNamed(context, "/");
      }
    });
  }

  @override
  void initState() {
    super.initState();
    this.checkAuthentification();
  }

  login() async {
    if (_formKey.currentState.validate()) {
      _formKey.currentState.save();

      try {
        UserCredential user = await _auth.signInWithEmailAndPassword(
            email: _email, password: _password);
      } catch (e) {
        showError(e);
      }
    }
  }

  showError(String errormessage) {
    showDialog(
        context: context,
        builder: (BuildContext context) {
          return AlertDialog(
            title: Text('ERROR SOMTHING WENT WRONG WITH ID AND PASS'),
            content: Text(errormessage),
            actions: <Widget>[
              // ignore: deprecated_member_use
              FlatButton(
                  onPressed: () {
                    Navigator.of(context).pop();
                  },
                  child: Text('OK'))
            ],
          );
        });
  }

  navigateToSignUp() async {
    //Navigator.push(context, MaterialPageRoute(builder: (context)=> SignUp()));
    Navigator.pushReplacementNamed(context, "SignUp");
  }

  @override
  Widget build(BuildContext context) {
    return Scaffold(
        appBar: AppBar(
          title: Text('Clean Bin'),
          backgroundColor: Color.fromRGBO(123, 180, 49, 1),
        ),
        body: SingleChildScrollView(
          child: Container(
            child: Column(
              children: <Widget>[
                Container(
                  height: 400,
```

```
                child: Image(
                  image: AssetImage("images/log.JPG"),
                  fit: BoxFit.contain,
                ),
              ),
              Container(
                child: Form(
                  key: _formKey,
                  child: Column(
                    children: <Widget>[
                      Container(
                        child: TextFormField(
                            validator: (input) {
                              if (input.isEmpty) return 'Enter Email';
                            },
                            decoration: InputDecoration(
                                contentPadding: EdgeInsets.only(
                                    left: 25, top: 10, bottom: 25),
                                border: OutlineInputBorder(
                                  borderRadius:
                                      BorderRadius.all(Radius.circular(90.0)),
                                  borderSide: BorderSide.none,
                                ),
                                filled: true,
                                fillColor: Colors.grey[350],
                                hintText: 'Email',
                                hintStyle: GoogleFonts.lato(
                                  color: Colors.black26,
                                  fontSize: 18,
                                  fontWeight: FontWeight.w800,
                                ),
                                prefixIcon: Icon(Icons.email)),
                            onSaved: (input) => _email = input),
                      ),
                      SizedBox(
                        height: 20.0,
                      ),
                      Container(
                        child: TextFormField(
                            validator: (input) {
                              if (input.length < 6)
                                return 'Provide Minimum 6 Character';
                            },
                            decoration: InputDecoration(
                              contentPadding: EdgeInsets.only(
                                  left: 25, top: 10, bottom: 25),
                              border: OutlineInputBorder(
                                borderRadius:
                                    BorderRadius.all(Radius.circular(90.0)),
                                borderSide: BorderSide.none,
                              ),
                              filled: true,
                              fillColor: Colors.grey[350],
                              hintText: 'Password',
                              hintStyle: GoogleFonts.lato(
                                color: Colors.black26,
                                fontSize: 18,
                                fontWeight: FontWeight.w800,
                              ),
                              prefixIcon: Icon(Icons.lock),
                            ),
```

```
                                obscureText: true,
                                onSaved: (input) => _password = input),
                            ),
                            SizedBox(height: 50),
                            // ignore: deprecated_member_use
                            RaisedButton(
                              padding: EdgeInsets.fromLTRB(70, 10, 70, 10),
                              onPressed: login,
                              child: Text('LOGIN',
                                  style: TextStyle(
                                      color: Colors.white,
                                      fontSize: 20.0,
                                      fontWeight: FontWeight.bold)),
                              color: Colors.blue,
                              shape: RoundedRectangleBorder(
                                borderRadius: BorderRadius.circular(30.0),
                              ),
                            )
                          ],
                        ),
                      ),
                    ),
                    SizedBox(height: 30.5),
                    GestureDetector(
                      child: Text('Create an Account?'),
                      onTap: navigateToSignUp,
                    )
                  ],
                ),
              ),
            ));
  }
}
```

- HomePage.dart

```
#Complaint registration
import 'dart:io';
import 'package:cleanbin/ResultScreen.dart';
import 'package:firebase_auth/firebase_auth.dart';
import 'package:flutter/material.dart';
import 'package:cloud_firestore/cloud_firestore.dart';
import 'package:geolocator/geolocator.dart';
import 'package:image_picker/image_picker.dart';
import 'package:permission_handler/permission_handler.dart';
import 'package:firebase_storage/firebase_storage.dart';
import 'package:random_string/random_string.dart';

class HomePage extends StatefulWidget {
  @override
  _HomePageState createState() => _HomePageState();
}

TextEditingController name = new TextEditingController();
TextEditingController contact = new TextEditingController();
TextEditingController email = new TextEditingController();
TextEditingController address = new TextEditingController();
TextEditingController comment = new TextEditingController();
```

```
23
24 class _HomePageState extends State<HomePage> {
25   String imageUrl;
26
27   TextStyle text = TextStyle(fontSize: 30);
28   int number = 25;
29   String string2 = randomAlphaNumeric(10);
30   final FirebaseAuth _auth = FirebaseAuth.instance;
31
32   String locationMessage = "";
33
34   User user;
35   bool isloggedin = false;
36
37   //get maxLines => true;
38
39   checkAuthentification() async {
40     _auth.authStateChanges().listen((user) {
41       if (user == null) {
42         //Navigator.push(context, MaterialPageRoute(builder: (context)=> Start()
               ));
43         Navigator.pushReplacementNamed(context, "Start");
44       }
45     });
46   }
47
48   getUser() async {
49     User firebaseUser = _auth.currentUser;
50     await firebaseUser?.reload();
51     firebaseUser = _auth.currentUser;
52
53     if (firebaseUser != null) {
54       setState(() {
55         this.user = firebaseUser;
56         this.isloggedin = true;
57       });
58     }
59   }
60
61   signOut() async {
62     _auth.signOut();
63   }
64
65   void _getCurrentLocation() async {
66     final position = await Geolocator.getCurrentPosition(
67         desiredAccuracy: LocationAccuracy.high);
68     print(position);
69
70     setState(() {
71       locationMessage = "${position.latitude}, ${position.longitude}";
72     });
73   }
74
75   uploadImage() async {
76     final _storage = FirebaseStorage.instance;
77     final _picker = ImagePicker();
78     PickedFile image;
79
80     //Check Permissions
81     await Permission.photos.request();
82
```

```
    var permissionStatus = await Permission.photos.status;

    if (permissionStatus.isGranted) {
      //Select Image
      image = await _picker.getImage(source: ImageSource.gallery);
      var file = File(image.path);
      //var imagename = File(image.name);
      String fileName = file.path.split('/').last;

      if (image != null) {
        //Upload to Firebase
        var snapshot = await _storage
            .ref()
            .child('UserQueryImage/' + fileName)
            .putFile(file);

        var downloadUrl = await snapshot.ref.getDownloadURL();

        setState(() {
          imageUrl = downloadUrl;
        });
      } else {
        print('No Path Received');
      }
    } else {
      print('Grant Permissions and try again');
    }
  }

  @override
  // ignore: must_call_super
  void initState() {
    this.checkAuthentification();
    this.getUser();
  }

  @override
  Widget build(BuildContext context) {
    return Scaffold(
        resizeToAvoidBottomInset: false,
        appBar: AppBar(
          title: Text('Go Bin'),
          backgroundColor: Color.fromRGBO(123, 180, 49, 1),
        ),
        body: SingleChildScrollView(
            child: Container(
          child: !isloggedin
              ? CircularProgressIndicator()
              : Column(
                  children: <Widget>[
                    SizedBox(height: 40.0),
                    Container(
                      padding: EdgeInsets.all(10),
                      child: Text(
                        "Hello ${user.displayName} Please Fill this form ",
                        style: TextStyle(
                            fontSize: 20.0, fontWeight: FontWeight.bold),
                      ),
                    ),
                    Container(
                      padding: EdgeInsets.all(10),
```

```
            child: TextFormField(
              controller: name,
              decoration: InputDecoration(
                border: OutlineInputBorder(
                  borderRadius:
                      BorderRadius.all(Radius.circular(90.0)),
                ),
                labelText: 'Name',
                prefixIcon: Icon(Icons.person),
              ),
              //obscureText: true,
            ),
          ),
          Container(
            padding: EdgeInsets.all(10),
            child: TextFormField(
              controller: contact,
              decoration: InputDecoration(
                border: OutlineInputBorder(
                  borderRadius:
                      BorderRadius.all(Radius.circular(90.0)),
                ),
                labelText: 'Contact Number',
                prefixIcon: Icon(Icons.phone),
              ),
              //obscureText: true,
            ),
          ),
          Container(
            padding: EdgeInsets.all(10),
            child: TextFormField(
              controller: email,
              decoration: InputDecoration(
                border: OutlineInputBorder(
                  borderRadius:
                      BorderRadius.all(Radius.circular(90.0)),
                ),
                labelText: 'Email Address',
                prefixIcon: Icon(Icons.mail),
              ),
              //obscureText: true,
            ),
          ),
          Container(
            padding: EdgeInsets.all(10),
            child: TextFormField(
              controller: address,
              maxLines: null,
              keyboardType: TextInputType.multiline,

              decoration: InputDecoration(
                border: OutlineInputBorder(
                  borderRadius:
                      BorderRadius.all(Radius.circular(90.0)),
                ),
                labelText: 'Address/Area/Sector',
                prefixIcon: Icon(Icons.add_to_home_screen_sharp),
              ),
              // obscureText: true,
            ),
          ),
```

```
205                 Container(
206                   padding: EdgeInsets.all(10),
207                   child: TextField(
208                     controller: comment,
209                     maxLines: null,
210                     keyboardType: TextInputType.multiline,
211                     decoration: InputDecoration(
212                       border: OutlineInputBorder(
213                         borderRadius:
214                             BorderRadius.all(Radius.circular(90.0)),
215                       ),
216                       labelText: 'Description',
217                       prefixIcon: Icon(Icons.description),
218                     ),
219                   ),
220                 ),
221                 Container(
222                   padding: EdgeInsets.all(20),
223                   child: (imageUrl != null)
224                       ? Image.network(imageUrl)
225                       : Image.asset("images/doc.JPG"),
226
227                   /*: Placeholder(
228                         fallbackHeight: 100.0,
229                         fallbackWidth: double.infinity),*/
230                 ),
231                 Row(
232                   mainAxisAlignment: MainAxisAlignment.center,
233                   children: <Widget>[
234                     // ignore: deprecated_member_use
235                     RaisedButton(
236                         padding: EdgeInsets.only(left: 35, right: 30),
237                         onPressed: () => uploadImage(),
238                         child: Text(
239                           'Add Image',
240                           style: TextStyle(
241                             fontSize: 20,
242                             fontWeight: FontWeight.bold,
243                             color: Colors.white,
244                           ),
245                         ),
246                         shape: RoundedRectangleBorder(
247                           borderRadius: BorderRadius.circular(90.0),
248                         ),
249                         color: Colors.blue),
250                     SizedBox(width: 20.0),
251
252                     // ignore: deprecated_member_use
253                     FlatButton(
254                       padding: EdgeInsets.only(left: 35, right: 30),
255                       onPressed: () {
256                         Map<String, dynamic> data = {
257                           "Name ": name.text,
258                           "contact_details": contact.text,
259                           "Email_id": email.text,
260                           "Address": address.text,
261                           "Query": comment.text,
262                           'token': string2,
263                           'location': locationMessage,
264                         };
265                         _getCurrentLocation();
```

```
                                FirebaseFirestore.instance
                                    .collection("UserComplaints")
                                    .add(data);
                                Navigator.push(
                                  context,
                                  MaterialPageRoute(
                                      builder: (context) => ResultScreen()),
                                );
                              },
                              child: Text(
                                'SUBMIT',
                                style: TextStyle(
                                  fontSize: 20,
                                  fontWeight: FontWeight.bold,
                                  color: Colors.white,
                                ),
                              ),
                              shape: RoundedRectangleBorder(
                                borderRadius: BorderRadius.circular(90.0),
                              ),
                              color: Colors.blue,
                            ),
                          ],
                        ),
                      ],
                    ),
                  ],
                ),
              ),
            )));
  }
}
```

Chapter 7

System Testing

System Testing is a level of testing that validates the complete and fully integrated software product. The purpose of a system test is to evaluate the end-to-end system specifications. Usually, the software is only one element of a larger computer-based system. Below shows the test cases of our system.

7.1 Test Cases and Test Results

Test ID	Test Case Title	Test Condition	System Behavior	Observed Result
T01	Hardware Connection	Give input of 5v and connect Ultrasonic	Firebase should display distance in real time	Successful
T02	Web Login	Enter username and password and click login button	Login using given Username and password should be successful and redirect to home screen	Successful
T03	Web Interface	Home page	Home page should display all the recent complaints	Successful
T04	Realtime Map Tab	Above map area two drop downs of area and sector should be displayed	Above map area two drop downs of area and sector are visible	Successful
T05	Realtime Map Tab	Select area from drop down	Sector should get populated	Successful
T06	Realtime Map Tab	select any sector from drop down	Bins area displayed on the map accordingly	Successful

T07	Google Map	Refresh the page and select any other sector	location is changed when clicked on maps	Successful
T08	Complaint screen	click on complaints tab	Complaints from firebase are getting populated	Successful
T09	Log out	click on log out	user should log out and system should go to login screen	Successful
T10	Login screen	Open the application	should display login screen with login and register buttons	Successful
T11	Register screen	Click on register	Registration form should be displayed	Successful
T12	Registration	Enter details required and click submit	New user should get registered	Successful
T13	Login	Login with new user created	Login should redirect to home screen	Successful
T14	Home screen	Observe home screen	Home screen should display form fields	Successful
T15	Image	Click on add image button and select an image	selected image should be displayed on screen	Successful
T16	Location	Click on location button	Latitude and longitude should get displayed on screen	Successful
T17	Submit	Click on submit button	All data including image should get submitted on firebase and thank you message should be displayed	Successful
T18	Log out	Click on log out button	user should get logged out and redirected to login screen	Successful

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7.2 Test Cases

Title: Hardware Connection – To check NodeMCU connection with firebase.
Description: NodeMCU should connect to WiFi network and firebase.

Precondition: Firebase should have read/write permissions.
Assumption: Wifi network is available.

Test Steps:

1. Connect NodeMCU to Ultrasonic sensor.
2. Connect Power input to ultrasonic sensor.
3. Login to firebase.

Expected Result: Data from NodeMCU should being sent to Firebase.
Actual Result: Data from NodeMCU is being sent to Firebase in realtime.

Title: Web Interface – Checking Maps on Realtime tab
Description: To check map is displaying required data in real time.

Precondition: User is logged in.
Assumption: Hardware connection with firebase is done.

Test Steps:

1. Login with admin.
2. Go to Real time monitoring screen.
3. Select any area.
4. Select any sector.

Expected Result: Map should display bins in the selected sector with their realtime status

Actual Result: Map is displaying overlay of all the bins with realtime status color indications.

Title: Web Interface – Checking Complaint table on complaints tab.
Description: To check all the data from firebase is populated into table.

Precondition: User is logged in.
Assumption: Android users are able to send complaints to firebase

Test Steps:

1. Login with admin.
2. Go to complaints screen.
3. Select filters of fields to be displayed
4. Observe table.

Expected Result: Table should contain list of all data submitted from android app.
Actual Result: Table is populated with all the entries made by android users and area filtered according to selection.

Title: Android – Checking android form functioning
Description: To check data sent from android is populated into firebase.

Precondition: User is logged in.
Assumption: Read/Write permissions are given in firebase.

Test Steps:

1. Login with registered user.
2. Enter the required data.
3. Select Image and get live location.
4. Click submit button.

Expected Result: All data from android app form should be seen into Firebase Firestore.
Actual Result: All entries are shown in Firebase Firestore and media is being uploaded to storage.

7.2.1 Software Quality Attributes

1. AVAILABILITY: The system should not be down, whenever the user use the system the specific data should be available to the user.
2. CORRECTNESS: As per the user search the the correct should be shown to the user like at time for searching the the similar type of startup the system should show all the similar startup.
3. MAINTAINABILITY: The administration of the system will maintain the system with effective updates though on air update if needed.

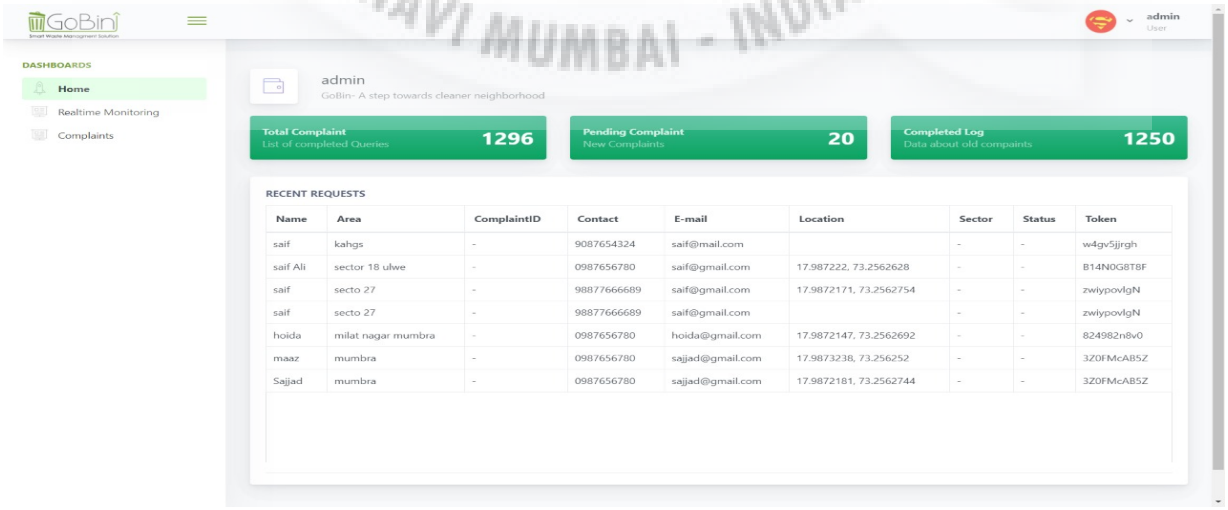
Chapter 8

Screenshots of Project

8.1 Authority View

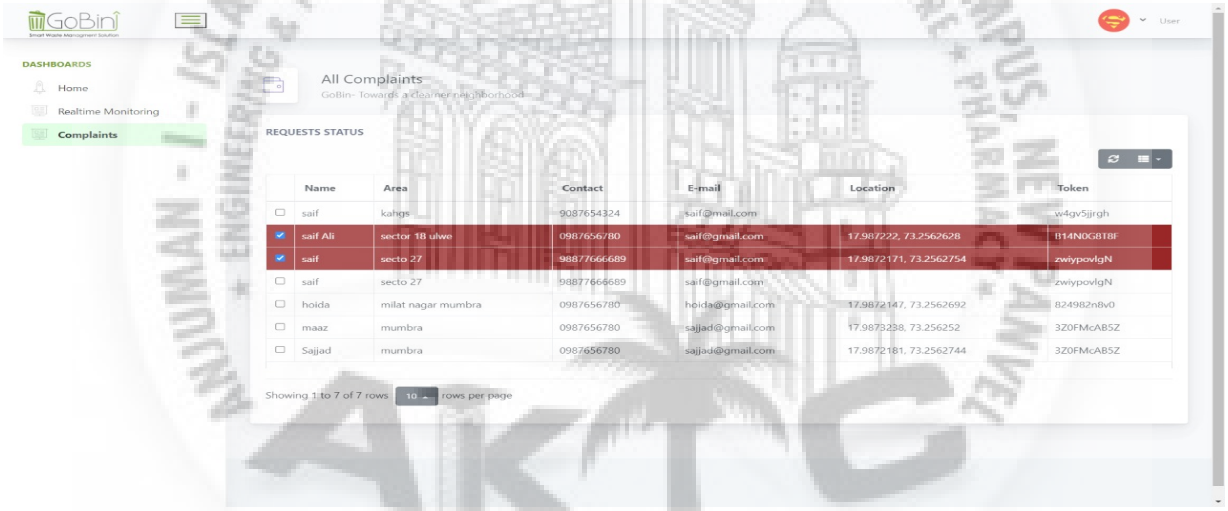
8.1.1 Login

8.1.2 Home page



8.1.3 Real-time monitoring

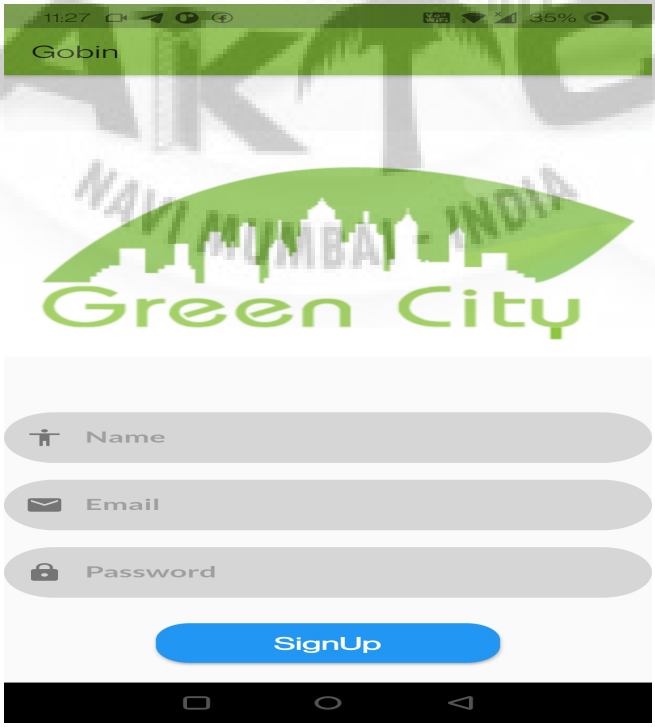
8.1.4 Complaints



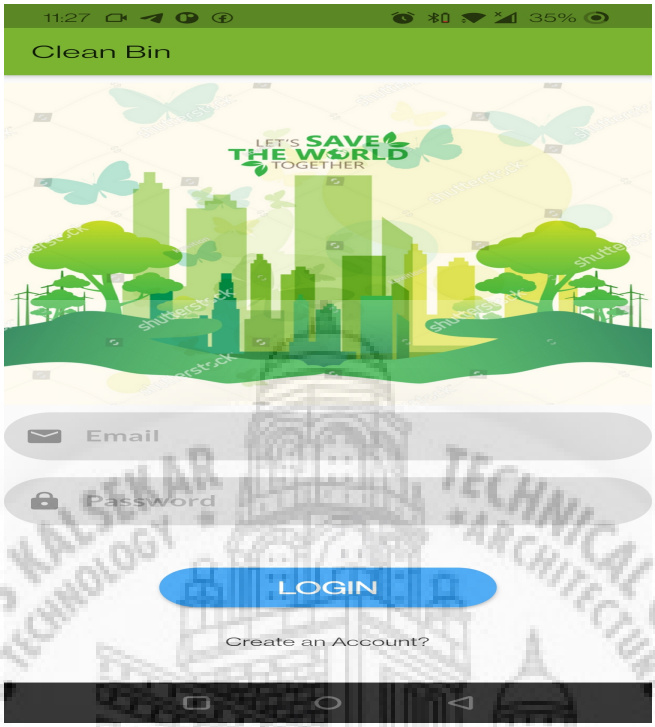
8.2 Citizen View

8.2.1 Homepage

8.2.2 Registration

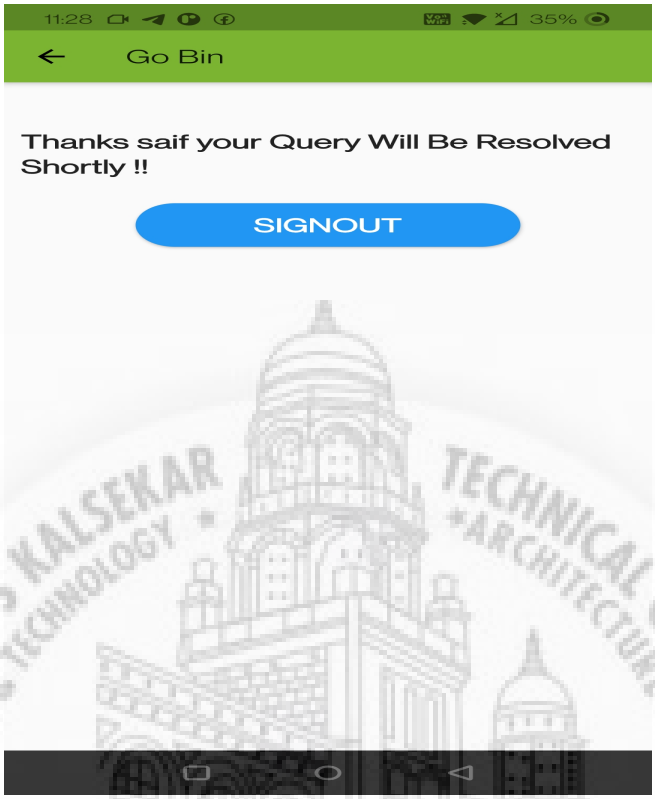


8.2.3 Login



8.2.4 Complaint registration

8.2.5 Complaint confirmation



8.3 Hardware view

8.3.1 Solid waste detection - Ultrasonic sensor HC-04

8.3.2 Send real-time status - NODEMCU ESP 8266

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Chapter 9

Conclusion and Future Scope

9.1 Conclusion

Now, this is the era of internet revolution, human activities are changing very fast. The society is moving towards further development. The activities of humans in most time leaves huge amount of solid waste behind with no appropriate plan of its collection.

Management of solid waste is undoubtedly on an upward trajectory. Now, almost every public governing authorities are trying to implement a well formed solid waste management system. Solid waste management system should give benefit to public governing authorities and society. By adapting digital aspects in today's solid waste management, it can lead to a more efficient, cost effective and reliable approach.

Though, there are already several solid waste management systems built, but each one has their pros and cons. The features of this product will make it a better system to stand out. With numerous features we are trying to build a web application and a mobile application and with latest technologies which will overcome the flaws of previous systems.

Being a connecting link between the solid waste and web application, we have attached two sensors to each dustbin for getting real-time status of solid waste.

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The important characteristics of this system is that it sends real-time status of solid waste to the web application controlled by solid waste management authorities. The management personal can also see how much a dustbin is filled with its location. Citizens can register a complaint through a mobile application if they found any issue related to solid waste nearby their locality. Management personal can analyse their complaint and he/she will try to solve them.

9.2 Future Scope

- Finding optimal solution using the Routing Algorithm.
- GPS module can be implemented for path planning combined with ultrasonic sensors for traffic avoidance.
- Artificial Intelligence and Machine Learning could be implemented for predictions and future improvements.

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Achievements

1. Publication

   (a) *Geolocation Based Advance Waste Collection*; Chogle Saif Ali,Ansari Hoida, Lambe Maaz, Khalfe Sajjad, Mubashir Khan, MAY 2021 — IRE Journals (https://irejournals.com/formatedpaper/1702696.pdf)

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