



SMART BIN

PROBLEMS

- GARBAGE OVERFLOW
- UNOPTIMIZED GARBAGE COLLECTION

GARBAGE OVERFLOW

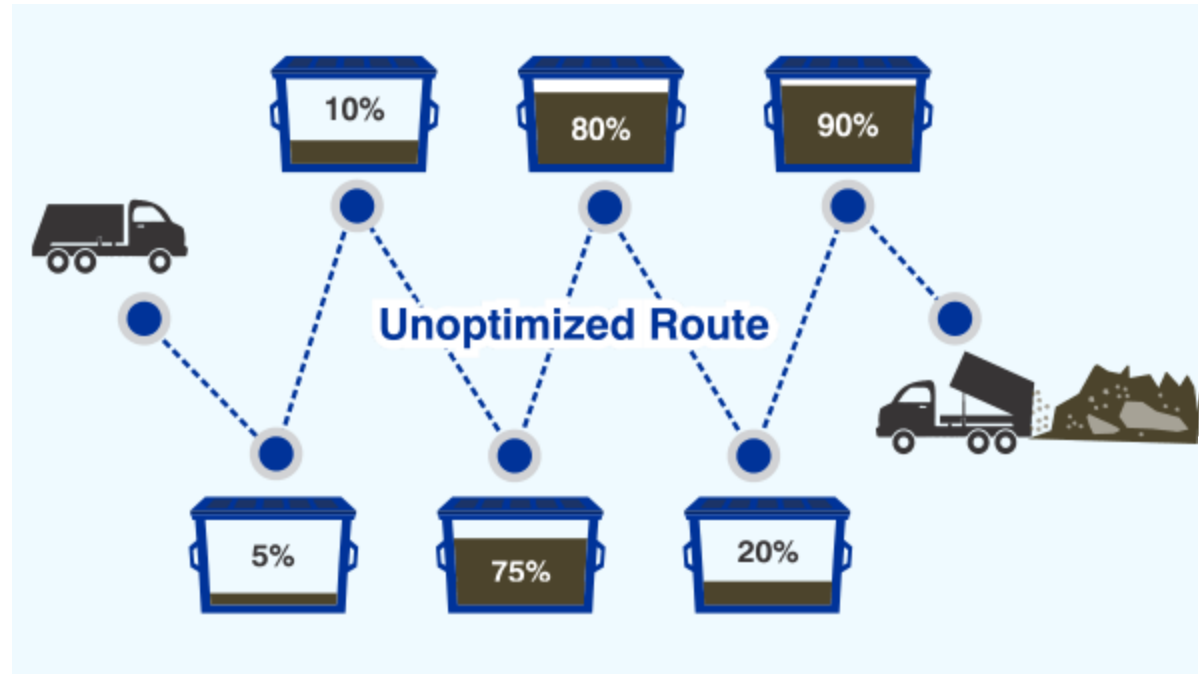


Overflowing garbage bin is a common sight for us. The sluggish clearance of garbage is leading to potentially hazardous health situations. Garbage trucks collect waste using fixed schedules every week and people are forced to bear with the stench.

PROBLEMS

- GARBAGE OVERFLOW
- UNOPTIMIZED GARBAGE COLLECTION

UNOPTIMIZED GARBAGE COLLECTION



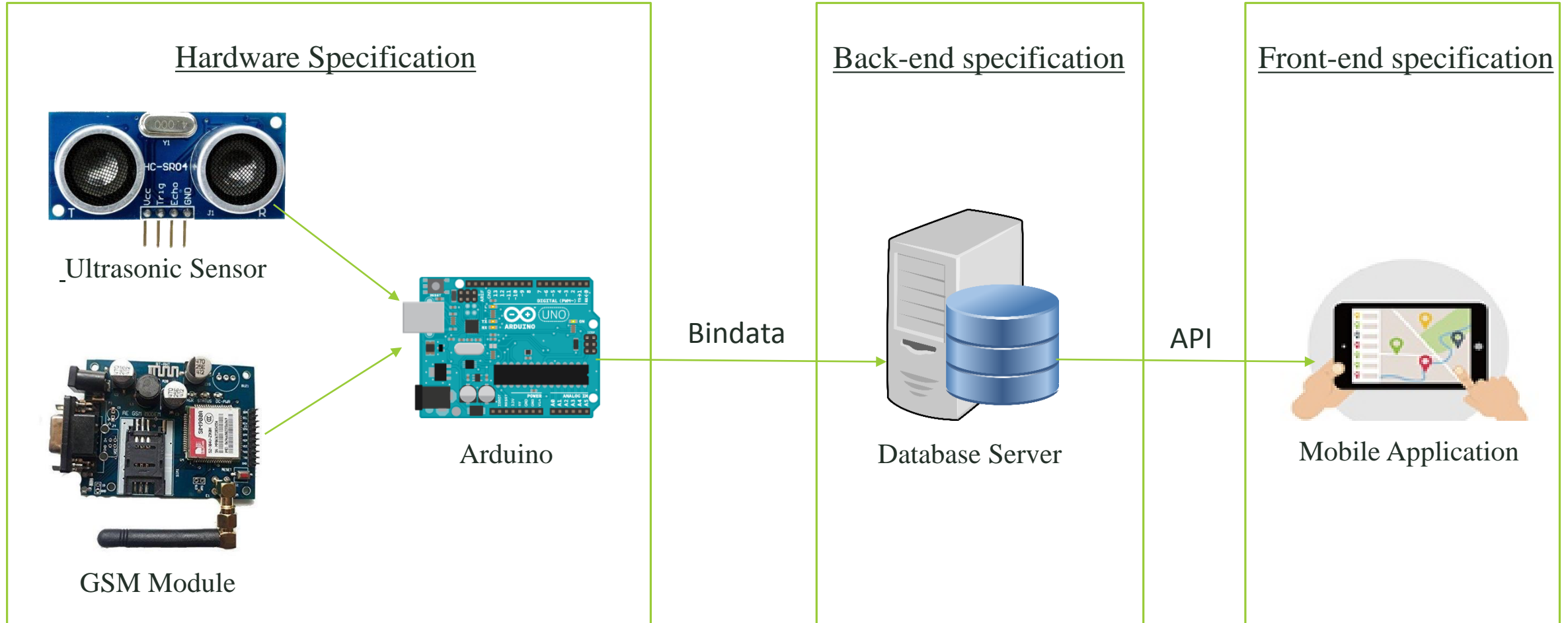
The traditional way of garbage collection, regardless they are full or not, leads to:

- Un-optimized route
- Higher transportation cost
- Loss of fossil fuel(petrol/diesel)
- Loss of time

KEY FEATURES

- Automate the solid waste monitoring and collection process using Internet of Things(IOT).
- Detect the waste level by using Ultrasonic Sensor interfaced with Arduino.
- Send the bin data to the application by using GSM module.
- Displays the relevant details of the bin in an application.
- Shows the location of the bin in a Map.
- Notify the admin to eliminate overfilling when the bin is almost full.
- Cut the service costs by up to 50%.

SYSTEM ARCHITECTURE



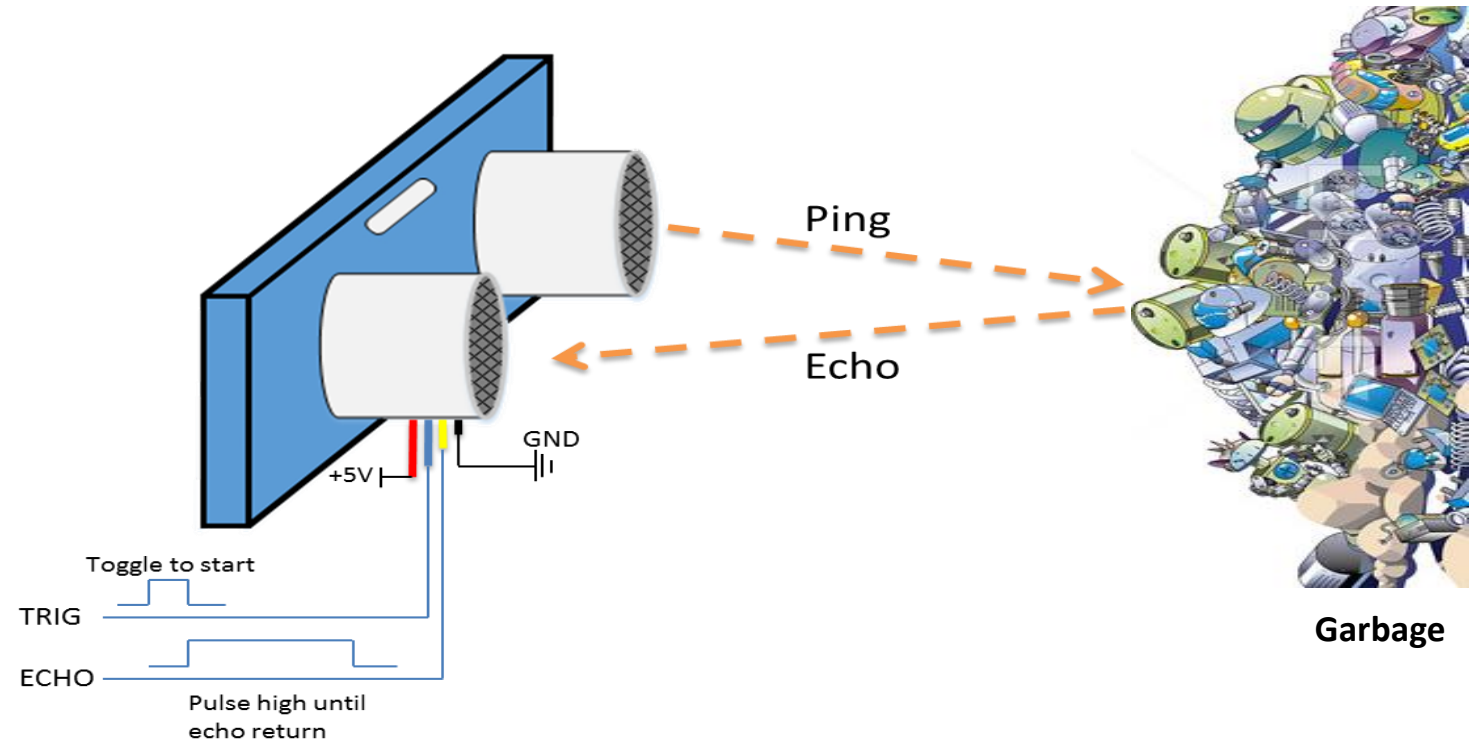
HARDWARE IMPLEMENTATION

➤ ULTRASONIC SENSOR

➤ GSM MODULE

➤ ARDUINO UNO

ULTRASONIC SENSOR



- Ultrasonic Sensor sends out a high-frequency sound pulse, and then times how long it takes for the echo of the sound to reflect back.
- The length of the returning pulse is proportional to the distance of the garbage from the sensor.
- The travel time and, the speed of sound is taken into account to calculate the distance.

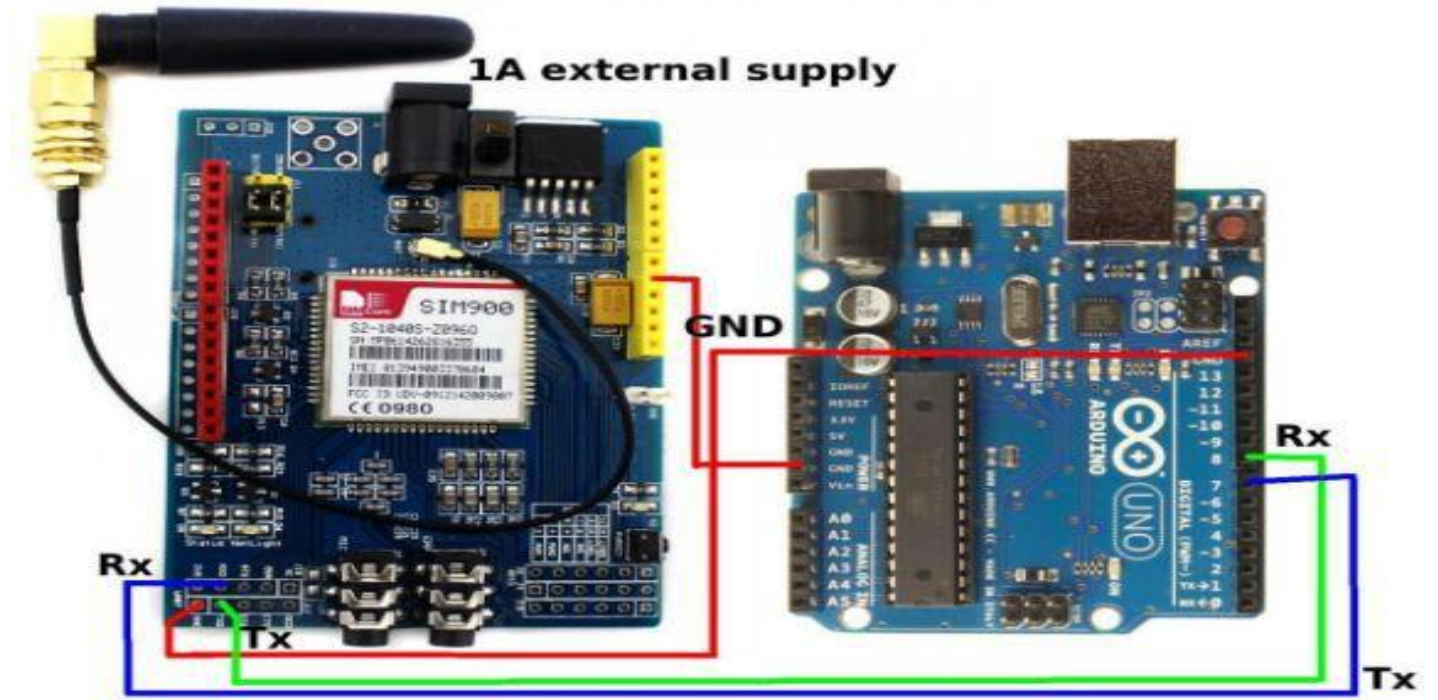
GSM MODULE

HARDWARE IMPLEMENTATION

➤ ULTRASONIC SENSOR

➤ GSM MODULE

➤ ARDUINO UNO



- GSM Sim 900 module is an ultra-compact, and reliable Quad-band modem.
- It provides an internet connection, and transfers the data to the server.
- The unique IMEI no. of the Sim is used to distinguish each bin from the other bins.

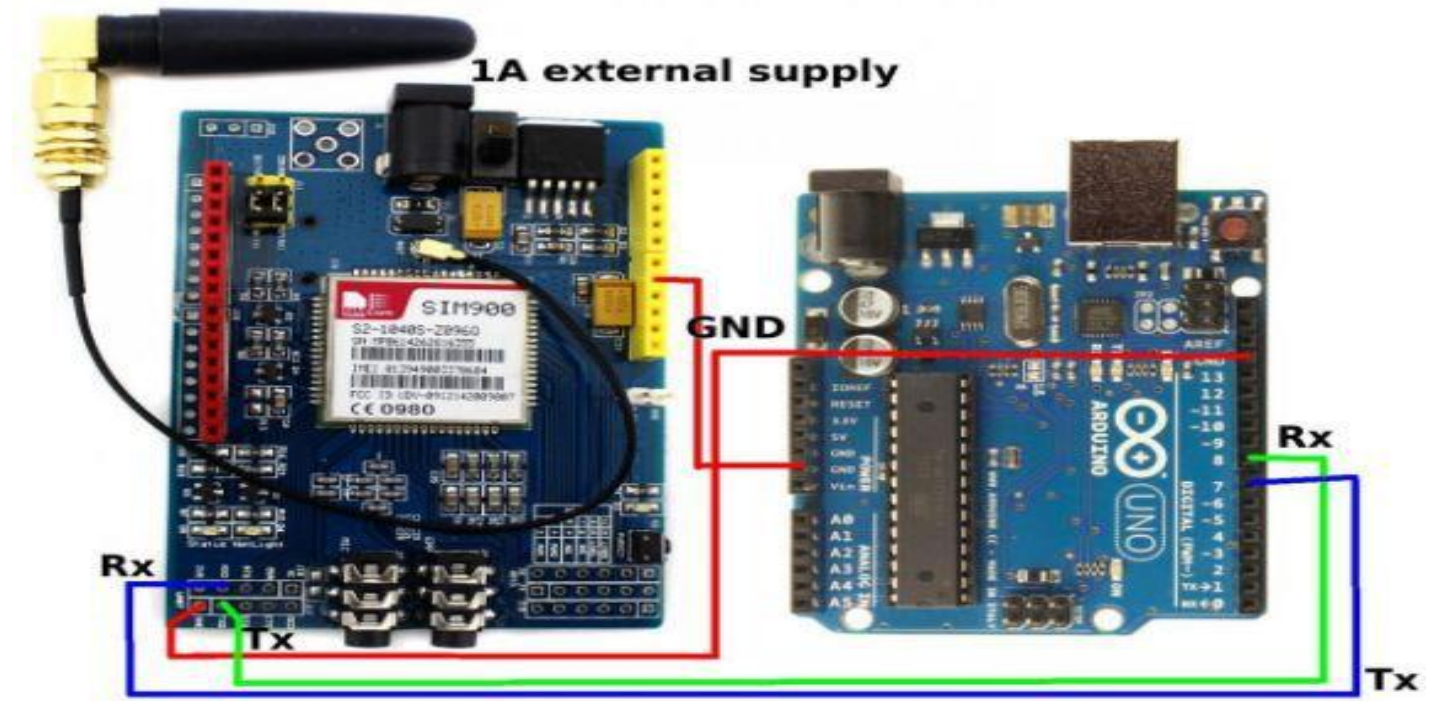
ARDUINO UNO

HARDWARE IMPLEMENTATION

➤ ULTRASONIC SENSOR

➤ GSM MODULE

➤ ARDUINO UNO



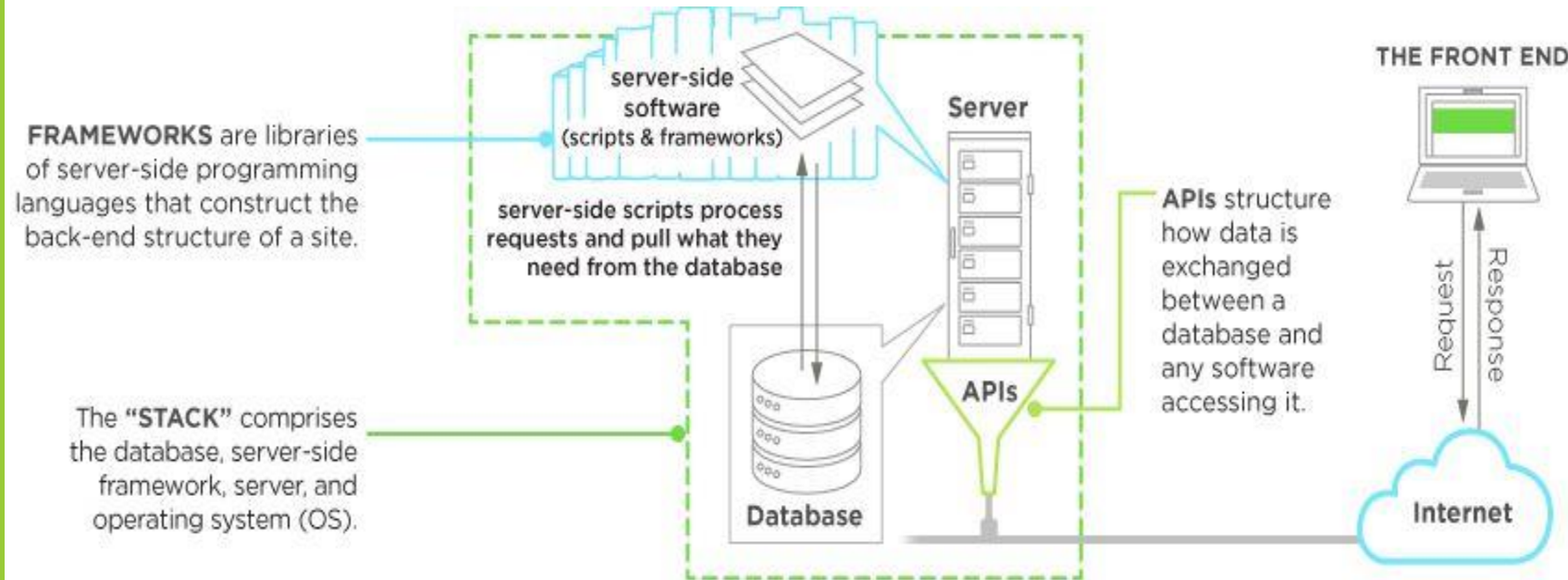
- Arduino Uno is the key component of this project. It is a micro-controller board that provides both Hardware and Software platform.
- Both, Ultrasonic Sensor and GSM module, is interfaced with the Arduino.
- The code is written in Arduino IDE software, where the data is analysed, calculated, and transferred successfully to the server.

BACK-END TECHNOLOGIES

➤ PHP

➤ DATABASE

PHP



- PHP (Hypertext Pre-processor) is a server-side back-end programming language.
- It facilitates the transfer of data from Arduino to the Database server.
- It is designed to interact with the database, and process information from the server to access the database.
- It is used to build Application Programming Interfaces (APIs), which controls what data and software a site shares with other apps.

BACK-END TECHNOLIGIES

➤ PHP

➤ DATABASE

DATABASE

bin_info table

#	Name	Type
1	bin_id 	int(20)
2	bin_code	varchar(20)
3	bin_name	varchar(20)
4	imei_no	varchar(20)
5	type	varchar(10)
6	latitude	decimal(12,9)
7	longitude	decimal(12,9)
8	location	varchar(500)
9	address	varchar(5000)

bin_level_data table

#	Name	Type
1	bin_code	varchar(20)
2	bin_view_count	int(11)
3	bin_level_count	int(11)

- The database is responsible for accepting the query, fetching the data, and returning it to the website and the application.
- It accepts new, and edited data when Arduino interacts with then using PHP.
- The relevant details of each Bin is stored in the bin_info table.
- The details are imported in MYSQL Database from the Excel Sheet using PHP.
- The level of the bin is stored in the bin_level_data table.

FRONT - END IMPLEMENTATION

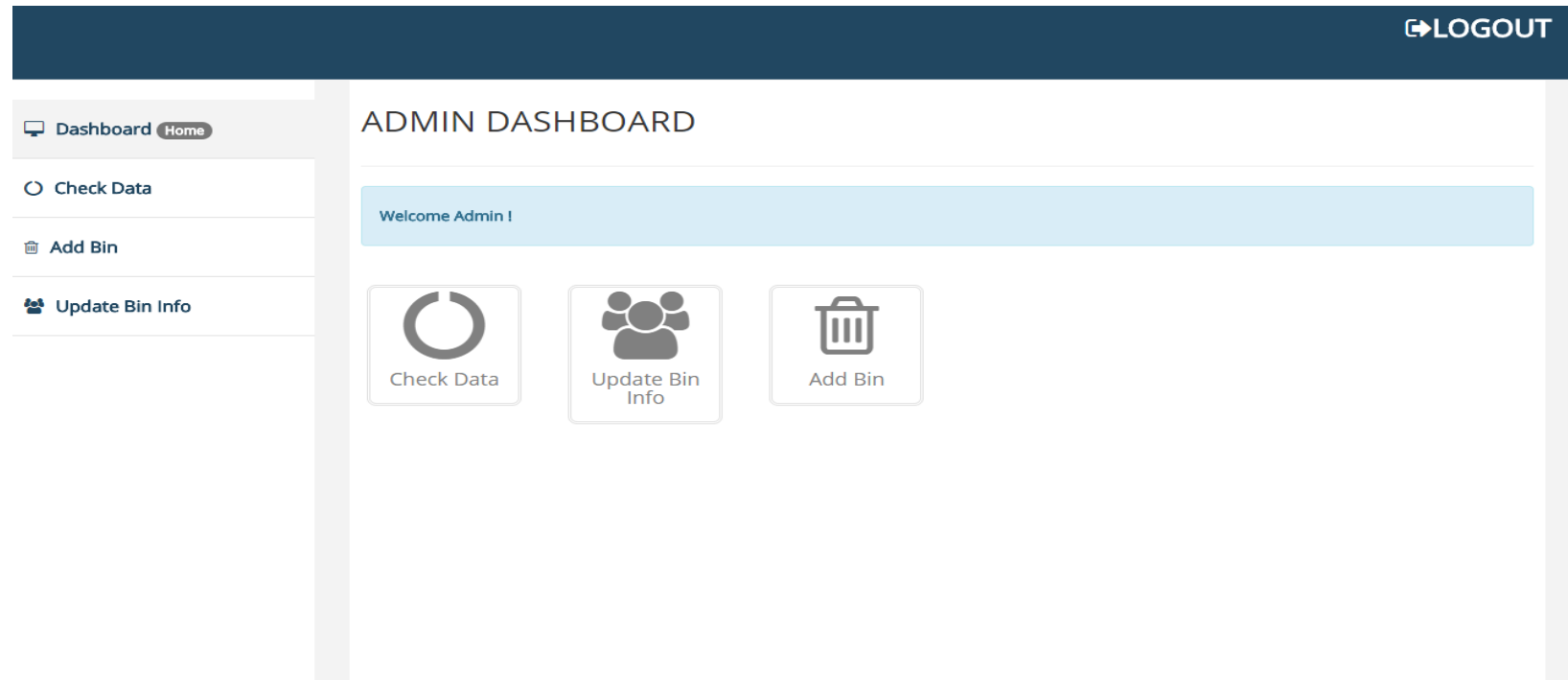
➤ WEB PAGES

- Login
- Check Data
- Add Bin
- Update Bin Info

➤ MOBILE APPLICATION

- Login
- Location
- Bin Details
- Map

WEB PAGES



Webpages are used by the admin for the following purpose:-

- To check the Bin Data of a particular bin.
- To update the location, address and other bin information.
- To add new bin's detail whenever a new bin is installed.

FRONT - END IMPLEMENTATION

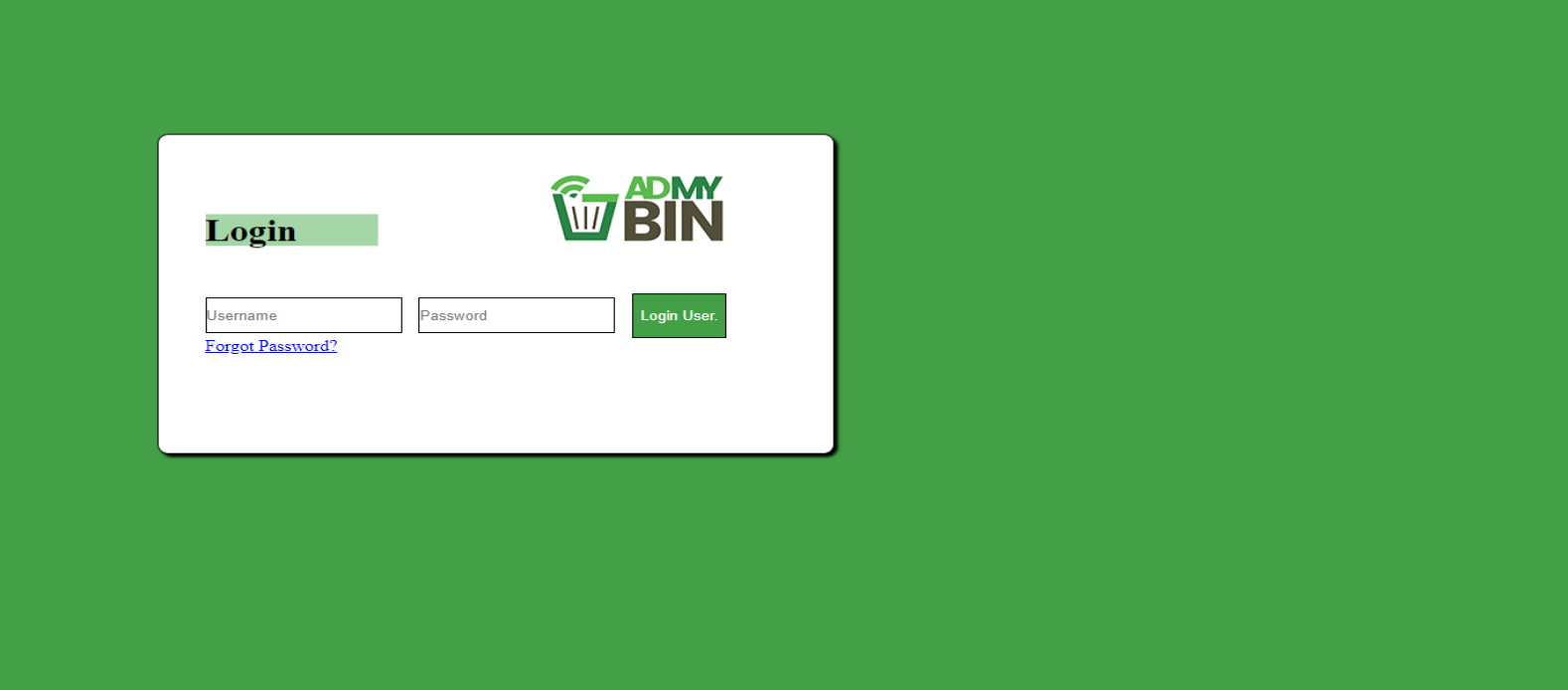
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Webpage - Login

A screenshot of a web login page for 'ADMY BIN'. The page has a green background. At the top right is the 'ADMY BIN' logo, which consists of a green bin icon with a Wi-Fi symbol and the text 'ADMY BIN' in green and black. Below the logo, the word 'Login' is written in bold black text next to a green rectangular button. Underneath, there are two input fields: 'Username' and 'Password'. To the right of the 'Password' field is a green button labeled 'Login User.'. Below the 'Username' field is a blue link that says 'Forgot Password?'.

Login



Username Password Login User.

[Forgot Password?](#)

Admin Login by using username and password

FRONT - END IMPLEMENTATION

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Webpage - Check Data

[Dashboard](#) [Home](#)

[Check Data](#)

[Add Bin](#)

[Update Bin Info](#)

Check Data

Select bin view method :

Area Wise Search

Bin Code Search

Imei no search

Select area to view bin :

NIT

Submit

Bin Id	Imei_no	Location	Address	Latitude	Longitude	Bin view count	Bin level
NIT-201	123456	NIT	near the entrance	22.676934290	88.379202780	10	9
NIT-202		NIT	inside campus in garden lobby	22.676687110	88.378914780	30	50
NIT-203		NIT	inside campus in garden lobby	22.676687110	88.378914780		
NIT-204		NIT	outside building exam cell in garden	22.676571720	88.379050900		
NIT-205	8976	NIT	outside mechanical department	22.676411790	88.379145120		
NIT-206	78354	NIT	outside exit gate	22.676310930	88.379418700		
NIT-207		NIT	outside university building front side	22.675983320	88.378766250		
NIT-208		NIT	outside university building near stairs	22.675874120	88.378689810		
NIT-209		NIT	inside building OPP room 101	22.675951460	88.378710600		
		NIT	outside canteen building	22.675630020	88.378600860		

Processing request...

Data can be checked using three parameters.

FRONT - END IMPLEMENTATION

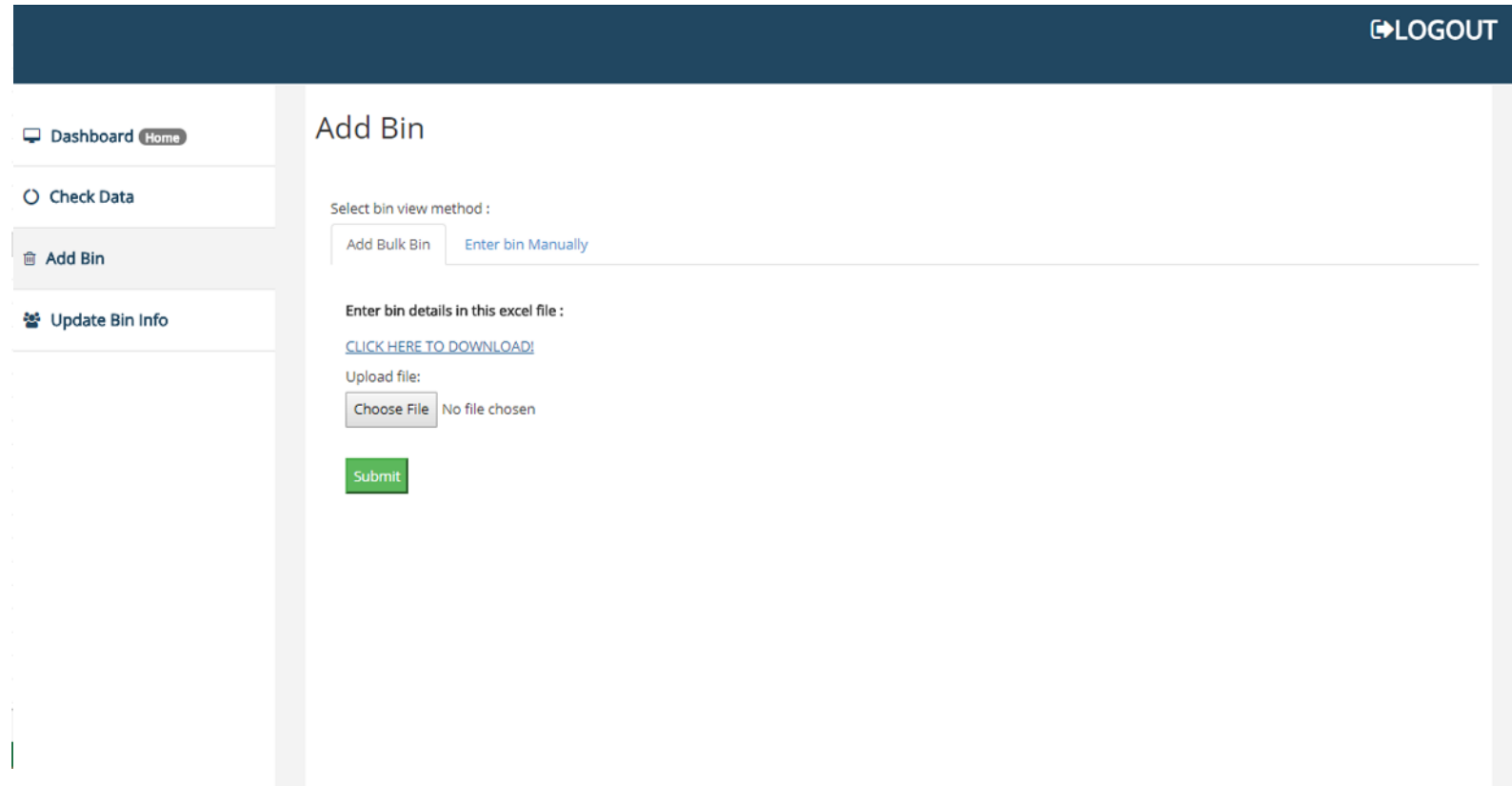
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Webpage – Add bin



The screenshot shows a web application interface for adding bins. At the top right, there is a dark blue header with a 'LOGOUT' button. On the left, a sidebar contains navigation links: 'Dashboard Home', 'Check Data', 'Add Bin' (which is highlighted), and 'Update Bin Info'. The main content area is titled 'Add Bin'. It features a section for 'Select bin view method' with two buttons: 'Add Bulk Bin' and 'Enter bin Manually'. Below this, there is a prompt to 'Enter bin details in this excel file' with a link 'CLICK HERE TO DOWNLOAD!'. An 'Upload file:' section includes a 'Choose File' button and the text 'No file chosen'. At the bottom of this section is a green 'Submit' button.

Adding multiple bins of same location using an excel file.

FRONT - END IMPLEMENTATION

➤ WEB PAGES

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Webpage - Update Bin Info

Dashboard Home

Check Data

Add Bin

Update Bin Info

Update Bin Info

Insert Bin Id:

Submit

LOGOUT

The basic bin information can be edited if a bin is shifted to another location by entering the unique bin id.

FRONT - END IMPLEMENTATION

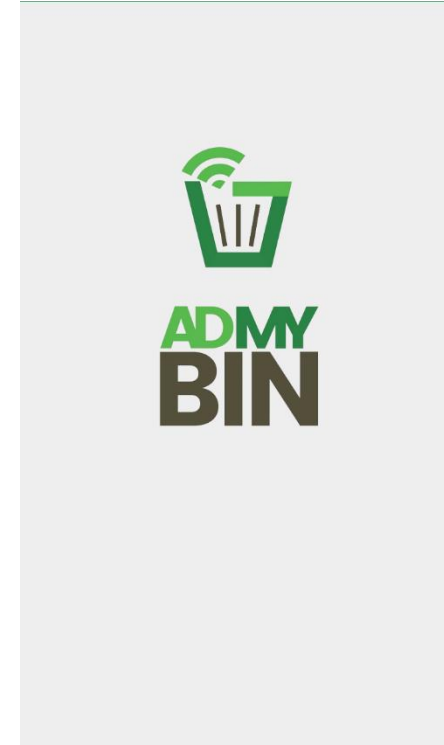
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MOBILE APPLICATION



- Mobile application displays the location of the bin.
- It also shows the level of waste and count of people using the bin.
- The location of the bin is also displayed in a map.

FRONT - END IMPLEMENTATION

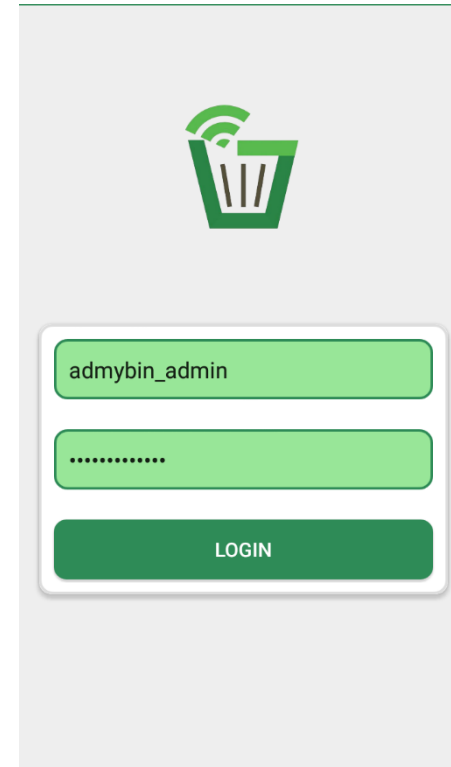
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MOBILE APPLICATION - Login

A mobile application login screen with a light gray background. At the top center is a green icon of a trash bin with a Wi-Fi signal. Below the icon is a white rounded rectangle containing three green input fields. The first field contains the text 'admybin_admin'. The second field contains a series of dots representing a password. Below the input fields is a green button with the text 'LOGIN' in white capital letters.

Login using username and password.

MOBILE APPLICATION - Location

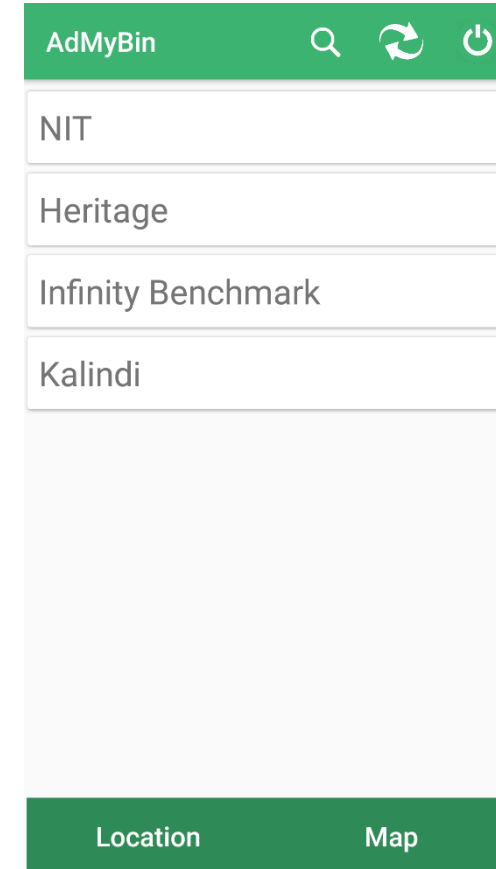
FRONT - END IMPLEMENTATION

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The list of location/area is present which on clicking gives the list of bin (along with details) present in that area.

FRONT - END IMPLEMENTATION

➤ WEB PAGES

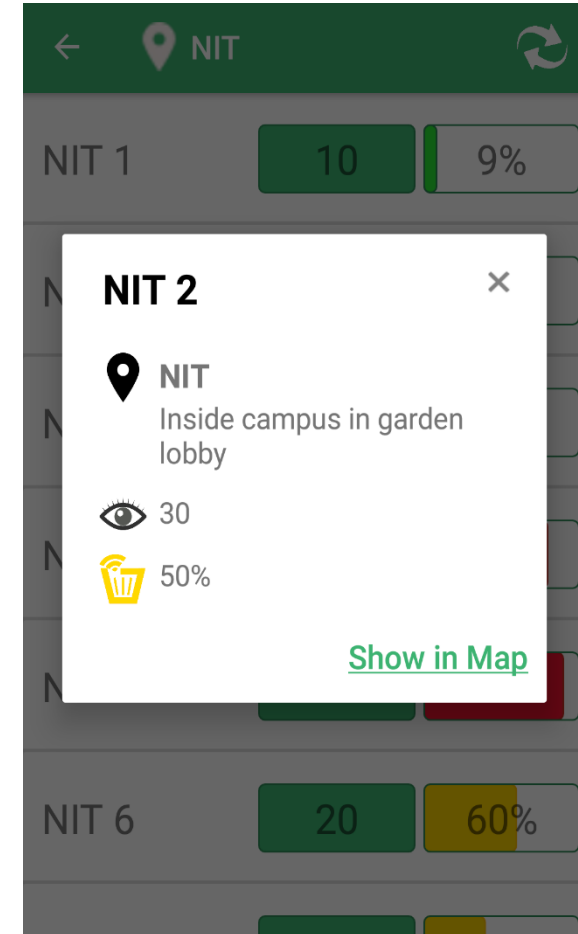
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MOBILE APPLICATION – Bin Details

← NIT ↻		
NIT 1	10	9%
NIT 2	30	50%
NIT 3	43	30%
NIT 4	20	80%
NIT 5	50	90%
NIT 6	20	60%
NIT 7	60	40%



The list of bins in an area is displayed along with the count of people who have used the bin and % waste level. A notification will be sent when the bin is more than 70% filled so that the drivers can go to collect the waste.

FRONT - END IMPLEMENTATION

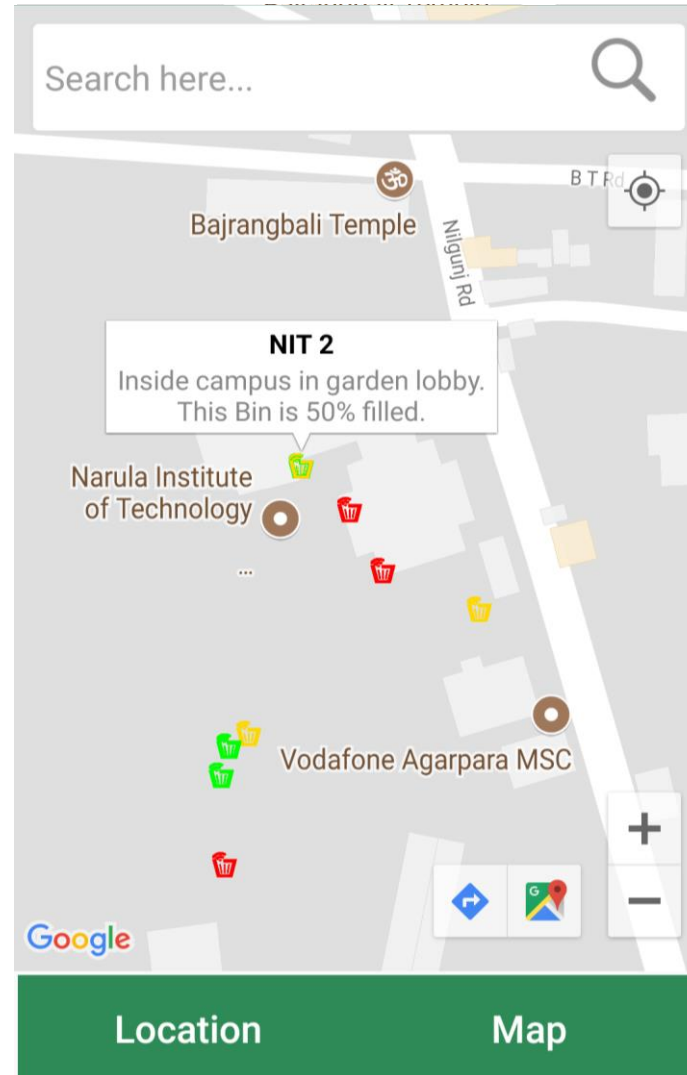
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MOBILE APPLICATION - Map



On clicking 'Show in Map' in the dialog box, the respective bin location is shown in the map.

REVENUE RECOGNITION



- The count of number of people is recorded to make the project economical to the admin.
- There will be an advertisement installed above each bin at a certain height.
- The number of people using the bin will be equal to the number of people viewing the advertisement.
- .
- The company whose advertisement is installed above bin will be given the bin id and location.
- The company can keep the track of no. of people viewing the advertisement.
- Hence, the admin will be paid by the company according to the count of people data.

LIMITATIONS

- Trial and testing of the project requires specific environment and labs equipped with proper facilities.
- The project can be implemented only in the metropolitan cities and some tier II cities.
- Skilled and trained people are required to operate the whole mechanism.
- Installing the hardware tools on the cap of the bin is not very secure. Tools can be robbed.

FUTURE SCOPE

- Separate type of waste collection put in difference bins by using other sensor.
- Install LCD screen in front of bins which displays the level of the bin to public.
- Generate a voice message whenever people throw the waste outside the bin.
- Generate an alarm system when someone tries to dismantle the hardware installed in the bin.



Keep Clean Go Green

THANK YOU