# *SRS: SYSTEM REQUIREMENT SPECIFICATIONS*

# SMART DUSTBIN SYSTEM


*GROUP 19 MEMBERS:*

- **PIYUSH AGARWAL (IIT2020012)**
- **MAYUKH BISWAS (IIT2020042)**
- **TARUN DABI (IIT2020045)**
- **ANKIT JHA (IIT2020049)**
- **RISHABH SINGAL (IIT2020078)**

# INDEX

# *I.* INTRODUCTION:

"Smart dustbin system" is basically an application which ensures optimal waste management in CC3 building of IIIT ALLAHABAD.

## 1. PURPOSE:

Dustbins (or Garbage bins, Trash Cans, whatever you call them) are small plastic (or metal) containers that are used to store trash (or waste) on a temporary basis. They are often used in homes, offices, streets, parks etc. to collect the waste and hence Public Waste Containers are the only way to dispose of small waste. Hence there is a need to dispose this waste in a proper and efficient manner to meet the following goals:

1. To increase recycling and reuse and to convert the remaining waste into electricity.
2. To ensure the protection of the environment through an effective waste management system.
3. To stabilize the quantity of waste disposed of to landfill and then reduce this volume.

## 2. SCOPE:

We describe what features are in the scope of the software and what are not in the scope of the software to be developed.

In Scope:

1. Application for waste management cell of IIITA.
2. Admins can retrieve information about the dustbins filled and whether the garbage is wet or dry.
3. Complaints by students, professors and other users about overfilled dustbins.

Out of Scope:

1. Garbage collection for the city since there is no communication among the waste management cell of IIITA and waste management of ALLAHABAD city via this application.
2. Not for commercial purposes

## 3. DEFINITIONS, ACRONYMS, AND ABBREVIATIONS:

Acronyms and Abbreviations:

- SRS: Software Requirement Specification

Definitions:

- Waste Management Cell: A department in IIITA which takes care of garbage related issues.
- "Smart Dustbin System": An Application for IIITA's Waste management cell for effective administration and management of the garbage collection in CC3 building.

## 4. REFERENCE


1. IEEE Overview format
2. IEEE SRS format
3. www.slideshare.com
4. www.geeksforgeeks.org


## 5. OVERVIEW

The rest of this SRS is organized as follows: Section B gives an overall description of the software. It gives what level of proficiency is expected of the user, some general constraints while making the software and some assumptions and dependencies that are assumed. Section C gives specific requirements which the software is expected to deliver. Functional requirements and Non-Functional requirements are given by various use cases. Some performance requirements and design constraints are also given.

# *II.* OVERALL DESCRIPTION:

1. **USER CHARACTERISTICS:**
   The user should be familiar with the operation of Android Device and Applications.

2. **PRINCIPAL ACTORS:**
   The two principal actors in "Smart Dustbin System" are “Admin” and “garbage collectors”.

3. **GENERAL CONSTRAINTS:**

- Working of "Smart Dustbin System" requires Internet connection.
- "Smart Dustbin System" is a single-user application .Only waste management cell admins can use this application.

4. **ASSUMPTIONS AND DEPENDENCIES:**

- In the smart dustbin, we use a lot of hardware, including ultrasonic sensors and moisture determiners. So, we assume that they are supplied with uninterrupted and regulated power and they work perfectly fine.
- Secondly, we assume that the primary users take enough precaution to not mix up wet and dry garbage, which might give confusing readings for later users.
- Also, this project’s feasibility is dependent on the efficiency of secondary users, ie, how regularly they can clean the bins.
- Our project interface depends on the availability of a device which can run Java Application, otherwise the garbage cleaning team will not be able to track the bins.

5. **PRODUCT PERSPECTIVE:**

Waste has always been generated by humans. In areas with low population density waste generation may have been negligible. In higher population areas even largely biodegradable waste had to be dealt with. The general populace is increasing and, correspondingly, the amount of waste is expanding as well. If we view the statistics, we will see that there is a gigantic zone of waste disposal everywhere throughout the world. Waste disposal destinations are a big issue for the planet. It results in extra contamination, openings in ozone layers, and spread of new ailments.
Hence everyone wants to stay in a good environment and live a healthy life.

So waste management will have an impact on all the living beings on earth. Waste management not only helps in saving the environment but also in making the economy of the country strong by implementing the 3R's (Reuse , reduce , recycle) in a more efficient manner.

## I. INTENDED USE:

(i) This model can be best used by municipal corporations/colleges and other big institutions for their improvement in managing garbage collection in the city.

(ii) With help improving the product and in its technology e.g GPS and its Software Apps can make the truck choose the best route for collection.

(iii) It Emphasizes "DIGITAL INDIA" and "SMART CITY" projects.

## II. ADVANTAGES OF SMART DUSTBIN:

(i) The sensors in the container will provide real time information on the fill level. This information will help in prioritizing the when and where of collection.

(ii) Reduces the infrastructure (containers), fuel and maintenance costs of the service up to 30% - 40 %.

(iii) It can sense all types of waste material either wet or dry, according to specific trucks that can be deployed for their management.

(iv) Past data will efficiently help in deploying waste containers and avoid overuse of containers and let it clutter up the roads and spaces for public use.

(v) Less time and efficient usage of trucks/carriers will reduce pollution and usage of limited resources resulting in less pollution.

(vi) It will help keep the surrounding clean and green, free from bad odour of wastes, emphasize on a healthy environment and keep cities more beautiful.

(vii) Reduces Manpower required to handle garbage management.

(viii) As the system is simple. If there is any problem in the equipment it can be changed with a new one without any difficulty.

(ix) It will also keep a check on workers and their work quality as containers and notify higher authorities if the container is not emptied on a regular basis.

### III. USER NEEDS:

The primary users of our smart dustbin will be the people visiting the CC3 block almost daily, including professors, students, administrative staff, etc. They can know whether a bin can hold any more trash or not and also know if it is meant for organic waste or paper/inorganic waste.

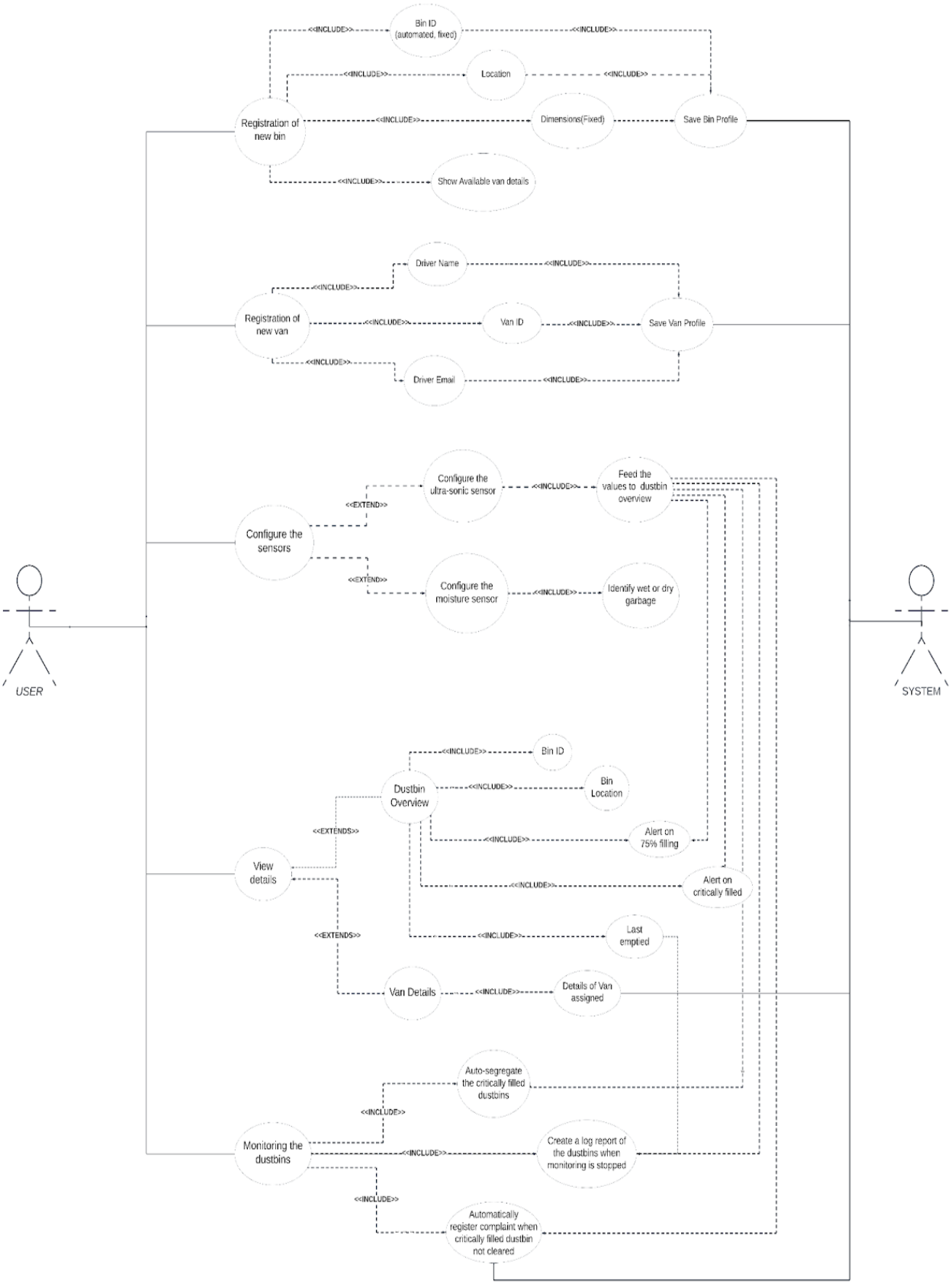
The secondary users of our smart dustbin will be the cleaning and sanitation staff of our college, those who are responsible for keeping the college clean and disposing of the garbage. They will be notified when a bin is almost full and also the type of waste it contains, so as to facilitate the proper disposal of wastes

## 6. PRODUCT FUNCTIONS:

| ***USE CASE*** | ***DESCRIPTION OF USE CASE*** |
|---|---|
| Registration of new Bin | It allows admin to add new dustbins in the network. |
| Registration of new Van | It allows admin to add new Vans in the network. |
| Configuration of sensors | It allows the admin to monitor the amount and dryness of the garbage. |
| View details | It allows the admin to see the details of the vans and dustbin. |
| Monitoring of dustbins | It deals with the complete complaint management of the system. |

## Appendix A: UML diagram:

# USE CASE DIAGRAM



# *III.* SPECIFIC REQUIREMENTS

## 1. FUNCTIONAL REQUIREMENTS:

Functional Requirement defines the function of the software system and how the system should behave when introduced inputs or specific conditions. This may include calculations, data manipulation and processing and other functions. The functional requirements of our project include:

We describe the functional requirements by giving various use cases -:

## Use Case 1:

**Name:** Registration of a new bin.

**Summary:** Allow admin to register a new dustbin.

**Actors:** Waste management department/admin

**Pre-conditions:**

- Internet connectivity.
- Required a smart dustbin with no defects in it and compatible with application requirements i.e. type of sensors and all app is supporting.

**Main success scenario:**

- Admin click on register a bin tab.
- Now admin can add bin id, bin location, and bin dimensions and save the bin profile.
- Now, can check the availability of the van and assigned the van to the bin.
- Bin status becomes active.

**Extensions:**

Shows notification when a dustbin is registered successfully. If a dustbin is already registered then shows an error dialogue box that “filled dustbin id is already registered”.

**Post-conditions:**

Now admin can view the details of new bin.

## Use Case 2:

**Name:** Registration of a new Van

**Summary:** Admin can change a van corresponding to a particular dustbin or register a new van and assign bins to it.

**Actors:** Waste management department/admin

**Pre-conditions:**

- Internet connectivity.
- There must be a vacancy for a new van.

**Main success scenario:**

• Admin clicks on registration of a van

• Admin can add the driver name, Van ID, driver email.

• Now the van is registered successfully.

**Extension:**
Shows notification if a van is registered successfully.
If a van is already registered then it shows an error dialogue box that “filled van id is already registered”.

**Post-condition:** Van is now registered.

## Use Case 3:

**Name:** View details of dustbin

**Summary:** Allows admin to view the current status of a particular dustbin that a bin is filled or not or gives alert when a bin 75% filled least and also provides van details of the van assigned to bins.

**Actors:** Waste management department/admin

**Pre-conditions:**

• Internet Connectivity.

• Sensors should be active/running properly

**Main success scenario:**

• Admin clicks on the View details button.

• Admin can view all data shown there.

**Extension:**

Error in downloading. Shows an error dialog box that occurs due to poor internet connectivity.

**Post-condition:** NIL

## Use Case 4:

**Name:** Configure the sensors

**Summary:** It allows the admin to monitor the amount and dryness of the garbage .

**Actors:** Waste management department/admin

**Pre-conditions:**

• Internet connectivity.

• Correctly working ultrasonic sensor.

* Correctly working moisture sensor.

**Main success scenario:**

- Admin will be able to detect the amount of waste in the dustbin.
- Admin will be able to detect the dryness of the waste in the dustbin.

**Extension:**

- App will give the warning at two levels-75% and at critical level.
- App will give us the amount of wet garbage in the dustbin.

**Post-condition:**

- Every dustbin will become empty before its overflow.

## Use Case 5:

**Name:** Monitoring the dustbin.

**Summary:** It deals with the complete complaint management of the system .

**Actors:** Waste management department/admin

**Pre-conditions:**

• Internet connectivity.

• Correctly working ultrasonic sensor.

* Correctly working moisture sensor.

**Main success scenario:**

- Admin will be able to detect how many dustbins are close to getting filled.
- Admin will be able to detect in which areas dustbins are close to get filled .

**Extension:**

- Complaints will be automatically sent to the admin if a dustbin is not cleared in a certain time after getting filled.
- A log report will be generated if monitoring of the dustbins gets stopped..

**Post-condition:**

- Complain will be registered in case of delay in collection.
- Admin will be able to fetch the performance report of the van drivers by the number of complaints against him/her.

## 2. NON-FUNCTIONAL REQUIREMENTS:

Non-functional requirements are requirements that are not directly related to the specific function that the system provides. They specify a condition that can be used to judge system performance rather than specific behavior. They may be related to emergent system properties such as reliability, response time and store durability.

The non-functional requirements of our project include:

- Response Time - The time it takes for the system to load and the response time for any action a user takes.
- Processing time - How acceptable is it to perform important tasks or to export / import data?
- Throughput - The number of tasks the system needs to be hosted should be remembered.
- Storage - The amount of data that will be stored for the system to run.
- Building Levels - Levels required for the system to operate and continue.

## 3. HARDWARE:

- ULTRASONIC SENSOR: A special sonic transducer is used for the ultrasonic proximity sensors, which allows for alternate transmission and reception of sound waves. The sonic waves emitted by the transducer are reflected by an object and received back in the transducer. After having emitted the sound waves, the ultrasonic sensor will switch to receive mode. The time elapsed between emitting and receiving is proportional to the distance of the object from the sensor.

- MOISTURE SENSORS: Moisture sensor checks whether the garbage is dry or wet and returns the percentage on screen of the dustbin and to our software.

## 4. COMMUNICATION

- If the dustbin is full, an email will be sent to the concerned Van driver along with dustbin status and its location to empty the dustbin within a given time.
- Depending on that, the status of the dustbin can change from full to empty or if not emptied within a given time then a van driver can be penalized.
- A log report will be generated along with the timestamp concerning the status of the dustbin along with the Van ID that emptied the dustbin.

## 5. HARDWARE REQUIREMENTS*:*

Should run on android device. Requires minimum 2GB ram for smooth functionality of the app.

## 6. SOFTWARE REQUIREMENTS*:*

Minimum SDK version: Android 4.0.3 (Ice Cream Sandwich).

## 7. DESIGN CONSTRAINTS*:*

- Security: The files in which the information regarding securities and portfolios should be secured against malicious deformations.
- Fault Tolerance: Data should not become corrupted in case of system crash or power failure.