

**Project Design Phase-II**  
**Solution Requirements (Functional & Non-functional)**

Date	12 October 2022
Team ID	PNT2022TMID31883
Project Name	Project – Smart Waste Management System For Metropolitan Cities Using IOT
Maximum Marks	4 Marks

**Functional Requirements:**

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Microcontroller	The ESP8266 module enables microcontrollers to connect to 2.4 GHz Wi-Fi, using IEEE 802.11 bgn. It can be used with ESP-AT firmware to provide Wi-Fi connectivity to external host MCUs, or it can be used as a self-sufficient MCU by running an RTOS-based SDK..
FR-2	Power supply	The power management unit comprises of a solar panel, a battery of 2500mAh capacity, and a circuit for energy harvesting and battery charging.
FR-3	Sensors	Ultrasonic / level sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target.
FR-4	Storage	Cloud storage is a cloud computing model that stores data on the Internet through a cloud computing provider who manages and operates data storage as a service. It's delivered on demand with just-in-time capacity and costs, and eliminates buying and managing your own data storage infrastructure.
FR-5	Application	With the help of cloud storage we can retrieve the information to application for collecting the database of Bin and its location.
FR-6	User login	The user can login in the application by email id and password. Then view the data and location of the bin.

**Non-functional Requirements:**

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

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Usability IOT device verifies that usability is a special and important perspective to analyze user requirements, which can further improve the design quality. In the design process with user experience as the core, the analysis of user product usability can indeed help designers better understand user

		potential needs in waste management, behaviour and experience.
NFR-2	<b>Security</b>	Cloud security is a collection of security measures designed to protect cloud-based infrastructure, applications, and data. These measures ensure user and device authentication, data and resource access control, and data privacy protection.
NFR-3	<b>Reliability</b>	Smart waste management is also about creating better working conditions for waste collectors and drivers. Instead of driving the same collection routes and servicing empty bins, waste collectors will spend their time more efficiently, taking care of bins that need servicing.
NFR-4	<b>Performance</b>	The Smart Sensors use ultrasonic technology to measure the fill levels (along with other data) in bins several times a day. Using a variety of IOT networks (NB-IOT,GPRS), the sensors send the data to Smart Waste Management Software System, a powerful cloud-based platform, for data driven daily operations, available also as a waste management app. Customers are hence provided data-driven decision making, and optimization of waste collection routes, frequencies, and vehicle loads resulting in route reduction by at least 30%.
NFR-5	<b>Availability</b>	Availability By developing eco-friendly and deploying resilient hardware and beautiful software we empower cities, businesses, and countries to manage waste smarter.
NFR-6	<b>Scalability</b>	Scalability Using smart waste bins reduce the number of bins located in street and cities because we able to monitor the garbage 24x7 more cost effect and scalability when we moves to smarter.