

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

Date	12 May 2023
Team ID	NM2023TMID01588
Project Name	Smart City waste management system connected with trash can

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Trash Can Monitoring	Monitor trash can fill level Monitor trash can temperature
FR-2	Trash Can Connectivity	Connect trash cans to the internet Establish communication protocol between trash cans and central system
FR-3	Route Optimization	Optimize trash collection routes based on real-time data Generate optimized collection schedules
FR-4	Alerting System	Send notifications to waste management personnel when trash cans are full or need maintenance Send notifications to residents when trash collection is scheduled or delayed
FR -5	Analytics and Reporting	Analyze and report on waste generation and collection trends. Provide waste reduction recommendations
FR -6	Mobile Application	Provide a mobile app for residents to report issues with trash cans or request extra collection services Enable residents to view trash collection schedules and notifications
FR -7	Smart Bin Design	Develop smart trash cans with sensors and connectivity capabilities Ensure that smart bins are durable and resistant to environmental factors such as extreme temperatures, precipitation, and vandalism
FR-8	Predictive Maintenance	Use data analytics and machine learning to predict when trash cans will need maintenance or repairs Schedule preventative maintenance based on predictive analytics
FR -9	Public Education and Awareness	Develop public education and awareness campaigns to encourage residents and businesses to reduce waste and participate in recycling programs Provide information on waste reduction, composting, and proper disposal practices to residents and businesses.

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The system should be user-friendly and easy to use for waste management personnel, residents, and other stakeholders. It should have clear instructions and intuitive interfaces, and provide appropriate feedback and error messages. It should be accessible to users with different levels of technical proficiency and physical abilities.
NFR-2	Security	The system should be secure and protect user data and transactions from unauthorized access or modification. It should comply with industry standards and best practices for data protection, encryption, and authentication. It should also protect against cyberattacks and physical tampering or theft of trash cans or equipment.
NFR-3	Reliability	The system should be reliable and available for use at all times, with minimal downtime or errors. It should be able to recover quickly from any failures or disruptions, and provide accurate and consistent results. It should also be able to withstand extreme weather conditions and other environmental factors.
NFR-4	Performance	The system should perform efficiently and respond quickly to user requests, with low latency and high throughput. It should be able to handle large volumes of data from multiple trash cans and sensors, and process and store data in real-time. It should also be able to optimize resource utilization and minimize energy consumption.
NFR-5	Availability	The system should be available for use by users at all times, with minimal downtime or maintenance periods. It should provide high availability and fault tolerance, and be able to handle traffic spikes or sudden increases in demand. It should also have backup and recovery procedures in place to prevent data loss or system failure.
NFR-6	Scalability	The system should be able to scale up or down based on changing user needs and business requirements. It should be able to handle growing numbers of trash cans and sensors, and adapt to new technologies and platforms. It should also be able to integrate with other Smart City systems and services, such as traffic management or energy management.
NFR-7	Maintainability	The system should be maintainable and easy to update or modify as needed. It should have clear documentation and well-structured code, and use standard programming languages and frameworks. It should also be designed with modularity and flexibility in mind, so that new features or modules can be added or removed without affecting the overall system functionality.