

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

Date	013 May 2023
Team ID	NM2023TMID04258
Project Name	IOT Based Weather Adaptive Street Lighting System

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User authentication:	Biometric authentication Smart card authentication Gmail and
FR-2	Registration and tracking:	The system can use GPS tracking Barcoding. This data can be integrated into a central management system to track the status and maintenance needs of each street light.
FR-3	Real-time Weather Monitoring	The system should have sensors to measure weather parameters such as temperature, humidity, and precipitation in real-time This information should be fed into the system to determine the required lighting levels. Methods to implement this requirement include installing weather sensors and using wireless communication to transmit data to the system's control center.
FR-4	Energy Efficiency:	The system should be designed to conserve energy while still maintaining safe lighting levels. This can be achieved by using LED lights that are energy-efficient and have a long lifespan. Additionally, the system should have an automatic shut-off feature that turns off the lights during daylight hours to save energy.
FR-5	Maintenance and Diagnostics	The system should be designed to provide maintenance alerts and diagnostics to ensure optimal performance. For example, the system can detect when a light bulb needs to be replaced and send an alert to maintenance staff. Additionally, the system should have self-diagnostic features that detect faults and notify operators. Methods to implement this requirement include using sensors to monitor system performance and setting up an alert system to notify maintenance staff.
FR-6	Data Analytics	The street lights should collect and analyze data to optimize their operation and reduce energy consumption. This can be achieved by implementing data analytics algorithms that analyze data from the sensors and make recommendations based on the data. To implement data analytics, a system should be installed that collects data from the sensors in the street lights and analyzes it using data analytics algorithms. The algorithms should be designed to identify patterns in the data and make recommendations based on the patterns.

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	User-friendly interface that allows for easy and intuitive customization of lighting settings based on weather conditions. This could include features such as adjusting brightness levels, colour ,temperature, and light direction to enhance visibility in foggy or snowy conditions. Additionally, the street light could be equipped with sensors to detect weather conditions and automatically adjust lighting settings accordingly, without requiring user input
NFR-2	Security	Security is an important non-functional requirement for the weather adaptive street light project. The street light should be designed with security features to prevent unauthorized access, tampering, or hacking. This is particularly important for smart street lights that are connected to the internet or other networked devices.
NFR-3	Reliability	The street light could be equipped with redundant components, such as backup power sources or duplicate sensors, to ensure that it continues to operate even in the event of component failures. Additionally, regular maintenance and testing should be performed to identify and address potential issues before they result in downtime or reduced performance. The street light should also be designed to withstand harsh weather conditions, such as high winds, heavy rain, or extreme temperatures, without affecting its performance or reliability.
NFR-4	Performance	The street light could be equipped with high-quality sensors and processors that can quickly detect changes in weather conditions and adjust lighting settings accordingly. Additionally, the street light should be designed to optimize energy efficiency, using energy-saving technologies such as LED lighting and intelligent power management systems. The street light should also be capable of operating at peak performance under varying environmental conditions, such as extreme temperatures or humidity levels. This could involve using heat dissipation technologies to prevent overheating
NFR-5	Availability	The street light should also be designed to have a long service life, with components and materials that can withstand the wear and tear of continuous use over an extended period of time. This could involve using high-quality materials and manufacturing processes to ensure that the street light is built to last.
NFR-6	Scalability	The street light could be designed with modular components that can be easily added or removed as needed, allowing for the system to be expanded or reduced as necessary. Additionally, the street light should be designed to integrate with other smart city systems, such as traffic management or emergency response systems, to provide a more comprehensive and connected solution.