

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

Date	13 May 2023
Team ID	NM2023TMIDO2708
Project Name	Project - 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	Weather Monitoring	The system should be able to gather real-time weather data such as temperature, humidity, precipitation, and ambient light levels.
FR-2	Light Intensity Control	The system should be able to adjust the intensity of the streetlights based on the detected ambient light levels. It should automatically increase the brightness during low light conditions and decrease it during high light conditions.
FR-3	Motion Detection	The system should include motion sensors to detect the presence of pedestrians, vehicles, or other objects on the street. It can then adjust the lighting levels accordingly, providing brighter illumination when motion is detected and reducing it when there is no activity
FR-4	Rain Detection	The system should be able to detect rainfall or the presence of moisture on the road surface. It can use rain sensors or other weather data to identify when it is raining and adjust the lighting levels to enhance visibility during rainy conditions.
FR-5	Fog Detection	The system should be equipped with sensors or cameras capable of detecting fog or low visibility conditions. Based on the fog density, it should adjust the lighting levels to provide better visibility and ensure safety for drivers and pedestrians.
FR-6	Energy Efficiency	The system should be designed to optimize energy usage by using LED lights or other energy-efficient lighting technologies. It should have the ability to automatically dim or turn off lights when there is no activity or during periods of low traffic.
FR-7	Data Logging and Analytics:	The system should have the capability to log and store data related to weather conditions, lighting levels, and energy consumption. This data can be used for analytics and performance optimization purposes, such as identifying patterns, detecting anomalies, and making informed decisions regarding maintenance and energy management.
FR-8	Integration with Central Management System	The IoT-based street lighting system should be capable of integrating with a central management system or

		smart city platform. This allows for centralized control, coordination, and monitoring of streetlights across different locations, enabling efficient management of the entire lighting infrastructure.
FR-9	Remote Monitoring and Control	The system should provide remote monitoring and control capabilities, allowing administrators to view the status of individual streetlights, adjust lighting settings, and receive alerts or notifications in case of any faults or malfunctions.

### Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	<b>Usability</b>	The system should be user-friendly and intuitive, ensuring that administrators and operators can easily navigate the interface, monitor the system, and make necessary adjustments. It should have clear and concise instructions, well-organized menus, and a logical flow of tasks.
NFR-2	<b>Security</b>	The system should implement robust security measures to protect against unauthorized access, data breaches, and tampering. It should use encryption protocols to ensure secure communication between devices and the central management system.
NFR-3	<b>Reliability</b>	The system should be highly reliable, ensuring that the streetlights operate consistently and respond accurately to weather conditions. It should have a low failure rate and be able to recover from any failures quickly.
NFR-4	<b>Performance</b>	The system should be designed to operate with high performance and minimal latency. It should be capable of processing and analyzing real-time weather data and making lighting adjustments quickly and efficiently.
NFR-5	<b>Availability</b>	The system should be available and accessible for use at all times. It should have redundant components, failover mechanisms, and backup power sources to minimize disruptions in case of power outages or network failures.
NFR-6	<b>Scalability</b>	The system should be designed to handle a large number of streetlights and accommodate future expansion as the city or infrastructure grows. It should be able to efficiently manage and process data from numerous sensors and devices.