MSME IDEA HACKATHON 5.0

<div align="center">Reference No. :- INC25EWB107129</div>

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4. HI/BI State	WEST BENGAL
5. HI/BI Name	Techno International New Town
6. Theme	Low-carbon footprint solutions/technologies
7. Idea Sector	Power, Renewables, Electricals, Power Electronics, Energy Efficiency and any related sub-sector
8. Title of proposed idea/innovation	IoT-Enabled Adaptive Smart Street Lighting System with Fault Detection and Dual Communication Architecture
9. Briefly explain newness/uniqueness of the innovation	The proposed system introduces a dual-communication architecture combining Wi-Fi and LoRaWAN, enabling flexible deployment in both urban and remote highway environments—a capability not seen in conventional models. It dynamically adjusts LED brightness based on real-time ambient light and motion detection using LDR, IR, and PIR sensors, significantly improving energy efficiency. A key innovation lies in the real-time fault detection mechanism that proactively identifies and reports power, sensor, and module anomalies via IoT protocols, minimizing maintenance delays. The use of the cost-effective ESP32 DevKit V1 ensures affordability while supporting advanced control logic, making the system modular, scalable, and suitable for smart city integration.
10. Concept & Objective	The proposed innovation aims to develop an IoT-enabled smart street lighting system that dynamically adjusts LED intensity based on real-time ambient light and motion detection, significantly reducing energy consumption. The concept integrates a dual-mode communication framework using Wi-Fi for urban environments and LoRaWAN for highways or remote areas, ensuring wide deployment flexibility. The system also features an automated fault detection mechanism to identify and report common failures (power line, LED, network, and sensor faults) in real time, thereby improving maintenance efficiency. The primary objectives are: 1)To reduce street lighting energy consumption by up to 80. 2)To provide context-aware adaptive lighting based on traffic and ambient conditions. 3)To implement real-time fault detection and notification to reduce system downtime. 4)To create a scalable, cost-effective, and sustainable solution for smart city infrastructure.
11. Specify the potential areas of application in industry/market in brief	Potential Areas of Application: 1)Smart Cities and Urban Infrastructure – for adaptive lighting, real-time monitoring, and energy-efficient street lighting networks. 2)Highway and Rural Road Management – utilizing LoRaWAN for long-range, low-power deployment in remote or low-traffic areas. 3)Municipal Corporations and Public Works Departments (PWD) – to reduce energy bills, improve maintenance, and support sustainable urban planning. 4)Industrial Campuses and SEZs – to automate lighting based on operational hours and activity. 5)Real Estate and Gated Communities – for smart, sensor-based lighting with automated fault alerts.

12. Briefly provide the market potential of idea/innovation	With the rapid push toward smart city development, energy conservation, and infrastructure automation, the market potential for IoT-based intelligent street lighting is substantial. India alone has over 3.5 crore streetlights, and municipal bodies are actively seeking cost-effective solutions to reduce power consumption and improve maintenance. This innovation offers up to 80 energy savings, real-time fault detection, and dual-communication adaptability—making it highly attractive for government tenders, urban planners, industrial parks, and private infrastructure developers. Its low-cost, scalable design ensures broad adoption across tier-1 cities, highways, and even rural zones, aligning with national smart infrastructure missions like AMRUT and Smart Cities Mission.
13. Uploaded Proposal	View/Download