TEAM LUMEN
Luminous

GEEKATHON
IN ASSOCIATION WITH GEEKONIX

TITLE PAGE

Domain- SMART CITY

Problem Statement Title- STREET LIGHT HEALTH MONITORING SYSTEM

Team Name- TEAM LUMEN

College Name- TECHNO INTERNATIONAL NEWTOWN

IDEA TITLE

Proposed Solution: Concept, Implementation & Innovation

An **IoT-based Smart Street Light Health Monitoring System** that detects **light failures, power issues, and electrical faults** in real time. It automates fault detection, reduces maintenance costs, and optimizes energy use.

Implementation:

•**Sensors:** Monitor voltage, current, and earthing continuity.
•**Connectivity:** LoRa/Wi-Fi for real-time data transmission to the cloud.
•**Dashboard:** Displays live status, alerts, power consumption, and predictive maintenance.

Innovation & Impact:

- **Automated fault detection** – Faster response, lower costs
- **Real-time monitoring** – Immediate alerts prevent hazards
- **Predictive maintenance** – AI-based insights reduce failures
- **Energy efficiency** – Smart power optimization
- **Scalable & Smart City Ready**

Potential impact: Reduced costs, and optimized energy use for smarter urban infrastructure.

TECHNICAL APPROACH

Technology Stack & Implementation Process

- ***Technologies Utilized:***

  Hardware: Voltage, current, and earthing sensors; LoRa/Wi-Fi modules; ESP32.

  Software: Python, C/C++, HTML, CSS, JavaScript, Flask.

- ***Implementation Approach:***

  - **Sensor Integration:** Sensors monitor voltage, current, and faults, sending data to the microcontroller.
  - **Data Transmission:** LoRa/Wi-Fi enables real-time communication with the cloud.
  - **Cloud Processing:** AI analyzes data to detect failures and predict maintenance needs.
  - **Dashboard & Alerts:** A web dashboard visualizes real-time status, alerts, and power consumption.
  - **Smart Optimization:** AI-based power adjustments improve efficiency and reduce failures.

SUBMISSION REQUIREMENTS

- ***GitHub Repository (Public) – GithubLink***
- ***Deployed Link (if available) –*** DeployedLink

FEASIBILITY AND VIABILITY

Feasibility Assessment & Risk Mitigation

Viability & Implementation Potential:

- ✅ Uses **readily available sensors & IoT modules** – cost-effective & scalable
- ✅ **Cloud-based monitoring** allows remote access & real-time insights
- ✅ Can integrate with **existing streetlight infrastructure** for easy deployment

Challenges & Risks:

- ⚠ **Connectivity Issues** – Network failures in remote areas
- ⚠ **Sensor Accuracy & Durability** – Environmental wear & tear
- ⚠ **Data Security** – Risk of cyber threats in IoT-based systems

Strategic Solutions:

- ✓ **Hybrid Connectivity** – Combining LoRa & Wi-Fi for reliable communication
- ✓ **Weatherproof & Calibrated Sensors** – Ensuring durability & precision
- ✓ **Secure IoT Framework** – Encryption & authentication to prevent cyber risks

IMPACT AND BENEFITS

- **Social Impact** – Improved public safety with well-lit streets, reducing accidents & crime.
- **Economic Benefits** – Lower maintenance costs, reduced manual inspections, and optimized energy use.
- **Environmental Impact** – Efficient power consumption, reduced energy waste, and lower carbon footprint.
- **Government & Smart City Readiness** – Supports urban planning, enhances infrastructure reliability, and integrates with smart city initiatives.

RESEARCH AND REFERENCES

References:

1.IEEE Papers & Journals – Research on IoT-based smart street lighting systems

2.Government Reports – Urban planning & smart city initiatives

3.Industry Reports (IEA, Smart City Trends) – Energy efficiency & automation in public infrastructure

4.Existing Implementations – Case studies from cities implementing smart street lighting