Industrial Internship Report on

Smart streetlight Iot Project

Prepared by

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Executive Summary
This report provides details of the Industrial Internship provided by upskill Campus and The IoT Academy in collaboration with Industrial Partner UniConverge Technologies Pvt Ltd (UCT).

This internship was focused on a project/problem statement provided by UCT. We had to finish the project including the report in 6 weeks' time.

My project was: Developing an Android application for remote monitoring and efficient management of streetlights, allowing users to check the status of streetlights and adjust their settings based on light intensity.

This internship gave me a very good opportunity to get exposure to Industrial problems and design/implement solutions for them. It was an overall great experience to have this internship.

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1 Preface

1.1.1 Summary of the whole 6 weeks' work.

The project focuses on developing a streetlight monitoring system android application, integration various technologies such as Android app development, IoT devices, and communication protocols. The primary objective is to monitor streetlight status remotely, ensuring management without errors.

Over the internship duration, I dedicated myself to developing an Android application tailored for efficient streetlight management, incorporating features for remote monitoring, light intensity adjustments, and real -time status updates.

1.1.2 The Steps Involved in Creating the Application:

1. **Understanding Hardware Setup:** Understanding Arduino microcontrollers for detecting streetlight status. Install these devices on each streetlight.

2. **Server setup:** Establish server to collect and store data from IoT devices, managing incoming data from light LEDs and storing it in the real time database.

3. **Android App Development:** Develop a glitch-free app with features like real-time data retrieval and status display indicating light on/off.

4. **Status Display:** Developed a user interface in app to indicate the status of streetlights.

5. **Data Retrieval:** Enable the app to retrieve and display timely updates from the server regarding streetlights.

     USC/UCT provided me a remarkable opportunity to engage in meaningful industry-oriented projects, fostering collaboration and gaining exposure to cutting-edge technologies, thus facilitating professional development and networking.
     The internship program was meticulously structured, comprising a blend of theoretical learning, practical assignments, mentorship sessions, and regular evaluations of our reports, ensuring a comprehensive and enriching learning experience aligned with industry standards and best practices.
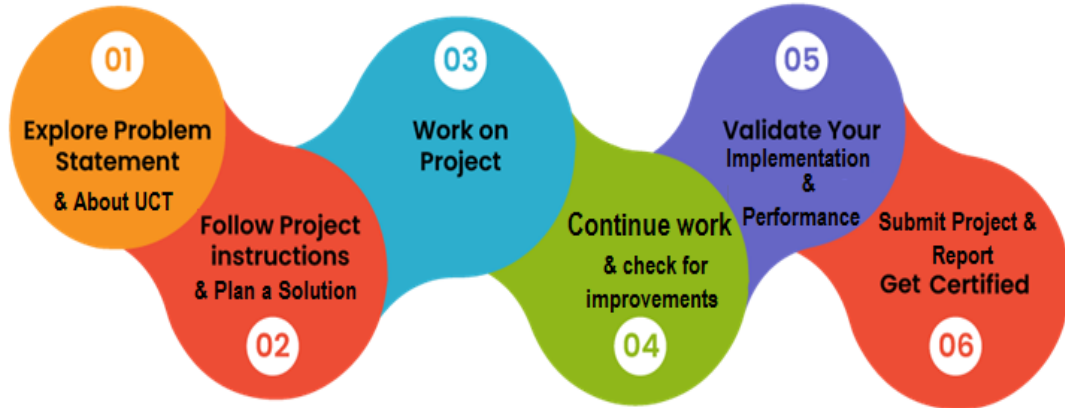
Throughout this internship, I've gained invaluable experience in project management, Android app development, IoT Integration, and overall setup.

Thank you all, I extend my heartfelt gratitude to all the team of this internship organizers (to our mentor Ankit Kumar sir and Santosh sir) to support throughout this internship. I'm thankful to the entire team at UCT UNICOVONVERGE TECHNOLOGY and UPSKILL CAMPUS for creating a conducive learning environment.

Deer juniors and peers,

I encourage you to embrace every learning opportunity and challenge that comes your way. Stay curious, keep pushing your boundaries, and never hesitate to seek help when needed. Remember, success in journey and each experience, whether good or bad, contributes to your growth and development. Keep striving for excellence and never stop learning.

I highly recommend you all to pursue this internship. It will be great experience which provides solid foundation to your career. Never stop learning.

2 Introduction

2.1 About UniConverge Technologies Pvt Ltd

A company established in 2013 and working in Digital Transformation domain and providing Industrial solutions with prime focus on sustainability and RoI.

For developing its products and solutions it is leveraging various **Cutting Edge Technologies e.g. Internet of Things (IoT), Cyber Security, Cloud computing (AWS, Azure), Machine Learning, Communication Technologies (4G/5G/LoRaWAN), Java Full Stack, Python, Front end** etc.


i. UCT IoT Platform ( )

UCT Insight is an IOT platform designed for quick deployment of IOT applications on the same time providing valuable "insight" for your process/business. It has been built in Java for backend and ReactJS for Front end. It has support for MySQL and various NoSql Databases.

- It enables device connectivity via industry standard IoT protocols - MQTT, CoAP, HTTP, Modbus TCP, OPC UA

- It supports both cloud and on-premises deployments.

It has features to
• Build Your own dashboard
• Analytics and Reporting
• Alert and Notification
• Integration with third party application (Power BI, SAP, ERP)
• Rule Engine
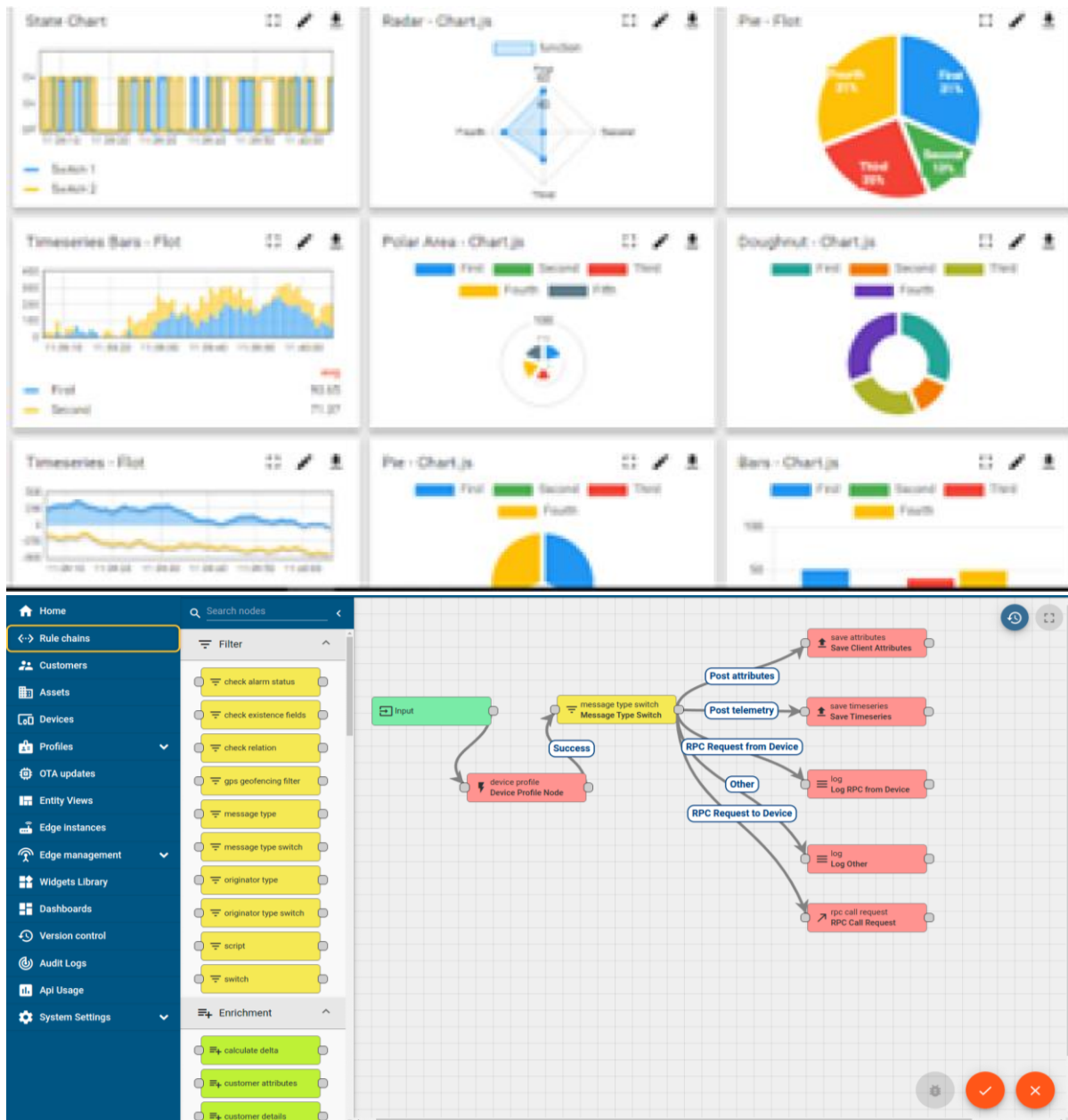
ii.   Smart Factory Platform (**FACTORY WATCH**)

Factory watch is a platform for smart factory needs.

It provides Users/ Factory

- with a scalable solution for their Production and asset monitoring

- OEE and predictive maintenance solution scaling up to digital twin for your assets.

- to unleased the true potential of the data that their machines are generating and helps to identify the KPIs and also improve them.

- A modular architecture that allows users to choose the service that they what to start and then can scale to more complex solutions as per their demands.

Its unique SaaS model helps users to save time, cost and money.

| Machine	Operator	Work Order ID	Job ID	Job Performance	Job Progress		Output		Rejection	Time (mins)				Job Status	End Customer
					Start Time	End Time	Planned	Actual		Setup	Pred	Downtime	Idle		
CNC_S7_81	Operator 1	WO0405200001	4168	58%	10:30 AM		55	41	0	80	215	0	45	In Progress	i
CNC_S7_81	Operator 1	WO0405200001	4168	58%	10:30 AM		55	41	0	80	215	0	45	In Progress	i

iii. LoRaWAN™ based Solution

UCT is one of the early adopters of LoRAWAN teschnology and providing solution in Agritech, Smart cities, Industrial Monitoring, Smart Street Light, Smart Water/ Gas/ Electricity metering solutions etc.

iv. Predictive Maintenance

UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful life time of various Machines used in production process.
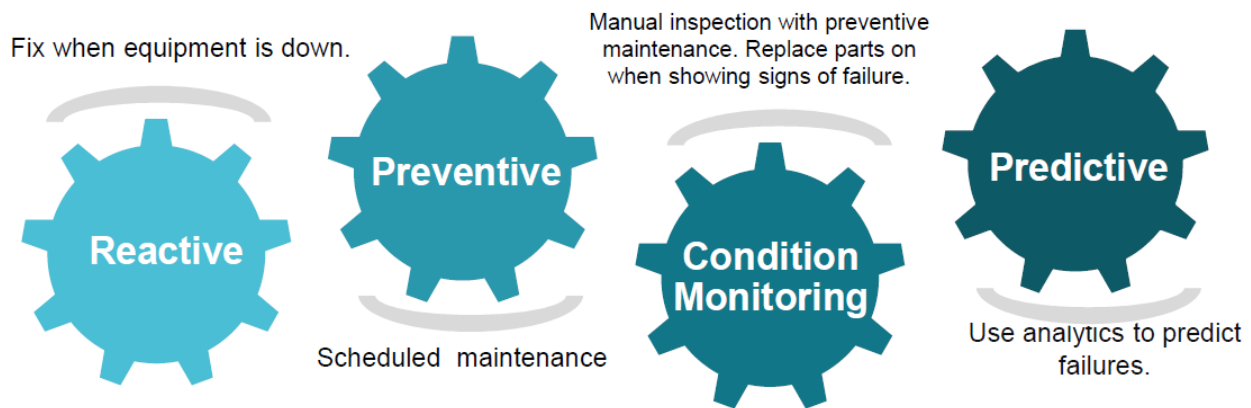
2.2 About upskill Campus (USC)

upskill Campus along with The IoT Academy and in association with Uniconverge technologies has facilitated the smooth execution of the complete internship process.
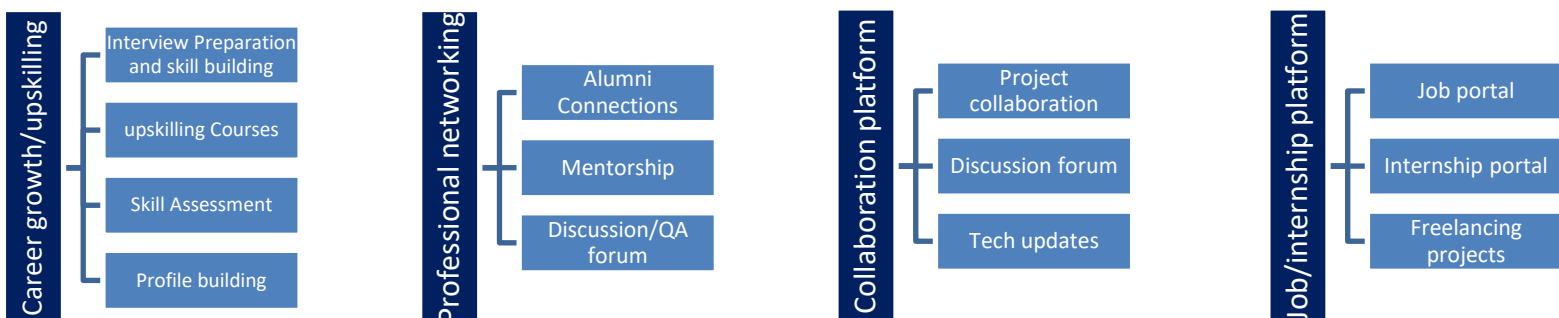
USC is a career development platform that delivers **personalized executive coaching** in a more affordable, scalable and measurable way.
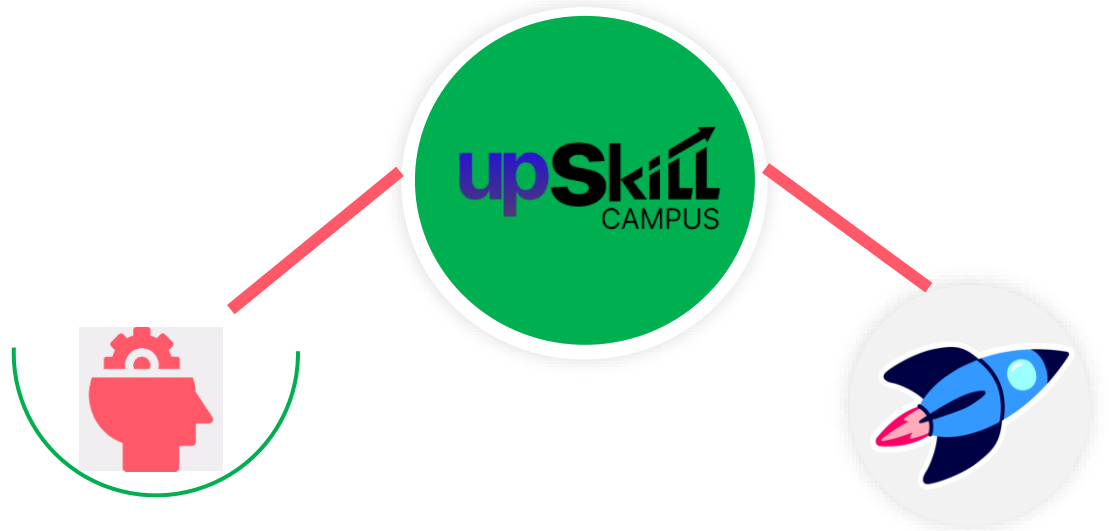
Seeing need of upskilling in self paced manner along-with additional support services e.g. Internship, projects, interaction with Industry experts, Career growth Services

upSkill Campus aiming to upskill 1 million learners in next 5 year

https://www.upskillcampus.com/

Career growth/upskilling		Professional networking		Collaboration platform		Job/internship platform	
	Interview Preparation and skill building		Alumni Connections		Project collaboration		Job portal
	upskilling Courses		Mentorship		Discussion forum		Internship portal
	Skill Assessment		Discussion/QA forum		Tech updates		Freelancing projects
	Profile building						

2.3 The IoT Academy

The IoT academy is EdTech Division of UCT that is running long executive certification programs in collaboration with EICT Academy, IITK, IITR and IITG in multiple domains.

2.4 Objectives of this Internship program

The objective for this internship program was to

☛ get practical experience of working in the industry.

☛ to solve real world problems.

☛ to have improved job prospects.

☛ to have Improved understanding of our field and its applications.

☛ to have Personal growth like better communication and problem solving.

2.5 Reference

[1]   https://developer.android.com/studio

[2]   https://www.upskillcampus.com/

[3]   https://developer.android.com/

2.6 Glossary

Terms	Acronym
UCT	**Uniconverge technologies**
IoT	Internet of things

3   Problem Statement

In the assigned problem statement

The problem statement outlines the development of street light monitoring system incorporating a distance sensor, aimed at effectively managing and overseeing street lighting.

The system entails:

- Control mechanisms for adjusting light intensity

- Integration of Sensors for monitoring

- On and Off functionalities for operational control

Develop a project related to the street light monitoring system in form of android application

4   Existing and Proposed solution

Existing solution for street light monitoring typically involve basic timers or manual switches, lacking in real-time monitoring capabilities and energy. These systems often require manual adjustments and provide limited insights into light usage and performance, resulting in inefficient energy consumption and maintenance challenges.

Proposed Solution:

Our proposed solution involves the implementation of advanced street light monitoring system equipped with IoT technology. This system offers real-time monitoring and control functionalities, allowing for automatic adjustment of light intensity based on environment factors such as ambient light levels and pedestrian activity. Additionally, it provides remote access through a mobile application, enabling administrators to manage street lights efficiently.

Value Addition:

- Real-time monitoring and control capabilities
- Automatic adjustment of light intensity for energy efficiency
- Remote access and management via a mobile application
- Improved maintenance scheduling and cost saving

Software required:

- Front end: xml
- Back end: java

- Database: Realtime database (Firebase)

Limitations of project:

- Sensors should be protected
- May not work properly when Internet connectivity is low

4.1 Code submission (Github link):

https://github.com/Rutika-Shelar/upskillcampus.git

4.2 Report submission (Github link) : first make placeholder, copy the link.

https://github.com/Rutika-Shelar/upskillcampus.git

5 Proposed Design/ Model

5.1 Start Stage

- Identify the key components needed, including IoT devices, sensors, communication protocols, and mobile application.
- Design the architecture of the system, outlining the interactions between different components and the flow of data.
- Begin the development process by setting up the hardware components such as sensors and microcontrollers.

5.2 Intermediate Stages:

- Implement communication protocols for data exchange between IoT devices and the server.
- Develop the server-side application for data collection, storage, and management.
- Design and develop the mobile application interface for users to monitor and control street lights remotely.
- Integrate the IoT devices with the server and mobile application to establish seamless communication.
- Test each component individually and conduct integration testing to ensure compatibility and functionality.

5.3 *Final Outcome:*

- Complete the development of the street light monitoring system with a user-friendly mobile application interface.
- Deploy the system in real-world environments for field testing and validation.
- Iterate on the design based on feedback and make necessary adjustments to optimize performance and usability.
- Launch the finalized version of the system for widespread use, providing efficient street light management and energy conservation benefits
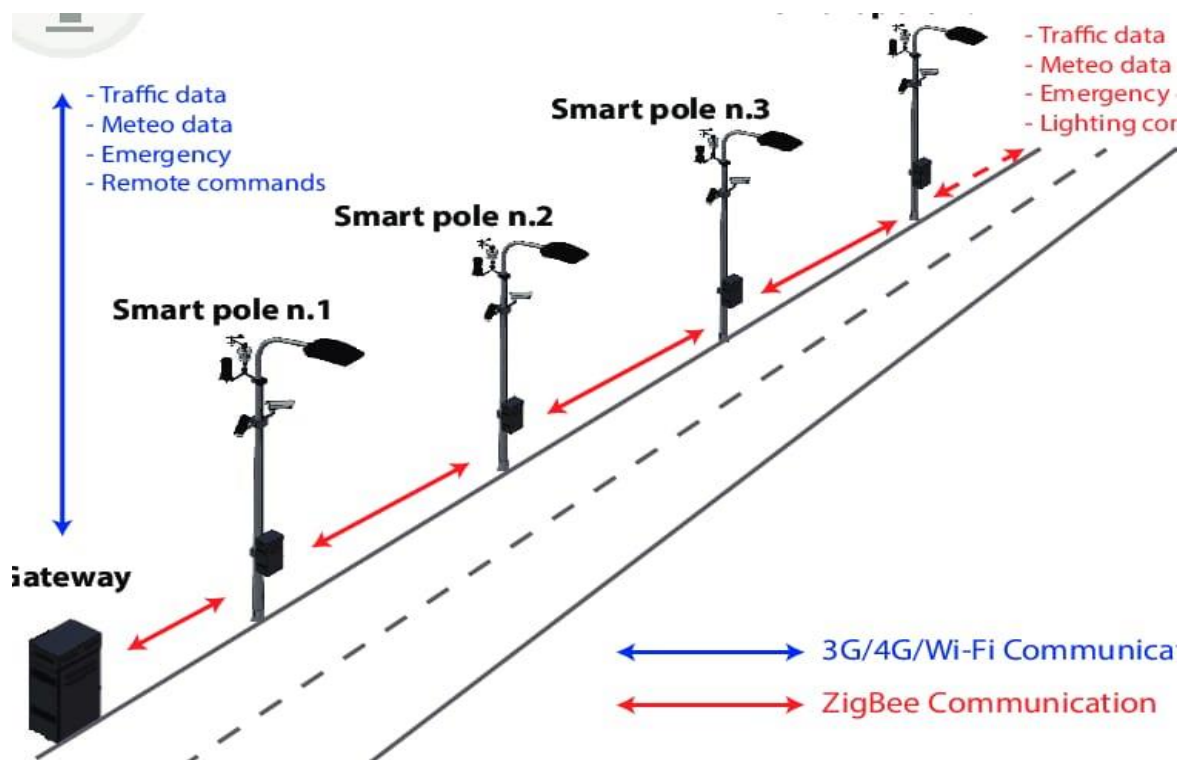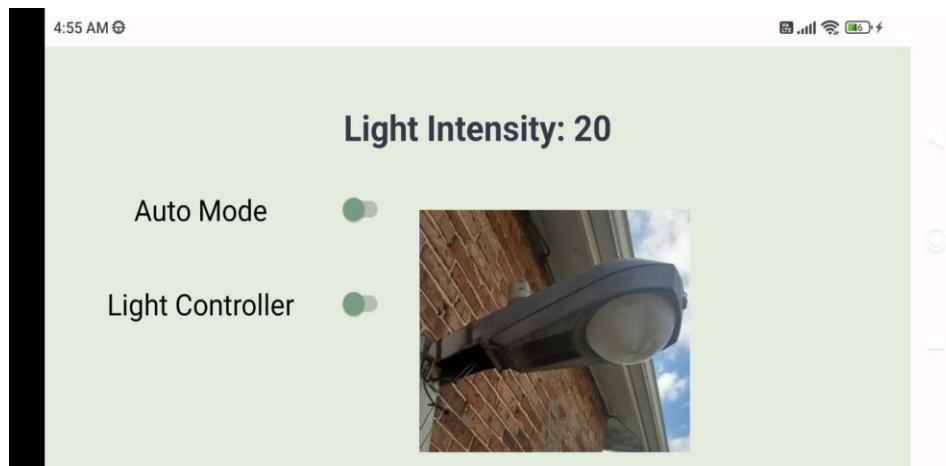
5.4 High-Level Diagram (if applicable)

Figure 1: HIGH LEVEL DIAGRAM OF THE SYSTEM

5.5 Interfaces (if applicable)

Horizontal Orientation

Vertical Orientation

6   Performance Test

If any issue arise, we can modify the code as needed. Various software tools are available for conducting performance testing, including Apache JMeter.

6.1   Performance Outcome

The accuracy of app is 93% .app woks within 5 seconds after clicking on on/off switch.

7   My learnings

Project learning points:

- IoT Integration
- Firebase Usage
- Android UI Development
- Data Visualization
- Remote Monitoring

- Error Handling
- Testing and Debugging
- Documentation

8 Future work scope

- Integration with smart city infrastructure
- Implementation of predictive maintenance algorithms
- Integration with weather sensors for adaptive lighting
- Integration of machine learning for predictive analysis