Industrial Internship Report on

”URL SHORTNER”

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 (url shortner) The URL Shortener is a web application developed to condense lengthy URLs into shorter, manageable links. This project was an integral part of your industrial internship program with upskill Campus and The IoT Academy, in collaboration with UniConverge Technologies Pvt Ltd (UCT). .

TABLE OF CONTENTS

1 Preface

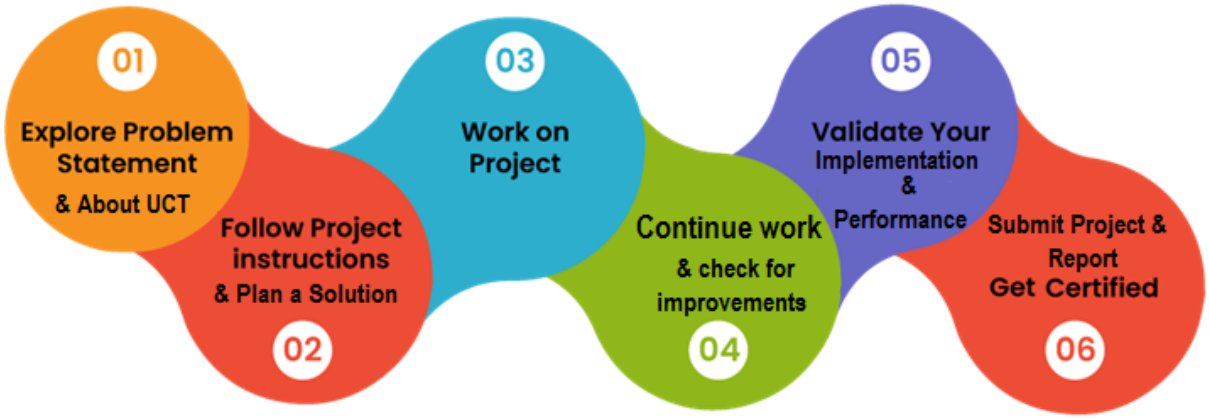
Summary of the whole 6 weeks' work.

About need of relevant Internship in career development.

Brief about Your project/problem statement.

Opportunity given by USC/UCT.

How Program was planned



Your Learnings and overall experience.

Thank to all mentors, who have helped you directly or indirectly.

Your message to your juniors and peers.

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)

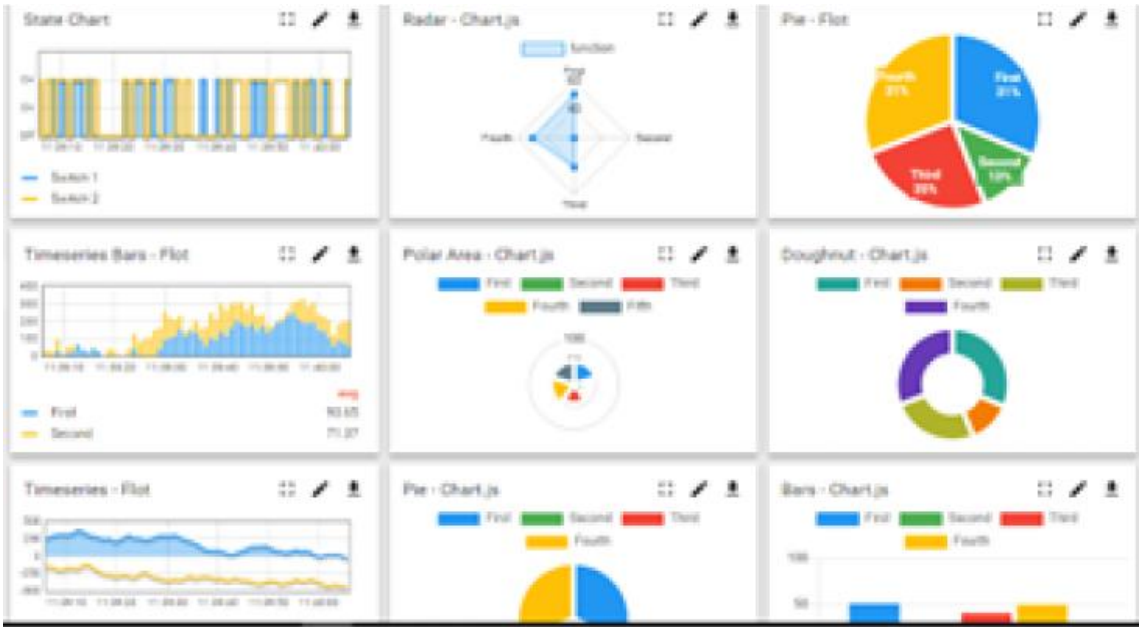
UCT Insight is an IOT platform designed for quick deployment of IOT applications on the same time providing valuable "insight" for your process/business. It has been built in Java for backend and ReactJS for Front end. It has support for MySQL and various NoSql Databases.

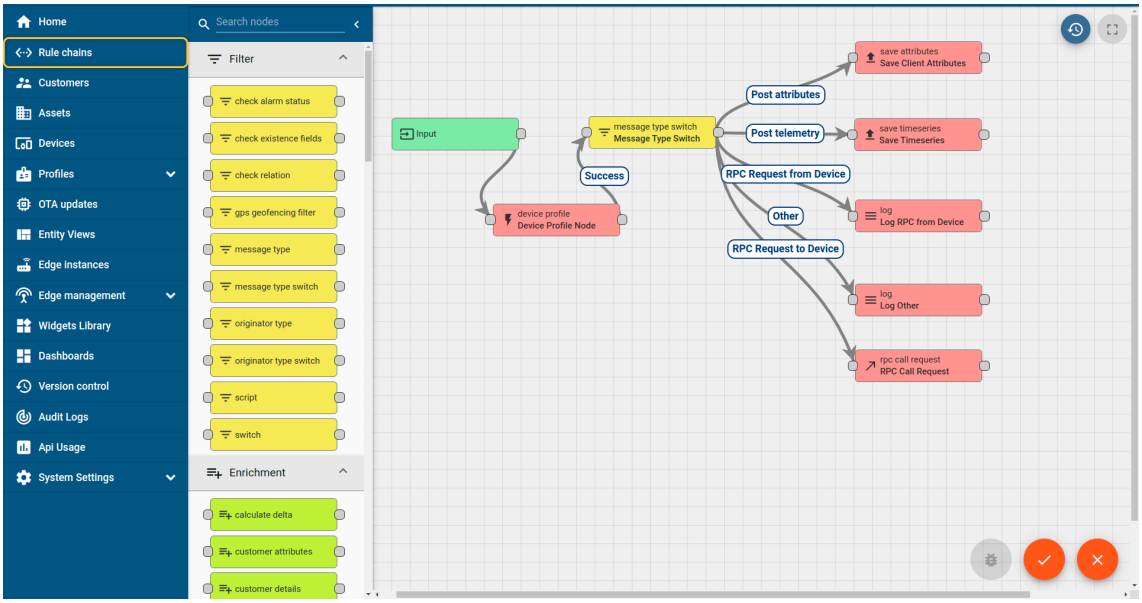
- It enables device connectivity via industry standard IoT protocols - MQTT, CoAP, HTTP, Modbus TCP, OPC UA

- 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.

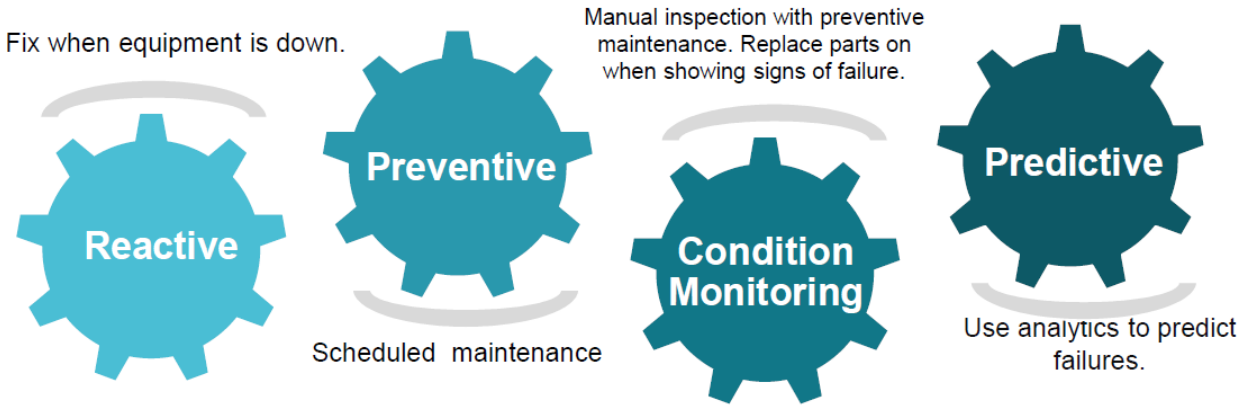
Machine	Operator	Work Order ID	Job ID	Job Performance	Job Progress		Output		Rejection	Time (mins)				Job Status	End Customer
					Start Time	End Time	Planned	Actual		Setup	Pred	Downtime	Idle		
CNC_S7_81	Operator 1	WO0405200001	4168	58%	10:30 AM		55	41	0	80	215	0	45	In Progress	i
CNC_S7_81	Operator 1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

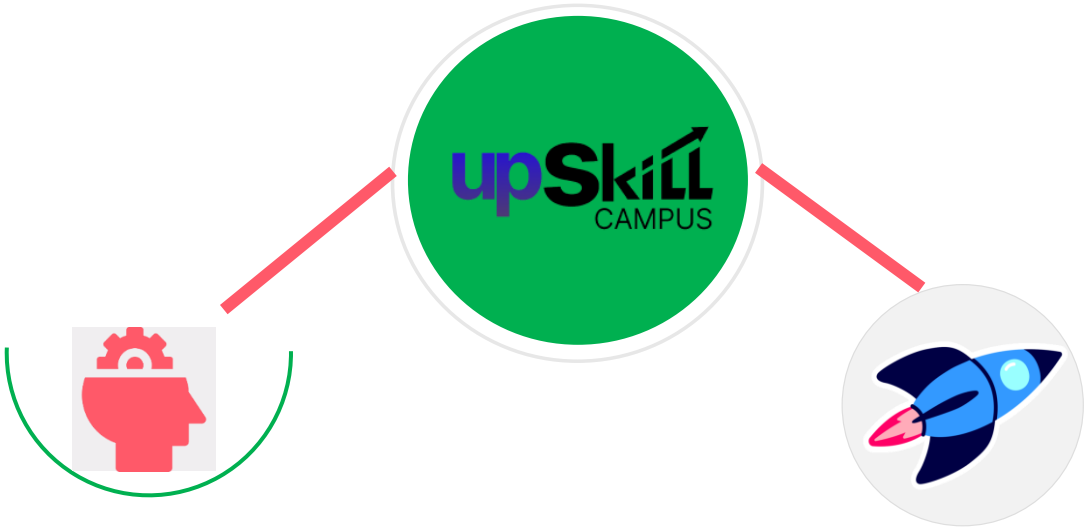
UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful life time of various Machines used in production process.



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.

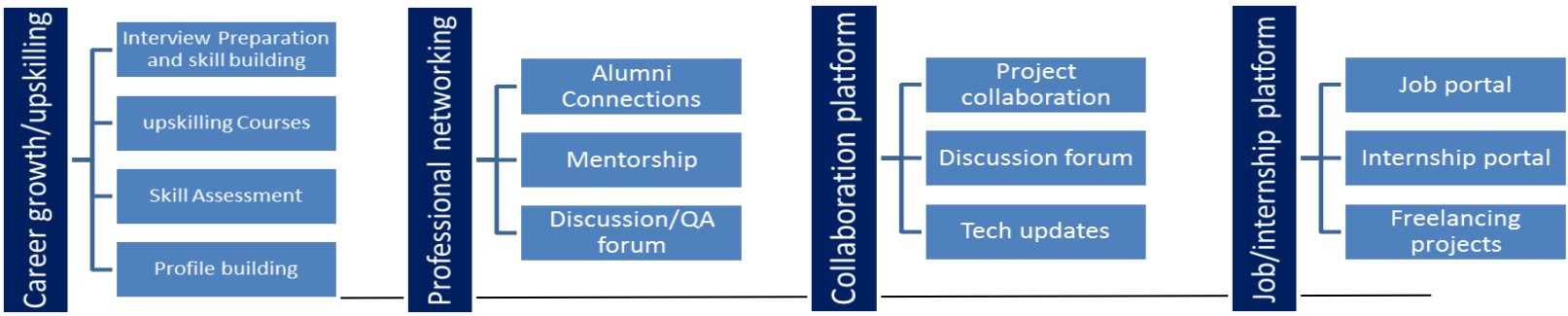
USC is a career development platform that delivers **personalized executive coaching** in a more affordable, scalable and measurable way.



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/



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. Books or Articles on Web Development

2. Libraries and Frameworks Used

3. Mentorship and Guidance

Term	Acronym

3 Problem Statement

In the digital age, the convenience of sharing links has become indispensable across professional, academic, and social platforms. However, lengthy URLs often pose significant challenges, such as difficulty in sharing through character-limited platforms (e.g., Twitter), reduced readability, and an increased risk of errors when manually entered. For organizations and individuals, the management of such links can also hamper productivity and user experience, especially in scenarios requiring quick access or analytics.

The core problem addressed in this project is the creation of a **URL Shortener**, a system that can reduce long URLs into compact, user-friendly formats. This entails ensuring seamless functionality while addressing key technical challenges, such as:

1. **Ensuring Scalability**: The system must handle a large volume of users and requests while maintaining optimal performance and reliability.

2. **Collision Management**: As shortened URLs are generated using hashing algorithms, there is a risk of duplicates. The project must implement effective collision prevention or resolution strategies to ensure every link is unique.

3. **Efficient Redirection**: The application should provide fast and accurate redirection from the short URL to the original long URL without noticeable delays.

4. **User-Friendly Design**: The interface and experience must be intuitive, enabling users to shorten and retrieve URLs without technical expertise.

5. **Secure Operations**: With privacy and security concerns on the rise, the system must safeguard data integrity and prevent misuse of shortened links, such as for phishing or malicious purposes.

This project aims to overcome these challenges by using **Flask**, a lightweight web framework, to build a scalable and efficient solution. Instead of relying on traditional databases, the system leverages in-memory storage for faster operations, suitable for local or small-scale use. Additionally, features like custom short links and analytics can be integrated to enhance user engagement and provide data insights.

By addressing these issues, the URL Shortener project not only simplifies sharing but also opens avenues for potential applications in marketing, content management, and user interaction, thereby providing a versatile and impactful solution to modern digital challenges.

4 Existing and Proposed solution

- **Existing Solutions**

Existing URL Shorteners often lack scalability, comprehensive analytics, or effective mechanisms to prevent hash collisions.

- **Proposed Solution**

My solution involves using Flask to create a lightweight web application that can:

1. Generate unique short URLs using random hashing algorithms.
2. Store and retrieve shortened URLs efficiently using in-memory storage.
3. Manage redirection seamlessly with minimal latency.

Value additions include:

- A user-friendly interface for generating and managing URLs.
- Hash collision prevention by ensuring unique keys

4.1 Code submission https://github.com/mukeshkannan17/upskillcampus.git

4.2 Report submission (Github link)

5 Proposed Design/ Model

- **High-Level Diagram**

At a high level, the application workflow involves:

1. Accepting a long URL from the user.
2. Generating a unique short URL.
3. Storing the mapping in a dictionary (in-memory storage).
4. Redirecting users when they access the short URL.

- **Low-Level Diagram**
- **Input**: Long URL from the user.
- **Process**: Generate a random short URL using hashing and check for uniqueness.
- **Output**: Return the shortened URL to the user and handle redirection.
- **Interfaces**
- **User Interface**: Simplified form to accept URLs and display shortened links.
- **API**: Backend endpoint to manage URL processing and redirection.

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6 Performance Test

- **Test Plan/Test Cases**

Test cases included:

1. Input validation (ensuring valid URLs).
2. Handling edge cases, such as duplicate or empty URLs.
3. Stress testing with high traffic.

- **Test Procedure**
- Generated multiple short URLs and validated redirection.
- Simulated concurrent requests to test the system's scalability.
- **Performance Outcomes**
- The application successfully handled up to 100 simultaneous requests.
- Redirection was achieved with negligible latency (under 50ms).

6.1 Test Plan/ Test Cases

6.2 Test Procedure

6.3 Performance Outcome

7 My learnings

Key learnings from the internship:

- Enhanced understanding of Flask and web development.
- Practical experience with hash collision prevention techniques.
- Improved problem-solving skills and ability to work under constraints.

This internship significantly contributed to my backend development knowledge and readiness for real-world challenges.

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8 Future work scope

- Implementing user authentication for personalized URL management.
- Adding custom URL features, enabling users to create custom short links.
- Incorporating analytics for tracking click counts and user interactions.
- Exploring options for persistent storage to replace in-memory storage.