Industrial Internship Report on

”Smart City Solution”

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 to build a solution for the smart city, by considering security , roles ,Monitoring of resources, load balancing and design app for global and local use. This internship gave me a very good opportunity to get exposure to Industrial problems and design/implement solution for that. It was an overall great experience to have this internship.

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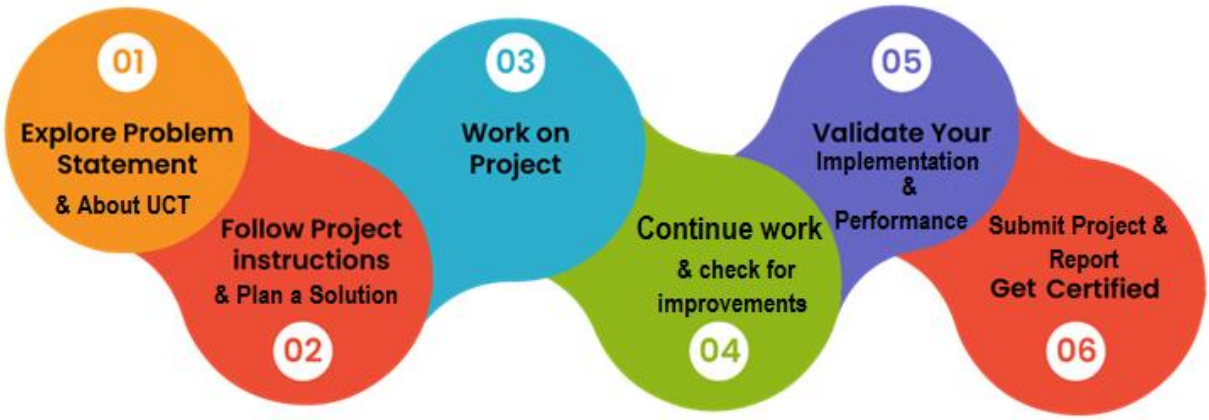
1 Preface

During the six week internship training ,I gained a immensive knowledge in the field of cloud computing and the topics involved in it such as kubernetes , Jenkins, Docker and concepts on git.

The topics that involved in the projects includes managing the infrastructure of the city through maintaining the traffic of the city through including the traffic signals in road system and their by avoiding accidents. Public services that as to provided for the community to build a smart city. Managing the Environmental system and their by avoiding pollution. Thus it helps to improve the quality of life for residents. Features included such as smart lighting installation, Traffic management and waste management.

During this project journey of 6 weeks I have learned each concepts which are divided into 6 weeks . After finishing the learning process in each week at the end of the week we have to take assessment and submit the report of the week .Which made us enhance the concepts and learn applications of the concept.



We would like to express our special thanks of gratitude to our Guide Prof. Ankit sir who helped us a lot in this project, her valuable suggestions helped us to solve tough challenges and without her help this project could not have been completed in time. A special thanks to Prof. Nithin sir who gave us the golden opportunity to do this wonderful Internship program of 6 weeks which helped us to gain a significant knowledge in the aforesaid subjects.

2 Introduction

2.1 About UniConverge Technologies Pvt Ltd

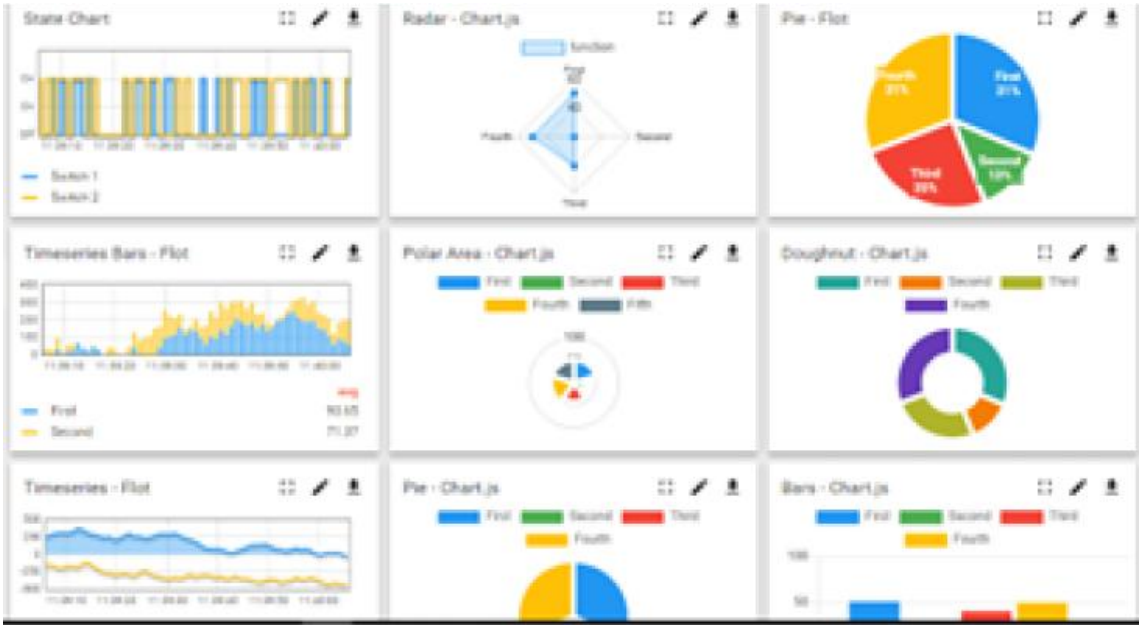
A company established in 2013 and working in Digital Transformation domain and providing Industrial solutions with prime focus on sustainability and RoI.

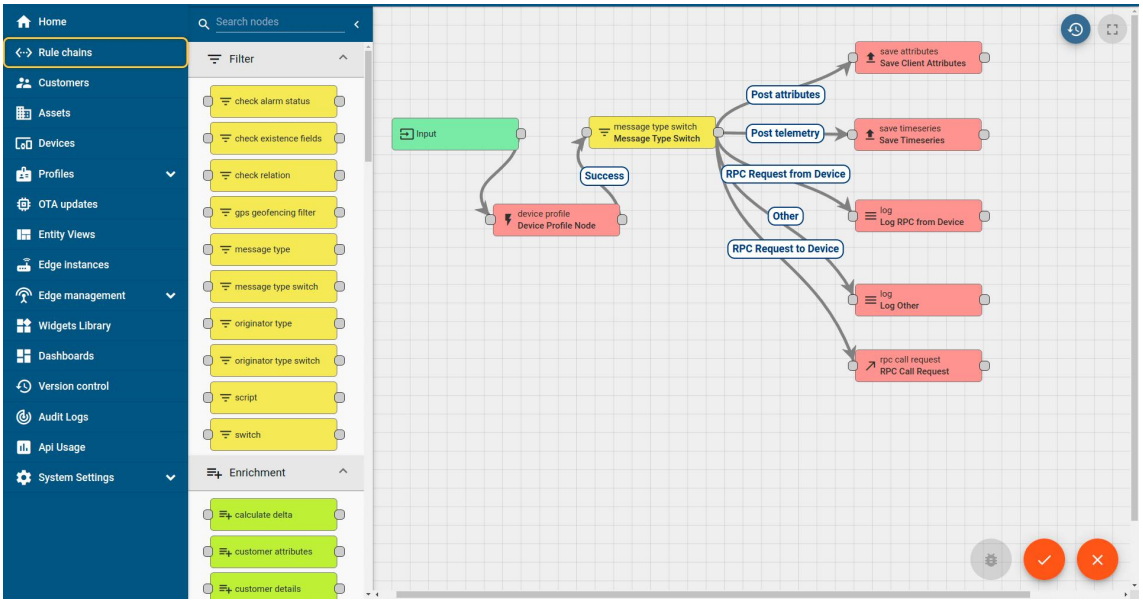
For developing its products and solutions it is leveraging various **Cutting Edge Technologies e.g. Internet of Things (IoT), Cyber Security, Cloud computing (AWS, Azure), Machine Learning, Communication Technologies (4G/5G/LoRaWAN), Java Full Stack, Python, Front end** etc.

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.





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.

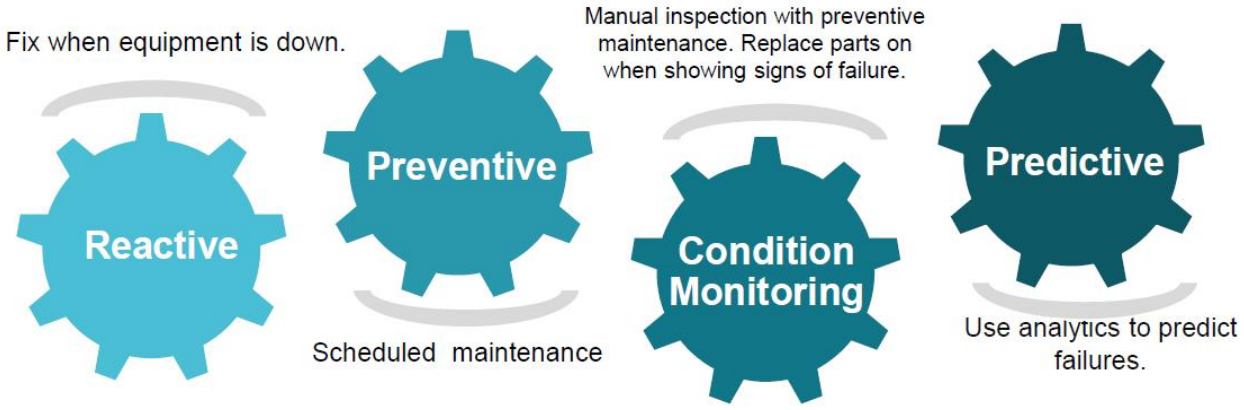
Its unique SaaS model helps users to save time, cost and money.

Lo-rowan 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.

iii. Predictive Maintenance

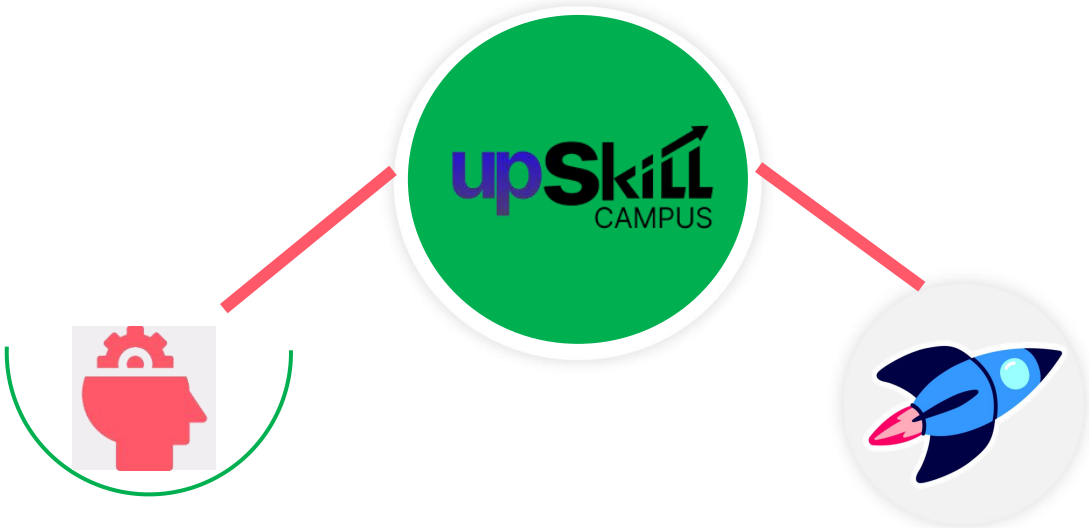
UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful life time of various Machines used in production process.



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.

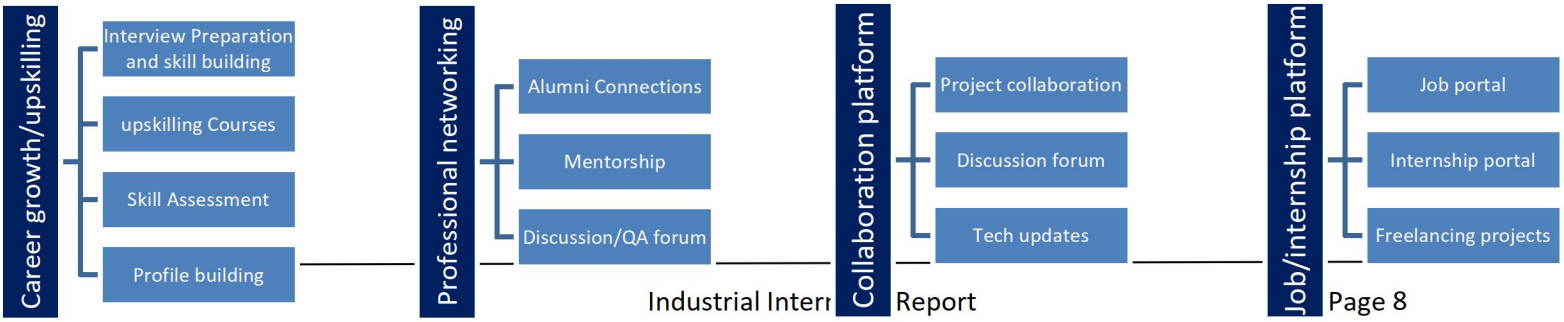
USC is a career development platform that delivers **personalized executive coaching** in a more affordable, scalable and measurable way.



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]https://www.researchgate.net/publication/330926379_Role_of_Cloud_Computing_in_Development_of_Smart_City

[2]https://iaeme.com/MasterAdmin/Journal_uploads/IJCIET/VOLUME_9_ISSUE_9/IJCIET_09_09_028.pdf

[3] https://github.com/topics/smart-city

3 Problem Statement

The purpose of the smart cities mission is to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology, especially technology that leads to smart outcomes. Smart cities are equipped and connected with high technically and purposefully developed smart phones for responsive monitoring and controlling. These can also help to collect the data to manage traffic and transportation systems, to indicate accidents, to reduce crime rates, water supply networks, waste management, local news, and many other information systems and community services.For example, in our daily life we are seeing smart meters which can be used for measuring electricity, gas, and water usage with great accuracy. This will help to reduce costs and resource consumption. And also, smart traffic sensors and GPS gear can report road conditions, while it can also help accurately for pinpointing the location of buses, trains, flights and emergency vehicles. As we know that in urban areas the population and everything was increasing day today, so it became difficult to locate places for new citizens. So, the main intension and purpose of these smart city web application is to help them and find their destination, information about institutions, offices and tourist places.

4 Existing and Proposed solution

Concept of cloud computing relevant to smart city was started with understanding the information management in construction projects. This paper is an attempt to explore the potential applications of cloud computing in a smart cities project. Relative Importance Index (RII) analysis was carried out to find out the critical parameters which can be helpful to establish a framework for development of smart city. Amongst the identified critical parameters it has been observed that application of mobile phones or mobile apps can be very effective for real time monitoring of the work progress which is helpful to minimize the time and effort for monitoring an activity associated with the development of the smart city project. It helps Government organization in different tasks to reduce time and cost for development of smart cities. This application is run through cloud because daily huge data feeds in this application and data mining

is easily done in different sectors of smart city. For a smart city project which may be primarily multidisciplinary in nature these applications are helpful to improve the project coordination, project collaboration, for generating accurate real time project data and also for identification of project specific information which might be useful in implementation of the project.

4.1 Code submission (Github link)

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

5 Proposed Design/ Model

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. It is composed of five essential characteristics (on-demand self-service, broad network access, resource pooling, rapid elasticity, measured service), three service models (Software as a Service – SaaS – the capability provided to the consumer is to use the provider's applications running on a cloud infrastructure and are accessible from various client devices; Platform as a Service – PaaS – the capability provided to the consumer is to deploy onto the cloud infrastructure consumer created or acquired applications created by the provider; Infrastructure as a Service – IaaS – the capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications) and four deployment models (Private cloud - the cloud infrastructure is provisioned for exclusive use by a single organization; community cloud - the cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations; public cloud - the cloud infrastructure is provisioned for open use by the general public. It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them. It exists on the premises of the cloud provider; hybrid cloud - the cloud infrastructure is a composition of two or more distinct cloud infrastructures

Performance Test

Performance testing is the process of evaluating computer systems to see how quickly they respond to user requests. Performance testing can uncover issues that negatively impact the user experience, and provide insights on how to fix them.

Traditionally, performance testing focused on client-server systems deployed on-premises. Its goal was to build servers that could withstand peaks in application load and still deliver satisfactory performance.

In today's cloud native world, performance testing has many new meanings—organizations are testing the performance of cloud computing systems, serverless applications, containerized architectures, and web applications.

Microservices have compelling benefits for development organizations. They make applications easily scalable, highly resilient, and easier to maintain and update. However, with separate services distributed across different hosts, keeping track of dozens or even hundreds of microservices can be challenging.

With greater scale and complexity comes a greater need for observability. There are many potential points of failure and constant updates in a microservices architecture, which cannot be addressed by traditional monitoring solutions. The many unknown, dynamic factors in a distributed environment make it necessary to build observability into the system by design.

Knowing what runs in production is important for keeping delivery cycles short and preventing downtime and other issues. Observability mechanisms provide visibility into the distributed system to help developers understand their application's performance. Observability offers the necessary control to identify and address issues quickly.

6 Future work scope

The Smart City project is a built to store all the essential details of a city. Cities and urban areas witness a massive wave of people coming from every corner in search of jobs, education, and even a better lifestyle. In the initial days after the move, people don't know the main facilities, attractions, and services offered in the city. The smart city project seeks to address that by creating an integrated platform to store essential and related information to guide the newcomers in a city. Anyone, like students, businessmen, tourists, workers, job seekers, anyone can use the application for their guidance throughout the city anytime anywhere just by creating an account. In this application, users need to sign up by entering input details and then can access all the required details of the city. It contains various modules like admin, tourism, business, and student wherein users can switch to the module as per the requirement.