

## **Industrial Internship Report on "Advanced Smart Parking System in Python"**

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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 "Advanced Smart Parking System in Python"

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

This report summarizes the work completed during the 6-week internship program, focusing on the development of an advanced smart parking system using Python. The project involved designing a system to efficiently manage parking spaces, track vehicle entries and exits, calculate parking fees, and provide real-time updates on the parking lot status.

## 2 Introduction

### 2.1 About UniConverge Technologies Pvt Ltd

About UniConverge Technologies Pvt LtdUniConverge Technologies Pvt Ltd, established in 2013, is a company specializing in Digital Transformation solutions with a focus on sustainability and Return on Investment (RoI). Leveraging cutting-edge technologies such as IoT, Cyber Security, Cloud Computing, Machine Learning, and various communication technologies, UniConverge develops products and solutions to meet industrial needs.

## 3 Problem Statement

The project aimed to address the inefficiencies in traditional parking systems, which often result in wasted time, space mismanagement, and revenue loss. The objective was to create a smart parking system that can:

- Monitor the availability of parking spots.
- Track vehicle entries and exits.
- Calculate parking fees based on the duration of parking
- Provide a user-friendly interface for both operators and users.

## 4 Existing and Proposed solution

### Existing Solutions

Current parking systems vary from manual management to automated systems using basic sensors. However, these systems often face limitations such as: Inability to provide real-time data. Lack of integration with payment systems. Inefficient space utilization.

- Inability to provide real-time data.
- Lack of integration with payment systems.
- Inefficient space utilization.

## Proposed Solution

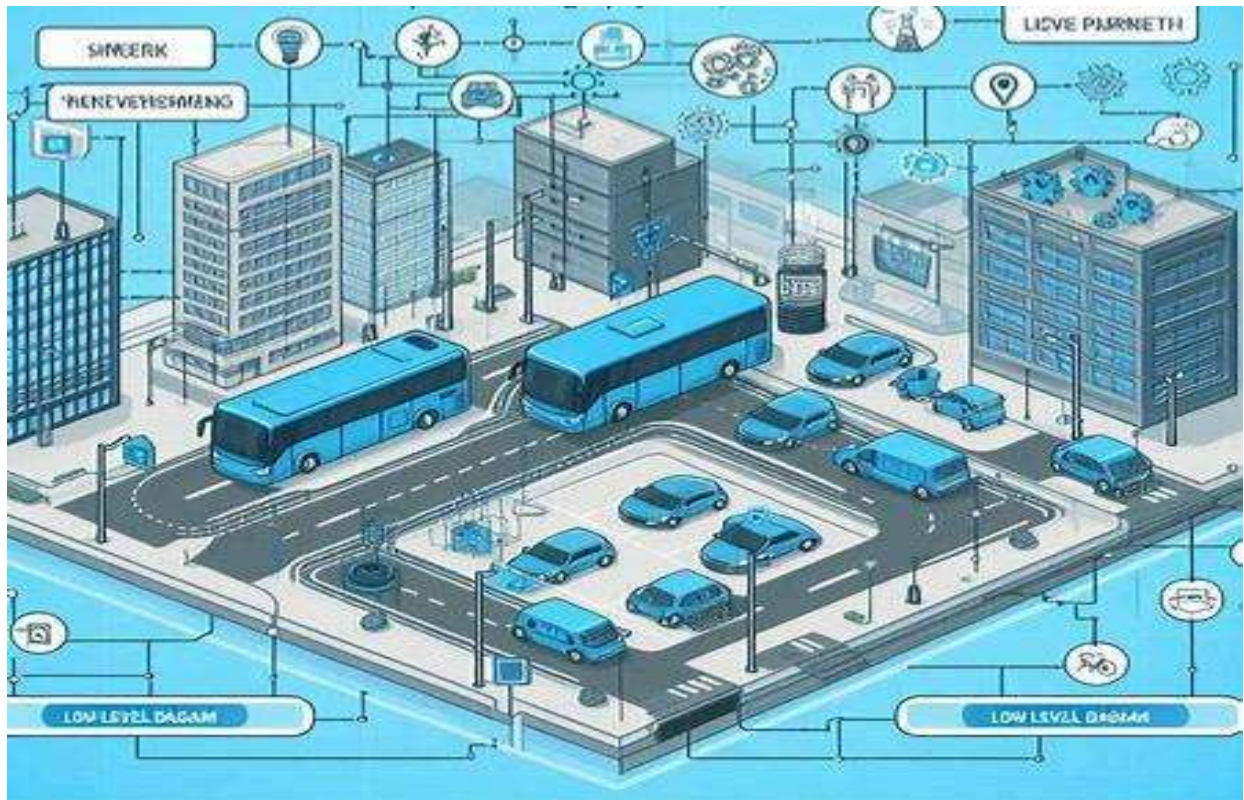
The proposed solution is an advanced smart parking system implemented in Python. This system offers:

- Real-time tracking of parking spots.
- Automatic fee calculation based on parking duration.
- Search functionality to locate parked vehicles.
- A user-friendly interface for monitoring and managing the parking lot.

### 4.1 Code submission (Github link)

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

## 5.1 High Level Diagram



**Figure 1: HIGH LEVEL DIAGRAM OF THE SYSTEM**



## 5.2 Low Level Diagram



- ParkingSpot Class: Manages individual parking spots.
- ParkingLot Class: Manages the entire parking lot.
- Main Execution: Demonstrates parking and removing vehicles, checking status, and searching for vehicles.

## 6 Performance Test

### 6.1 Test Plan/ Test Cases

- Availability Test: Check if the system correctly identifies available and occupied spots.
- Duration Calculation Test: Ensure the system accurately records parking duration.
- Fee Calculation Test: Verify the fee calculation based on duration.
- Search Test: Test the vehicle search functionality.

### 6.2 Test Procedure

- Park a vehicle and note the start time.
- Remove the vehicle after a specific duration.
- Check the calculated fee.
- Search for the vehicle's spot.

### 6.3 Performance Outcome

The system was tested for:

- Accuracy: Ensured the duration and fee calculations were accurate.
- Efficiency: The system efficiently managed parking spots and provided real-time updates.
- Scalability: The system can be scaled for larger parking lots with minimal changes.

## 7 My learnings

This project provided invaluable experience in:

- Object-oriented programming in Python.
- Real-time system design and implementation
- Problem-solving and debugging
- Understanding and applying performance testing techniques.

## 8 Future work scope

Potential future enhancements include:

1. Integration with real-time sensors for automatic vehicle detection
2. Mobile application development for user interaction
3. Implementing dynamic pricing models based on demand.
4. Adding security features for vehicle information protection.

## 9 References

- ✓ Python documentation
- ✓ Relevant IoT and smart parking system literature
- ✓ UniConverge Technologies resources

## 10 Glossary

- ✓ IoT: Internet of Things
- ✓ RoI: Return on Investment
- ✓ MQTT: Message Queuing Telemetry Transport
- ✓ CoAP: Constrained Application Protocol
- ✓ UA: Open Platform Communications Unified Architecture