**Industrial Internship Report on**

**” College Timetable Generator”**

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 4 weeks’ time.  My project was (“Student Attendance System”)  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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# Preface

The Student Attendance System is a simple yet effective application developed using Python, aimed at automating the process of recording and managing student attendance in educational institutions. Traditional attendance management methods, such as manual registers, are often time-consuming, prone to errors, and difficult to maintain.

This project leverages Python’s **Tkinter** library for building a user-friendly graphical interface and **SQLite3** for efficient and secure data storage. It allows administrators to add student details, mark daily attendance, generate reports, and export data for analysis. By implementing this system, institutions can improve record accuracy, reduce paperwork, and save valuable administrative time.

The application is designed with simplicity in mind, making it easy to use even for those with minimal technical skills. It serves as a practical example of how software solutions can address common challenges in educational environments, and it also provides hands-on experience in Python programming, GUI development, and database management.

# Introduction

## 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.

## 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.

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.

## Objectives of this Internship program

The primary objective of this internship program is to provide practical exposure to real-world software development processes while enhancing problem-solving and technical skills. Through the development of the *Student Attendance System* project, the internship aims to:

✅ Key Objectives:

 **Apply theoretical knowledge** of Python programming, GUI development, and database management to build a functional application.

 **Gain hands-on experience** in using libraries like Tkinter for interface design and SQLite3 for data storage.

 **Understand the software development lifecycle**, including planning, designing, coding, testing, and deployment.

 **Develop problem-solving skills** by addressing real-world challenges in attendance management.

 **Enhance project documentation and presentation abilities** by preparing detailed reports and project demonstrations.

 **Encourage self-learning and research skills** by exploring additional features and improving application efficiency.

## Reference

1. Python Software Foundation – Python Documentation  
   <https://docs.python.org/3/>
2. SQLite Documentation – SQLite3 Database Engine  
   <https://sqlite.org/docs.html>

## Glossary

|  |  |
| --- | --- |
| **Term** | **Definition** |
| **Attendance** | Recording whether a student is present or absent in a class. |
| **GUI** | A visual interface for interacting with the software using buttons and menus instead of text commands. |
| **Python** | The programming language used to build the project. |
| **SQLite** | A lightweight database used to store attendance records. |
| **Record** | A single row of data in the database containing student details and attendance status. |

# Problem Statement

In educational institutions, maintaining accurate and timely attendance records is essential for tracking student performance and discipline. Traditional methods of recording attendance, such as manual registers or paper sheets, are time-consuming, prone to human errors, and require significant effort to compile and analyze.

Furthermore, manual systems make it difficult to quickly generate reports or analyze attendance patterns, leading to inefficiencies in administration. There is a need for a digital solution that simplifies attendance management, reduces errors, and provides instant access to data.

The proposed *Student Attendance System* aims to address these issues by offering a user-friendly Python-based application with a graphical interface and database integration to store, manage, and retrieve attendance records efficiently.

# Existing and Proposed solution

* Existing Solution

Most educational institutions still use traditional attendance methods such as paper-based registers or manual entry in spreadsheets.

**Drawbacks:**

Time-consuming and inefficient.

Prone to human errors and data loss.

Difficult to generate reports instantly.

No centralized database for storing attendance records.

Some institutions use advanced biometric or RFID systems, but these require costly hardware, maintenance, and technical expertise, making them less feasible for small or budget-limited institutions.

• Proposed Solution:

The proposed *Student Attendance System* is a Python-based desktop application with a graphical user interface (GUI) and a database backend (SQLite).

* **Features:**
  + Easy attendance marking through a user-friendly interface.
  + Automatic storage of records in a database for quick retrieval.
  + Ability to generate daily, weekly, or monthly attendance reports.
  + Minimal hardware requirements—runs on any computer with Python installed.
  + Secure and accurate data handling, reducing manual errors.

This system will make attendance management faster, more reliable, and more accessible for institutions of all sizes without the need for expensive infrastructure.

## Code Submission (github link):

## <https://github.com/Monica1804/upskillCampus/blob/main/Student%20Attendance%20System.py>

## Report Submission (Github link):

<https://github.com/Monica1804/upskillCampus/blob/main/README.md>

# Proposed Design / Model

The proposed *Student Attendance System* is designed as a simple yet efficient desktop application that integrates a user-friendly interface with a secure backend database.

**5.1 System Architecture**

The system follows a **three-layer architecture**:

1. **Presentation Layer (Frontend)**
   * Built using **Tkinter** for Python.
   * Provides forms and buttons for marking attendance, viewing records, and generating reports.
2. **Application Layer (Logic)**
   * Python scripts handle attendance recording, data validation, and report generation.
   * Implements functions to interact with the database and ensure smooth workflow.
3. **Data Layer (Backend)**
   * **SQLite Database** stores student details, attendance records, and report data.
   * Data is secure, easily retrievable, and can be backed up.

# Performance Test

The College Timetable Generator was tested for performance, correctness, and user experience across different input sizes and usage conditions.

✅ Speed:

The application responds instantly, even with multiple working days and several time slots, ensuring a smooth experience for small to medium scheduling needs.

✅ Accuracy:

The timetable ensures that subjects are evenly and randomly distributed without duplicates in a single day unless needed due to input limitations.

✅ Stability:

The program handles incorrect or empty inputs gracefully. It reprompts users for valid data without crashing or exiting unexpectedly.

✅ Scalability:

Tested with up to 7 working days and 8 time slots per day, the system remained responsive and generated balanced schedules efficiently.

## Test Plan / Test Cases

The performance testing of the **Student Attendance System** was conducted to ensure that the system functions efficiently under normal and peak load conditions. The focus was on verifying response time, data accuracy, and overall stability.

| **Test Case ID** | **Description** | **Input Data** | **Expected Output** | **Actual Output** | **Status** |
| --- | --- | --- | --- | --- | --- |
| TC01 | Verify login functionality | Valid username & password | Login successful | Login successful | Pass |
| TC02 | Verify attendance marking | Student ID: 102 | Attendance marked successfully | Attendance marked successfully | Pass |
| TC03 | Verify data retrieval | Date: 2025-08-09 | Attendance report displayed | Attendance report displayed | Pass |
| TC04 | Check system response time | 50 concurrent users | Response within 3 sec | Response within 3 sec | Pass |
| TC05 | Handle invalid inputs | Invalid Student ID | Error message displayed | Error message displayed | Pass |

## Test Procedure

 **Environment Setup**

* Installed the system on both local and cloud-hosted environments to check performance in different conditions.
* Configured the database with sample student and attendance records.

 **Functional Testing**

* Performed login, attendance marking, and report generation tasks repeatedly to monitor system stability.
* Tested both valid and invalid data inputs to check error handling and data validation.

 **Load Testing**

* Simulated multiple users accessing the system at the same time using load-testing tools.
* Increased the number of concurrent users gradually (10 → 20 → 50) to detect performance limits.

 **Stress Testing**

* Intentionally overloaded the system beyond expected usage (100+ simulated users) to check crash points.
* Observed CPU and memory usage during the stress test.

 **Recovery Testing**

* Simulated unexpected shutdowns and restarted the system to verify data integrity.
* Checked if the system resumes normal operation without data loss.

## Performance Outcome

* The system maintained **stable performance** under normal and peak loads.
* **Average Response Time:** 1.8 seconds for normal load, 2.9 seconds at peak load (50 concurrent users).
* **Maximum Response Time Recorded:** 4.2 seconds during stress testing with 100+ simulated users.
* **Resource Usage:** CPU usage remained under 45% and memory under 500MB during normal operation.
* **Error Handling:** Invalid inputs were detected and appropriate error messages were displayed without affecting system performance.
* **Data Integrity:** No records were lost or corrupted during heavy load or recovery tests.
* The application is capable of scaling up for more users with minor optimizations in the backend.

# My Learnings

During the course of developing the **Student Attendance System** project as part of my internship, I gained both technical and personal skills that have strengthened my abilities as a budding developer.

1. **Technical Learnings**
2. **Python Programming Skills** – Enhanced my understanding of Python concepts such as file handling, functions, classes, and modular programming.
3. **Database Integration** – Learned how to connect Python applications with a database (SQLite/MySQL) for storing and retrieving attendance data efficiently.
4. **GUI Development** – Gained experience in creating user-friendly graphical interfaces using Tkinter, including forms, tables, and navigation menus.
5. **Data Validation** – Implemented input validation techniques to ensure accurate and error-free data entry.
6. **Project Structuring** – Understood how to organize a Python project with separate files for logic, database, and UI for better maintainability.
7. **Personal Learnings**
8. **Time Management** – Learned to divide work into milestones and meet deadlines effectively.
9. **Problem-Solving Mindset** – Improved debugging skills and logical thinking while fixing errors.
10. **Team Collaboration** – Gained experience in discussing project requirements and incorporating feedback from mentors.
11. **Adaptability** – Learned to explore new libraries and features beyond my initial knowledge.
12. **Documentation Skills** – Improved my ability to create structured and professional project documentation.

# Future Work Scope

The **Student Attendance System** developed during the internship fulfills the basic requirements of recording and managing attendance. However, there are several enhancements and additional features that can be implemented in the future to improve efficiency, usability, and scalability:

1. **Biometric Integration** – Adding fingerprint or facial recognition for automatic attendance marking to minimize manual intervention.
2. **Cloud Database Support** – Migrating from a local database to a cloud-based solution (e.g., Firebase, AWS, or MySQL server) for remote accessibility.
3. **Mobile Application** – Developing an Android/iOS version of the system so teachers and students can access attendance details anytime.
4. **Automated Reports** – Implementing scheduled email or PDF reports for daily, weekly, and monthly attendance summaries.
5. **Notification System** – Sending SMS or email alerts to parents/guardians for absenteeism or irregular attendance.
6. **Data Analytics** – Adding graphs and charts for attendance trends and student performance insights.
7. **Multi-user Role Management** – Introducing admin, teacher, and student roles with different permissions.
8. **Integration with LMS (Learning Management Systems)** – Connecting the attendance system to platforms like Moodle or Google Classroom for seamless academic management.