CSE7101- Capstone Project

Review-3

Wifi Based Classroom Attendance Application

Batch Number: CSE_56

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Problem Statement Number: PSCS_582

Organization: Presidency Univeristy

Category (Hardware / Software / Both) : SOFTWARE

Problem Description: This problem invites the development of a novel solution leveraging digital technology to address societal or administrative challenges within public services, sustainability, or governance.

Abstract

- This project presents a **WiFi-Based Classroom Attendance System** built using **Flask (Python)** and **SQLite**. The system allows students to mark their attendance by entering a unique secret code during active attendance sessions managed by the admin. The project is designed to simplify attendance tracking, reduce manual effort, and provide real-time attendance data with CSV export capability.

Objectives

- Build a web-based system for easy classroom attendance management.
- Enable students to mark attendance securely using a secret session code.
- Allow admins to start and stop attendance sessions dynamically.
- Provide real-time attendance monitoring and export session records as CSV.
- Ensure easy student data import from CSV files.
- Use lightweight technologies (Flask, SQLite) for a simple yet scalable solution.

Existing Methods and Drawbacks

Existing Methods

1. **Manual Attendance**: Faculty marks attendance on paper or spreadsheets.
2. **RFID-based Systems**: Students swipe RFID cards.
3. **Biometric Systems**: Fingerprint scanners or facial recognition.

Drawbacks

Method	Drawbacks
Manual Attendance	Time-consuming, prone to errors and proxy attendance.
RFID-based Systems	Requires additional hardware, prone to card sharing.
Biometric Systems	Expensive, complex to set up, potential privacy issues.

Github & Live demo link

- Github : https://github.com/Snigdha230920/wifi-attendance-capstone.git
- Live Demo :https://checkmate-1-pcyi.onrender.com/

Proposed method & feasibility study

Proposed Method

The proposed system relies on a simple **secret code mechanism**:

•Admin starts a session generating a random secret code.
•Students enter their roll number and the secret code.
•The system records their attendance in the database.

Feasibility Study

Criteria	Evaluation
Ease of Use	Simple student interface using a web form.
Cost Efficiency	No extra hardware required; uses Flask & SQLite.
Security	Admin generates random secret codes per session.
Real-Time Monitoring	Admin can view live attendance per section.
Data Export	Admin can export attendance as CSV for records.

Pseudo Code(MAIN SYSTEM FLOW)

```
START

LOAD login_page

USER enters credentials
IF credentials valid THEN
    role = get_user_role()

    IF role == "Admin" THEN
        LOAD admin_dashboard
        SHOW options: Manage Users, Register Faces, View Reports, Audit Logs

    ELSE IF role == "Teacher" THEN
        LOAD teacher_dashboard
        SHOW options: Create Session, View Students, View Reports

    ELSE IF role == "Student" THEN
        LOAD student_dashboard
        SHOW options: Join Session, Mark Attendance, View Attendance
    ENDIF
ELSE
    SHOW "Invalid Login"
END IF
```

Pseudo Code(ADMIN MODULE)

```
FUNCTION register_face(user_id):
    OPEN camera
    CAPTURE image
    STORE image in face_dataset
    LOG event in audit_logs
END FUNCTION

FUNCTION generate_reports():
    FETCH attendance_data
    FORMAT into tables/graphs
    DISPLAY report
END FUNCTION
```

Pseudo Code(TEACHER MODULE)

```
FUNCTION create_session():
    GENERATE session_code
    SET session_timer
    BROADCAST session_code to students
    STORE session in database
END FUNCTION

FUNCTION monitor_attendance():
    FETCH students_marked
    DISPLAY live list
END FUNCTION
```

Pseudo code (STUDENT ATTENDANCE MARKING)

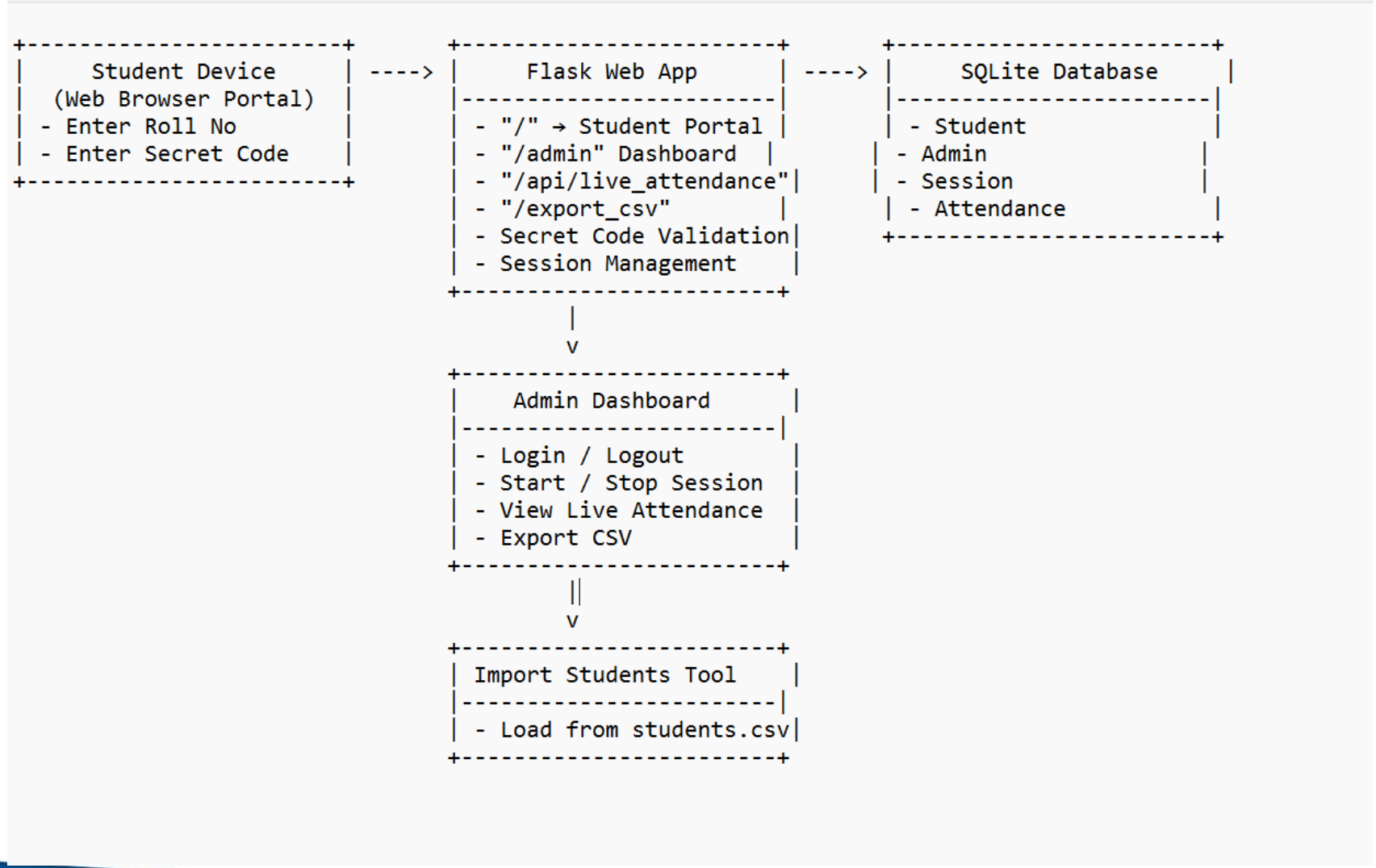
```
FUNCTION mark_attendance():
    CHECK if connected to allowed WiFi
    CAPTURE face_image
    MATCH with stored face_data

    IF match_success THEN
        UPDATE attendance_table
        SHOW "Attendance Marked"
    ELSE
        SHOW "Face Not Recognized"
    ENDIF
END FUNCTION
```

Algorithm Details

- **Login & Role Identification**
  - User enters credentials → System verifies → Redirect to Admin/Teacher/Student dashboard.
- **Session Creation (Teacher)**
  - Teacher creates a session → System generates unique code → Starts timer → Stores session.
- **WiFi Validation (Student)**
  - Student enters session code → System checks allowed WiFi → If mismatch → Reject.
- **Face Verification (Student)**
  - Camera captures image → Preprocess & encode → Compare with stored face data.
  - If match → Mark attendance with timestamp → Store in DB.
  - Else → Reject.
- **Live Monitoring (Teacher)**
  - System updates live attendance list during session timer.
- **Admin Operations**
  - Manage users, register faces, view logs, generate reports.
- **Report Generation**
  - Filter attendance → Compile present/absent → Display tables/graphs.

Architecture Diagram



Modules

- **Student Portal**
- Enter Roll Number and Secret Code.
- Displays success, warning, or error messages based on attendance validation.

- **Admin Dashboard**
- Admin Login/Logout.
- Start/Stop Attendance Session (generates a secret code).
- View live attendance.
- Export attendance data as CSV.

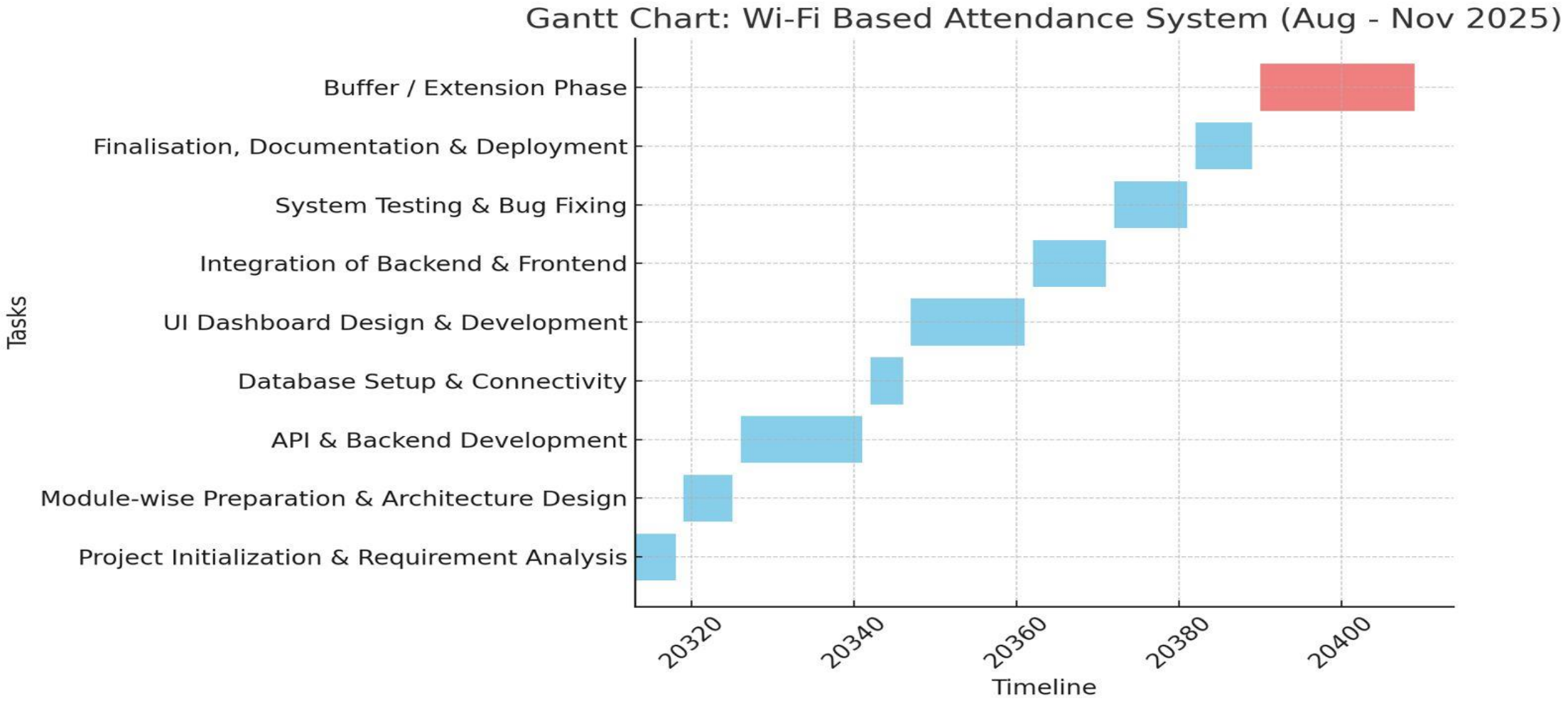
- **Database Models**
- Student, Admin, Session, Attendance.

- **Data Import Utility**
- Bulk student import from students.csv

Hardware and Software Details

Hardware	Any computer with browser access. No specialized hardware needed.
Software	- Flask 3.0.3 - Flask-SQLAlchemy 3.1.1 - Werkzeug 3.0.3 - SQLite (built-in) - Python 3.8+ - Web browser (Chrome, Firefox, etc.)

Timeline (Gantt chart)



References (IEEE Paper format)

- [1] "WiFi-Based Attendance Systems – Concepts and Implementations," *ResearchGate*. [Online]. Available: https://www.researchgate.net/publication/281528103_Attendance_Check_System_and_Implementation_for_Wi-Fi_Networks_Supporting_Unlimited_Number_of_Concurrent_Connections [Accessed: Sep. 6, 2025].

- [2] N. Ramakrishnan, M. Sundaram, A. A., S. V., and A. Ali, "Wi-Fi Based Smart Attendance Monitoring System," *ResearchGate*, Dec. 18, 2023. [Online]. Available: https://www.researchgate.net/publication/376345230_Wi-Fi_Based_Smart_Attendance_Monitoring_System [Accessed: Sep. 6, 2025].


Thank
You!