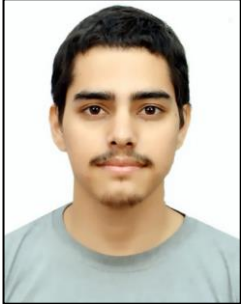# PROJECT AND TEAM INFORMATION

PROJECT TITLE

ADVANCED REAL TIME ATTENDANCE MANGEMENT SYSTEM (ARTAMS)

STUDENT / TEAM INFORMATION

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PROPOSAL DESCRIPTION

Motivation

Traditional attendance methods like manual registers, RFID card swipes, or static QR codes are often vulnerable to misuse. Students can mark attendance for friends, share QR code screenshots, or fake their location to appear present, leading to proxy attendance. This undermines fairness and the reliability of attendance records, affecting evaluations based on attendance.

To overcome these issues, our project introduces an attendance system that uses dynamic QR codes combined with geolocation verification. Dynamic QR codes refresh regularly, preventing unauthorized sharing or reuse. Location verification ensures students are physically present in the classroom at the time of marking attendance.

By combining these security measures, the system minimizes proxy attendance and manipulation. This creates a more transparent, reliable, and tamper-resistant way to track attendance, helping maintain academic integrity and ensuring fair attendance-based assessments.

State of the Art / Current solution

- ***Dynamic QR Codes:*** *QR codes that change periodically to prevent proxy attendance and unauthorized sharing.*
- ***Geolocation Verification:*** *Use of GPS or geofencing to confirm attendees are physically present at the designated location.*

There are apps and platforms like OneTap Checkin and AttendanceApp that use these smart features. They make taking attendance quick and easy—often just a few seconds per student—and provide helpful dashboards for teachers to see who's present and who's not. These systems help keep attendance fair, accurate, and hassle-free for everyone involved.

Project Goals and Milestones

GOALS

- *Mark attendance for a 200+ student class in under 2 minutes.*

- *Core system implemented in C using explicit DSAs (hash tables, linked lists, stacks, queues, heaps/AVL) — for learning and performance.*

- *Ensure secure and reliable attendance tracking, preventing proxy attendance via dynamic QR codes and GPS-based location verification.*

The primary goal of this project is to develop a secure and reliable attendance system that effectively prevents proxy attendance and ensures accurate tracking of student presence. To achieve this, the system will integrate dynamic QR codes, location verification, and Wi-Fi validation to create multiple layers of security.

MILESTONES

- ***System Design & Database Schema*** *– Design architecture and structure using Firebase for storage.*

- ***Core Logic in C*** *– Implement main attendance algorithms with DSAs.*

- ***Web Integration*** *– Connect C backend with web interface via FastCGI.*

- ***Dynamic QR Module*** *– Generate and validate QR codes through the web interface.*

- ***Location Verification*** *– Use GPS/geofencing to validate student presence.*

- ***Testing & Audit Logging*** *– Test for spoofing, check accuracy, log all attempts.*

- ***Deployment & Documentation*** *– Deploy fully on web, provide documentation and usage guidelines.*

Project Approach

*For this project, we are creating a **web-based attendance system** that can be accessed from any device with a browser—no app download required. This ensures that students and teachers can use the system seamlessly on laptops, tablets, or smartphones.*

*The system will generate **dynamic QR codes** on the website that refresh periodically to prevent proxy attendance. Students will scan these QR codes directly through the web interface using their device's camera. To ensure students are physically present in class, the system will verify their **location using GPS/geofencing**.*

*The backend, implemented in **C with efficient data structures** (hash maps, queues, and indexed storage), will handle all attendance processing in real-time. FastCGI will expose this C logic as web APIs, allowing smooth communication between the backend and frontend. Attendance records and logs will be stored in **Firebase** with indexing for fast retrieval.*

*The website will be designed for **ease of use**: students can mark attendance quickly, and teachers can monitor records and generate reports effortlessly. Testing will be performed across multiple devices and browsers to ensure reliability and smooth performance.*

*By choosing a **web-based approach**, the system avoids compatibility issues, remains accessible anytime, anywhere, and provides a secure, fast, and user-friendly experience for marking attendance.*

System Architecture (High Level Diagram)
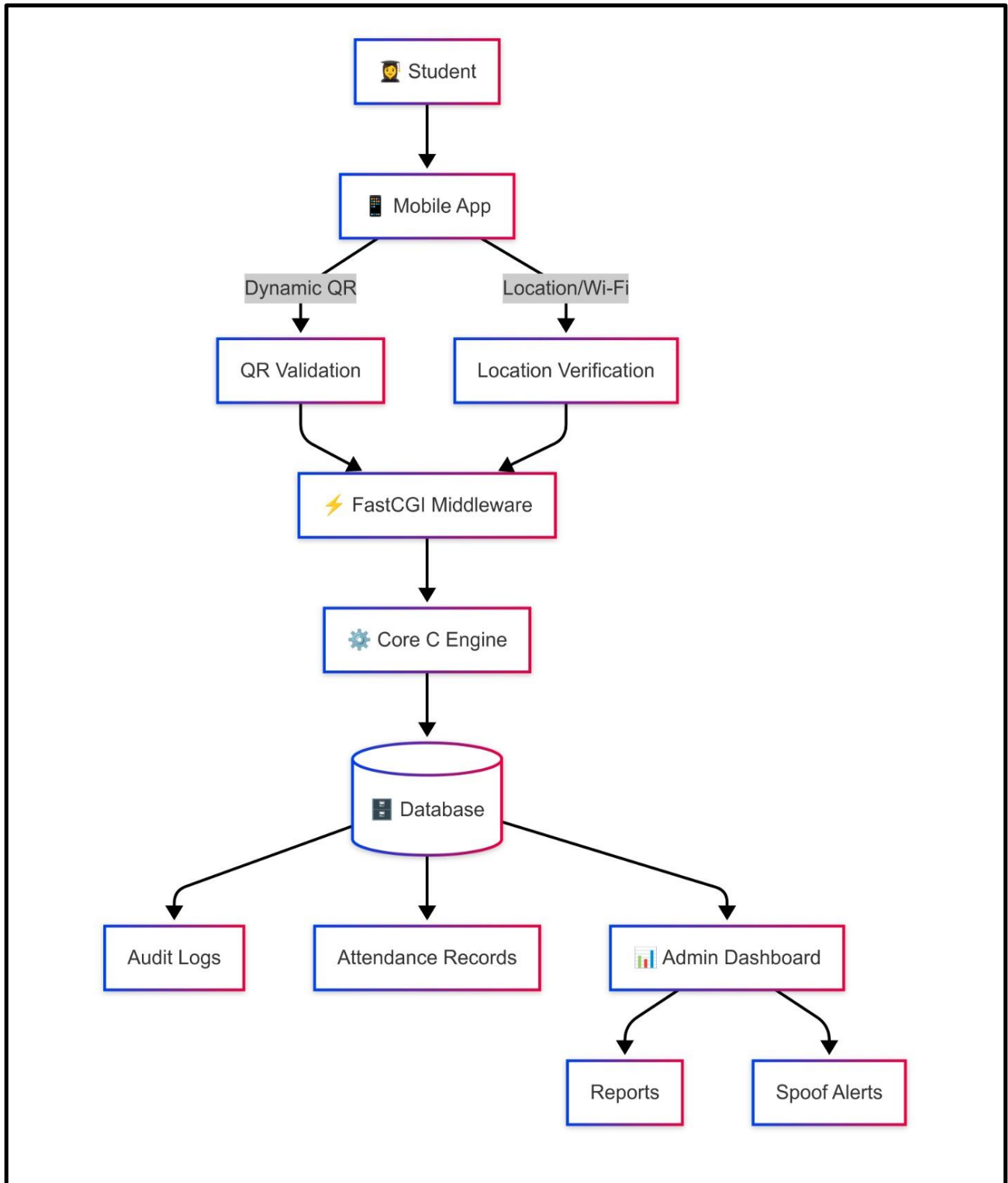
Project Outcome / Deliverables

- *Developed a secure and reliable attendance system that effectively minimizes proxy attendance and spoofing attempts.*

- *Implemented a dynamic QR code that refreshes regularly, preventing misuse through screenshots.*

- *Integrated location and Wi-Fi validation to ensure only students physically present and connected to the institution's network can mark attendance.*

- *Enhanced fairness and transparency in attendance tracking, supporting improved academic integrity.*

- *Designed a scalable solution adaptable across classrooms, departments, and multiple campuses.*

- *Reduced faculty workload by automating attendance recording and storing data in an easy-to-access database for streamlined reporting.*

Assumptions

- *Students carry smartphones with GPS enabled.*

- *The system can access students' location permissions without privacy violations.*

- *Faculty or system admin initiates the QR code generation during class.*

- *Students have a basic internet connection to scan QR codes and validate presence.*

- *Institutional servers or cloud infrastructure are available to host the system securely.*

References

- *Ramesh, A., & Kumar, V. (2020). Smart Attendance Systems Using QR Code and GPS Verification. International Journal of Computer Applications.*

- *Karia, D., & Desai, H. (2021). Hybrid Attendance Monitoring Using Dynamic QR and Network Validation. IEEE Conference on Smart Innovations.*

- *Priya, S., & Sharma, P. (2019). Enhancing Academic Integrity through Technology-Enabled Attendance Systems. Journal of Educational Technology.*

- *Official FastCGI Documentation – https://fastcgi-archives.github.io/*

- *Google Developers. Best Practices for Location and Wi-Fi APIs in Mobile Applications. https://developers.google.com*