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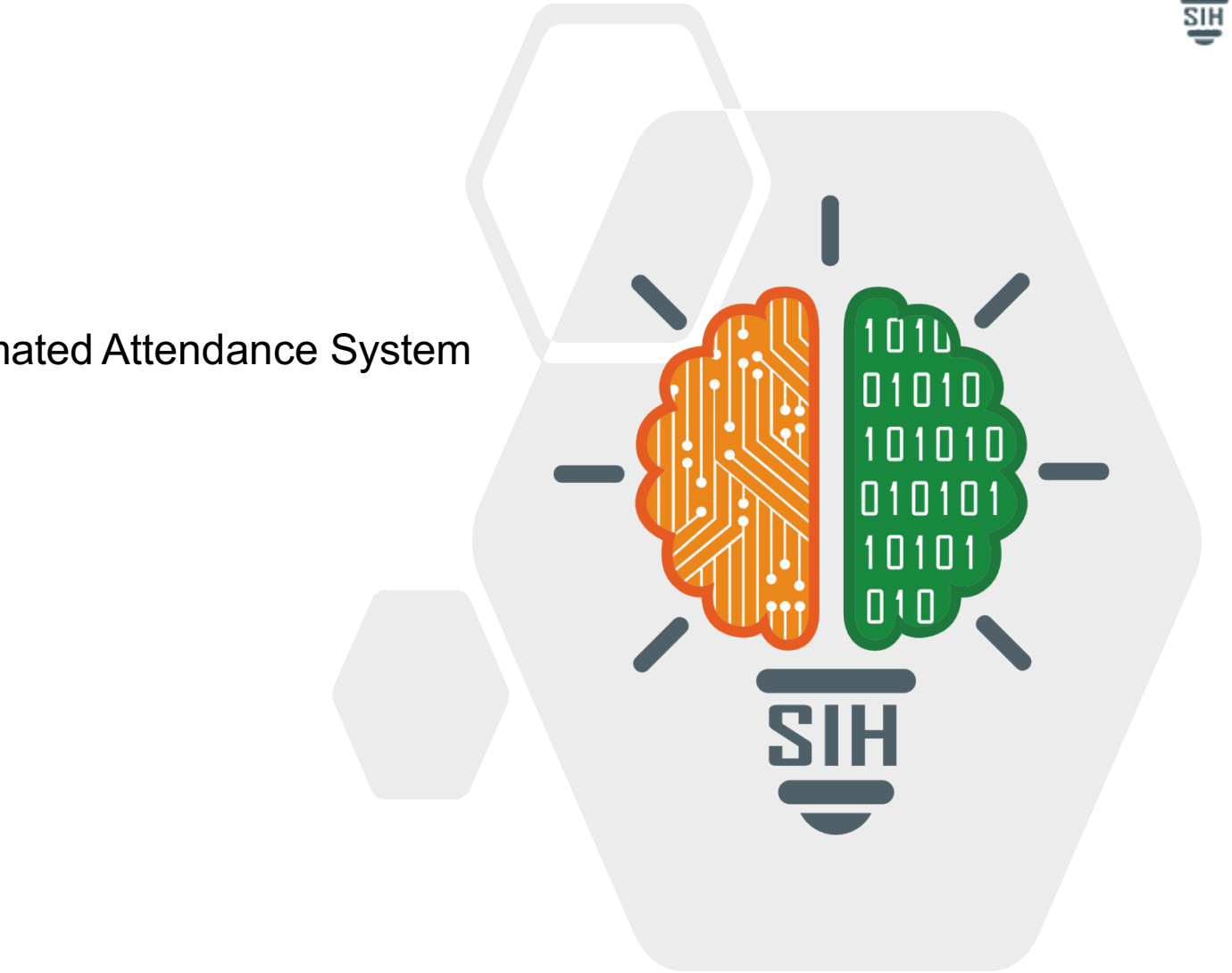
- **Problem Statement ID –** 25012
- **Problem Statement Title-** Automated Attendance System for Rural Schools
- **Theme-** Smart Education
- **PS Category-** Software
- **Team Name-** Cyber Knights



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Rural Attendance Automation

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❖ Proposed Solution

- Android teacher app that works fully offline and auto-syncs when network returns.
- **Three capture modes:** RFID/NFC tap, QR on student ID, and on-device face verification.

- **Detailed Explanation-**

  Select class → mark via RFID/QR/Face → local queue with hash-based deduplication → sync to server → dashboard and alerts update.

- **How it addresses the problem-**

  - Replaces error-prone manual registers, saving teacher time and reducing reporting delays.
  - Offline-first ensures reliable capture in rural areas; fast aggregation improves accuracy and timeliness.

- **Innovation and Uniqueness-**

  -Multi-mode capture selectable per class/day (RFID/QR/Face) plus conflict-free offline syncing tuned for low connectivity—avoids expensive hardware lock-in and keeps costs minimal.

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TECHNICAL APPROACH

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- **Technologies:**

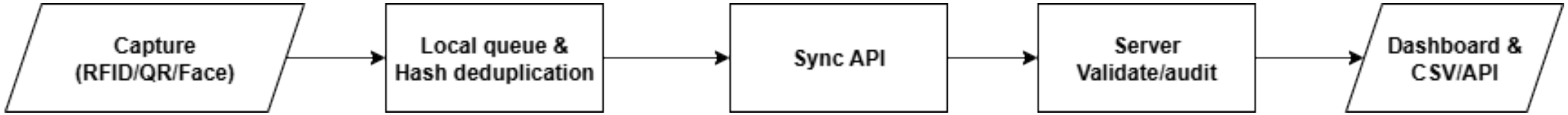
Mobile: Android (Kotlin) app with offline Room DB; CameraX for face, ZXing for QR, NFC APIs for RFID/NFC tap.

Backend: FastAPI/Node REST APIs, PostgreSQL, object storage; Redis queue for batched sync; JWT/OAuth2 auth; role-based access.

Deployment: State cloud/VM or Kubernetes; HTTPS/TLS; backup and audit logs.

- **Methodology/process:**

Offline-first: all actions work without internet; background worker retries with exponential backoff.



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FEASIBILITY AND VIABILITY

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- **Analysis of the feasibility of the idea**

  - Runs on existing Android phones; no compulsory biometric hardware, so rollout is low-cost and quick.
  - Offline-first with queued sync ensures reliable capture despite patchy rural connectivity.

- **Potential challenges and risks**

  - Network/power interruptions, proxy attempts, and privacy/acceptance concerns.
  - Training variability across schools can affect usage consistency.

- **Strategies for overcoming these challenges**

  - Offline queue with retry + multi-mode capture (RFID/QR/Face) to prevent proxies and keep costs low.
  - Privacy-by-design (on-device face, RBAC, consent) and short teacher onboarding with job-aids.

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IMPACT AND BENEFITS

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- **Potential impact-**
  - Saves teacher time and delivers same-day, accurate attendance to school → block → district, improving decisions for schemes and interventions.
  - Reduces proxies and improves punctuality/engagement, which correlates with better academic outcomes.
- **Benefits-**
  - Social: transparency for parents and faster support for at-risk students via timely alerts.
  - Economic/operational: lower admin workload and paper costs; minimal hardware using Android devices.

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RESEARCH AND REFERENCES

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- Multi-mode attendance background (RFID/QR/biometric practices in schools):
  - RFID School Attendance System in India | RFID Attendance in School – ETS
  - RFID System: Biometric Student Attendance System for Schools – Zimong Software Pvt. Ltd. – Best School ERP Provider in India
- Benefits/impact of automated attendance in education settings (time saved, accuracy, reporting):
  - www.creatrixcampus.com
  - www.oureclass.com

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Flow chart:

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