

# Plan : RFID Access Control (ESP32/TTGO LoRa32)

Student ID 40256377  
 Email y.belgha@concordia.ca  
 GitHub github.com/SilentOWings

## Progress Summary

Single node online access control runs on ESP32 with MFRC522, OLED, LEDs, touch, and a local web UI. A Node.js Express backend with Excel storage supports registration, room based access checks, counters, login stats, and card deletion. The potentiometer changes roomID to simulate multiple doors on one node. Core online paths are working end to end; remaining work is mainly hardware actuation, extra backend features, and security hardening. Overall progress is about 45% of the proposed scope.

### Subsystem Progress

Subsystem	Completion
RFID read pipeline	100%
Device web UI (/, /login, /register, /status, /login-hint)	85%
Registration flow (form to card to Excel)	85%
Access validation + counter update	85%
OLED, LEDs, touch status and delete mode	75%
Backend Excel integration and routes	90%
Room selection via potentiometer (multi room sim)	80%
Security (TLS, hashing, tokens, policy)	10%

### Completed Tasks

ID	Task
C1	Bring up ESP32, MFRC522, OLED, LEDs, touch, potentiometer.
C2	Local web server with pages for home, admin login, registration, and status.
C3	RFID path with UID read, registration window, access vs registration vs delete routing.
C4	Excel backed user store with load/save, counters, multi room string (roomID), access flag.
C5	End to end register and access flows including counter increments.
C6	Touch based delete mode with DELETE /user/:uid and OLED / LED feedback.
C7	Status and login pages showing last UID, lastStatus, HTTP codes, and JSON.

### Pending Tasks

ID	Task
P1	Wire and test relay, door sensor, and servo lock using existing status hooks.
P2	Refine roomID mapping and thresholds for stable multi room simulation.
P3	Add simple entry logging in the backend (timestamps and decisions).
P4	Add basic hardening (rate limits, safer error messages, simple auth checks).
P5	Clean up web UI for admin (better status, clearer errors).
P6	Refresh sequence and state diagrams for current endpoints and delete mode.
P7	Final integration tests, latency and reliability measurements, and report.

## Backend / Firmware Sync Status

Firmware uses /stats for admin login, /user/:uid?roomID=... for access, /register for new or appended rooms, /uid-name/:uid for login hints, and DELETE /user/:uid for deletion. Counters are incremented on granted access and pushed back to users.xlsx. The original multi service backend design is reduced to a single Express plus ExcelJS process for this prototype.

## Diagrams (Thumbnails)

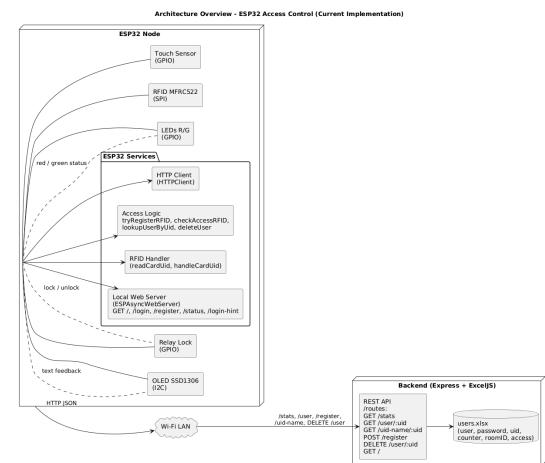


Figure 1: Architecture overview (current).

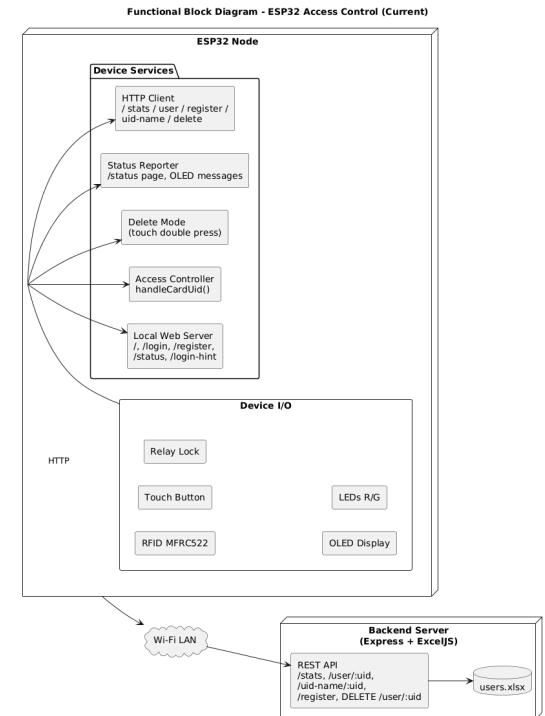


Figure 2: Functional block diagram.

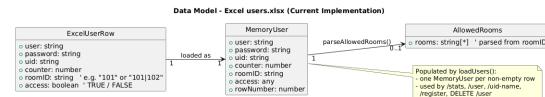


Figure 3: Data model vs Excel sheet.

## Risk Notes

Main risks are unfinished hardware actuation (relay, sensors), limited security, and extra backend features still open; scope is controlled by focusing on a robust single node, multi room simulation, and matching diagrams to the implemented design.

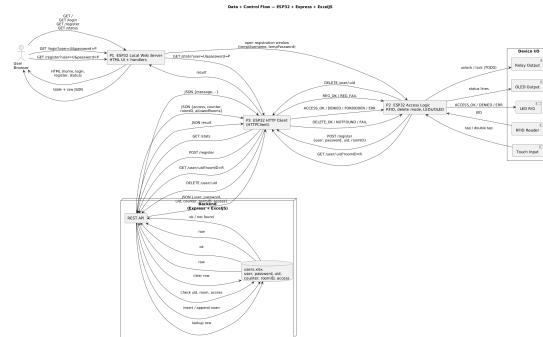


Figure 4: Data and control flow.

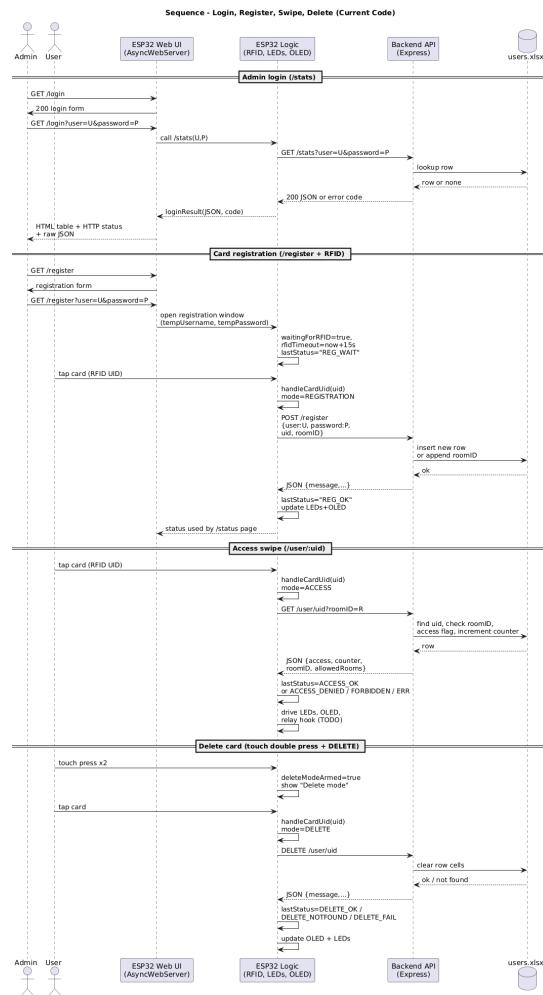


Figure 5: Main sequence diagram.

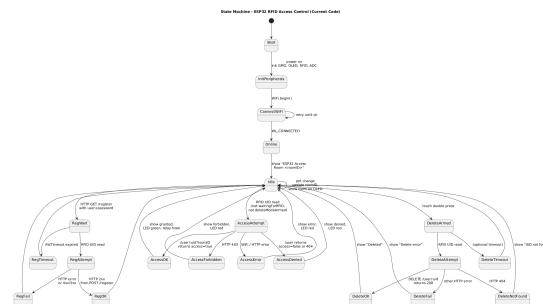


Figure 6: State machine.

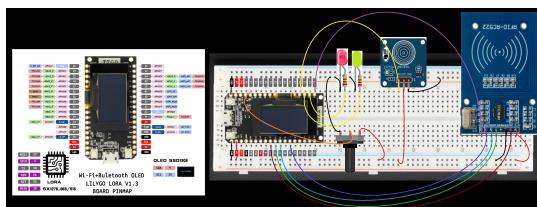


Figure 7: Circuit and wiring overview.