Preliminary Design Review (PDR)

Problem Statement

This system is designed to control access to a monitored room by detecting entry and exit events, confirming user health status, and regulating occupancy based on capacity limits. The system will rely on sensor-based contactless detection and a user-operated health verification mechanism. Occupancy levels will be clearly communicated using coloured LED indicators. This solution is intended to improve safety and room capacity awareness in public-access environments such as retail stores or labs.

System Requirements

1. The system shall detect when a person enters the monitored room.
2. The system shall detect when a person exits the monitored room.
3. The system shall maintain, update, and display a running count of the number of occupants in the room.
4. The system shall indicate occupancy levels using distinct visual cues corresponding to empty, low, medium, high, and full occupancy, as required by the customer.
5. The system shall restrict entry once the occupancy limit is reached. This limit shall be configurable by the system operator.
6. The system shall verify user health status prior to allowing entry, using a contactless or user-initiated method.
7. The system shall simulate door control by indicating whether entry is granted or denied.
8. The system shall allow unrestricted exit from the room at all times.
9. The system shall maintain an accurate count of current room occupants throughout operation.
10. The system shall provide confirmation to the user when entry is granted following a valid health verification.

Block Diagram