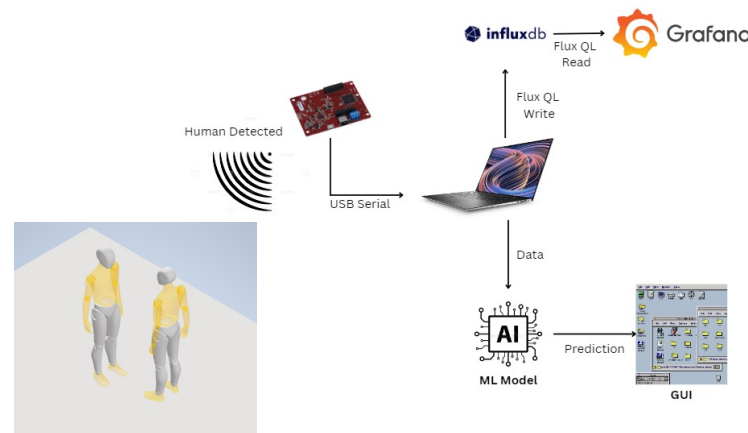


ROOM OCCUPANCY WITH RADAR TRACKING

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SYSTEM OVERVIEW

A system that accurately detects and tracks the number of occupants in a room using mmW radar technology (AWR1843)

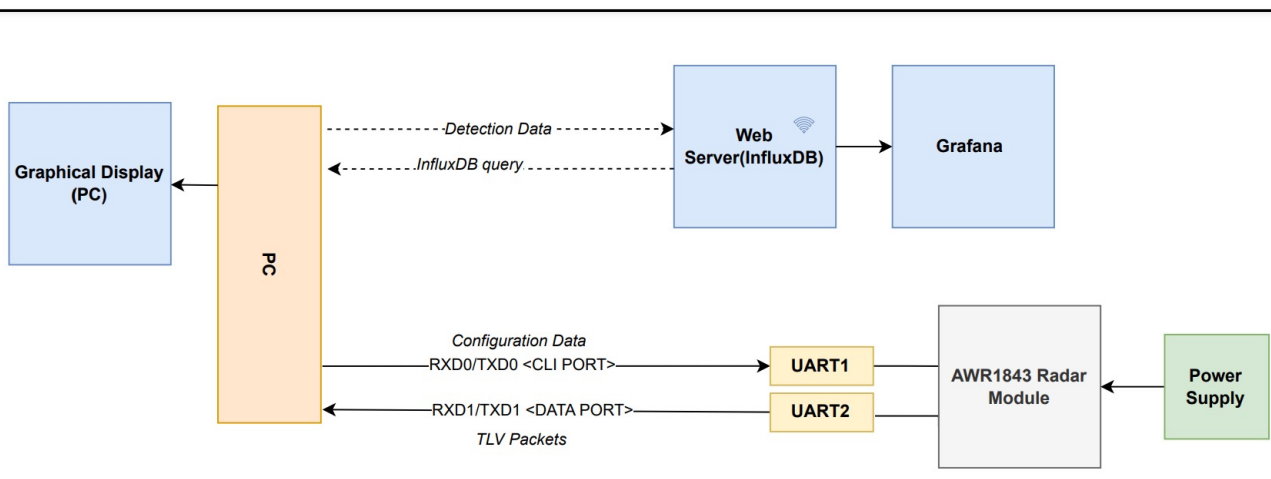


Methods:

- Clustering using DBSCAN
- Filtering using MAF
- Gaussian particle filtering with kernel size: $2 * \text{radius} + 1$
- Application of Kalman filter to center points to track moving occupants

Network:

- AWR communicates over UART using CLI with PC
- Relays information to Grafana dashboard using Flux QL



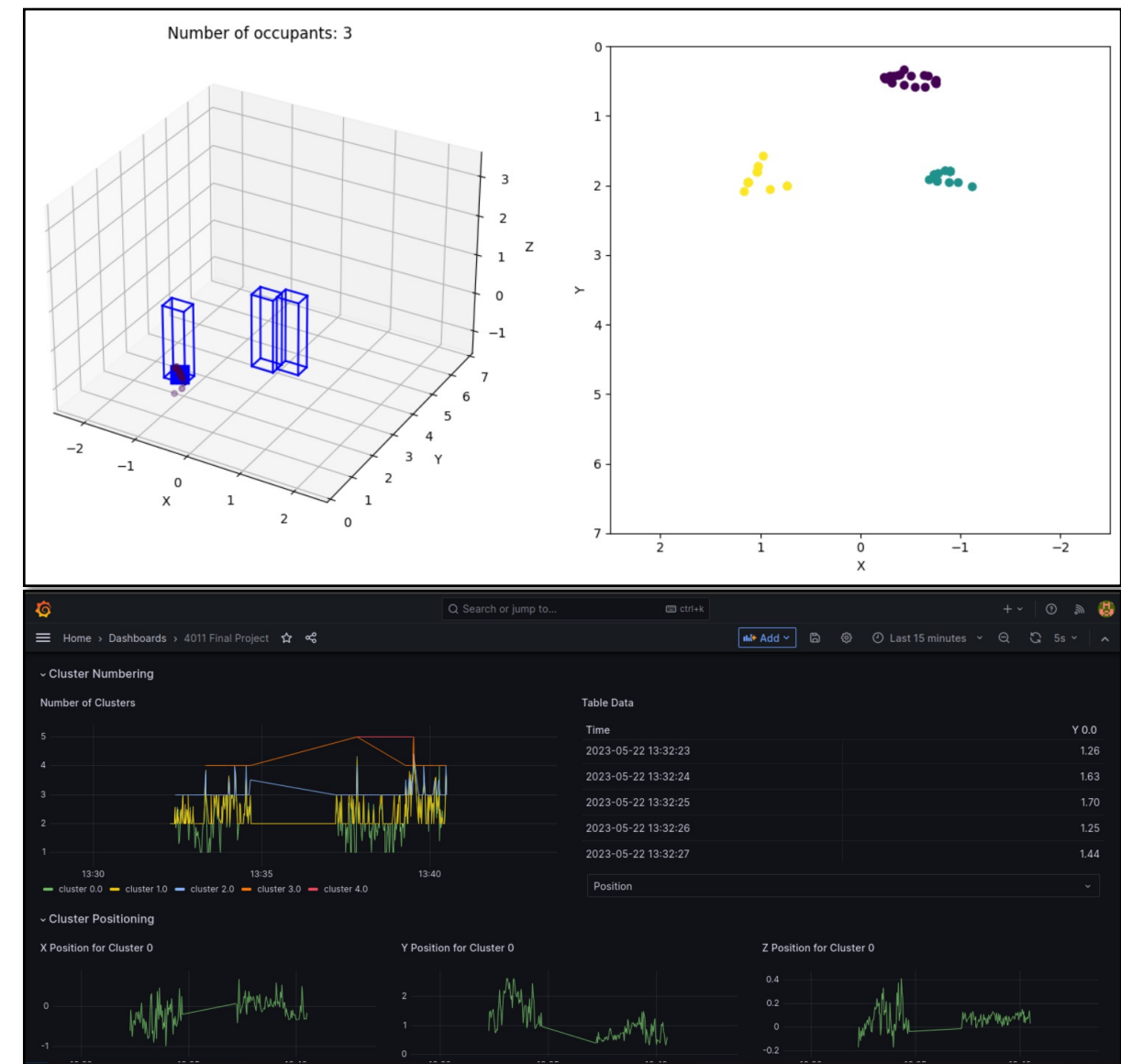
AIMS

1. Latency of mmW Rader: sampling rate $> 2\text{Hz}$.
2. Latency of Web dashboard: update rate $> 1\text{Hz}$.
3. Accuracy of Local GUI: ± 1 person
4. Latency of Local GUI: update rate $> 1\text{Hz}$
5. Resolution: 1m in a room size of 5m x 5m or smaller
6. Display: Display cluster points, bounding boxes and occupancy count
7. Detect human activity

CONFIGURABILITY & DEPLOYMENT

- Bounding box feature allows system to be easily integrated into human detection with a camera
- Potential for expansion with other algorithms e.g. SORT algorithm
- AWR Configuration parameters allow for advanced filtering and tracking capabilities
- Step-by-step instructions in README.md for public deployment

RESULTS



CONCLUSIONS

- Human activity detected
- mmW sampling rate of 10Hz
- Dashboard latency of 10Hz
- GUI latency of 10Hz
- GUI displays clusters, occupancy count and bounding boxes
- Occupancy prediction accuracy of ± 1 person
- Occupancy resolution of 0.2m
- Room size of 5x5m

