

# 3D Deep Learning-based Sensor Placement Optimization For Personalized Ageing-in-place

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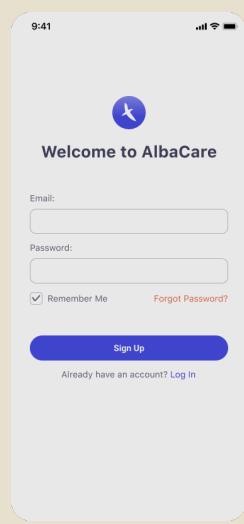
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## Project Objectives:

This project aims to implement a sensor placement optimization model for the self-designed ageing-in-place system. By processing the user-scanned living environment model, key furniture are identified to calculate appropriate position for each type of sensor to maximize their effect.

### System Overview

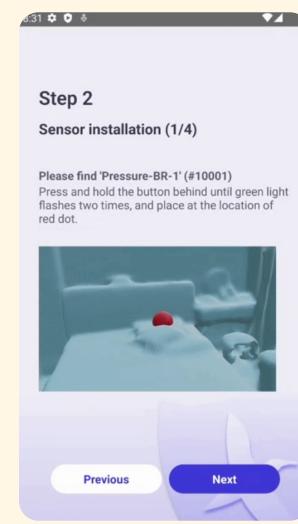
1. Become a user



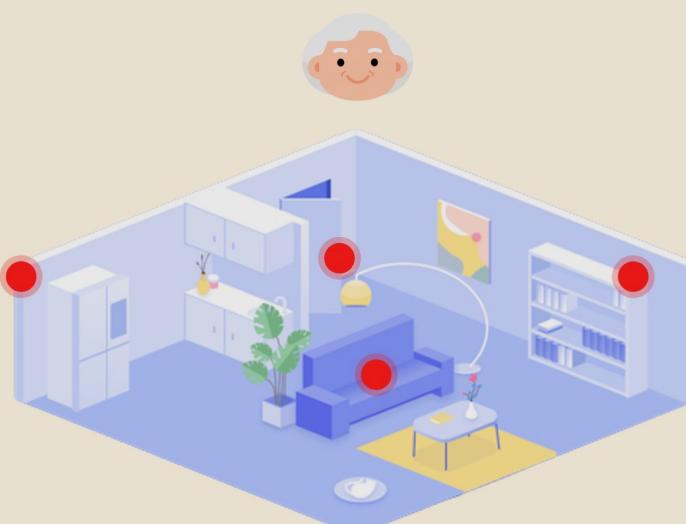
2. Scan the house



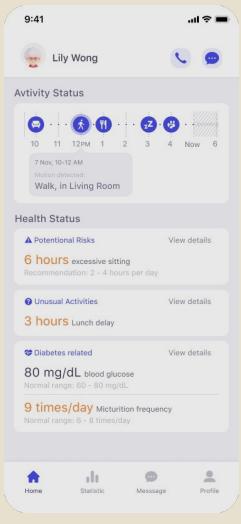
3. Purchase and install sensors following instructions



4. Behaviour data collection from daily activities



5. Check out weekly health report

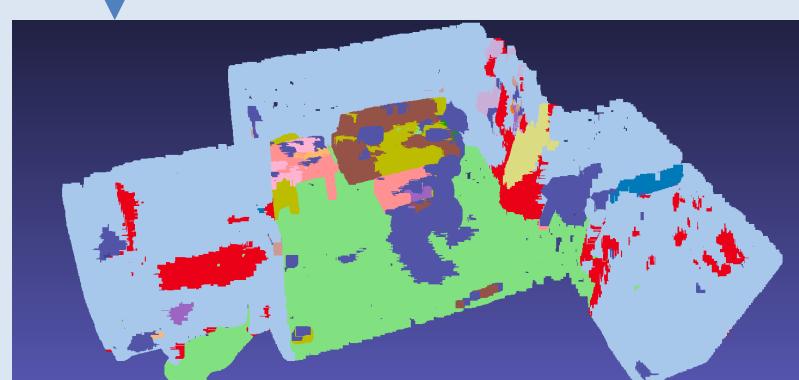
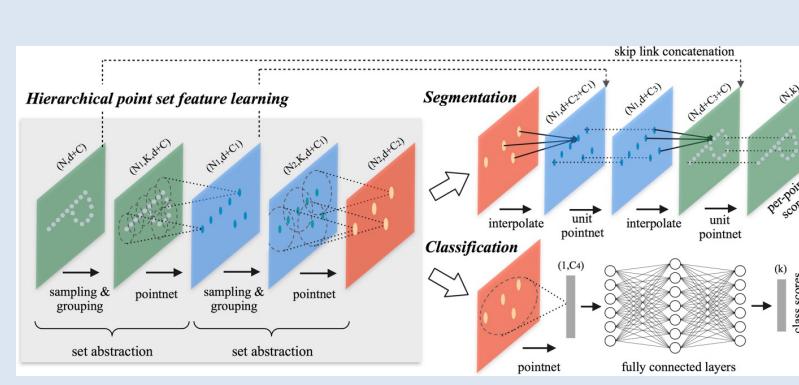


### 3D Semantic Segmentation - PointNet++



Model generated from video taken by user

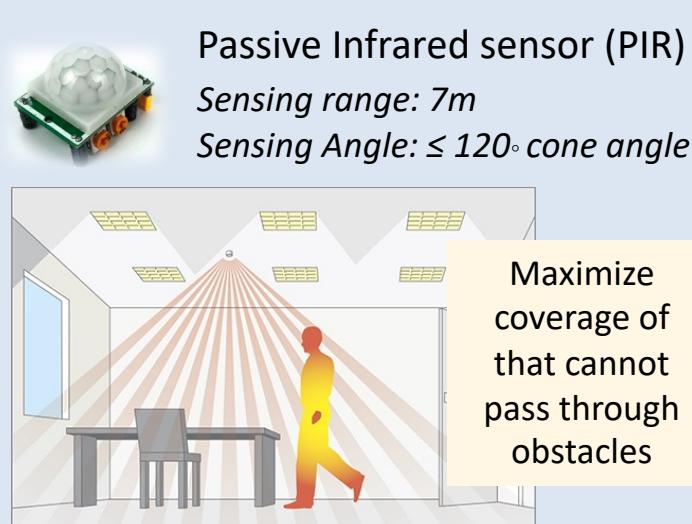
PointNet++



Segmented point cloud indicating key furniture

### Sensor Placement

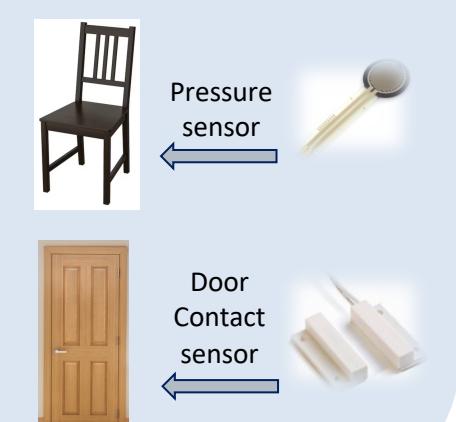
#### Coverage-based



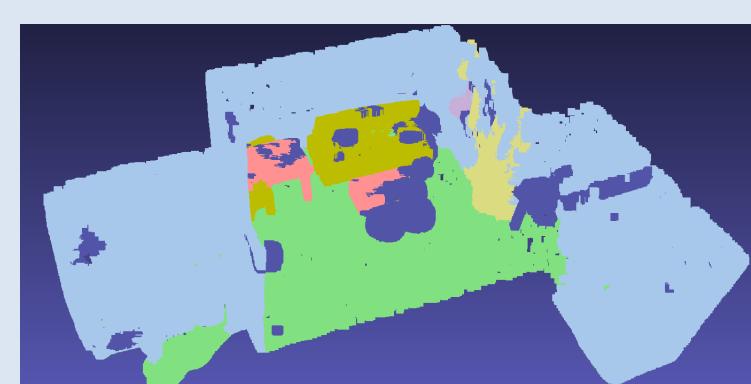
Passive Infrared sensor (PIR)  
Sensing range: 7m  
Sensing Angle:  $\leq 120^\circ$  cone angle

#### Location-based

Examples:



### Post-processing – label grouping and DBSCAN



Group similar labels (e.g., table and desk)

Re-classify or remove outlier clusters