NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Computer Science and Engineering
College of Engineering

Sensor-Based ElderCare Application

Involving 3D Reconstruction and Behaviour Detection

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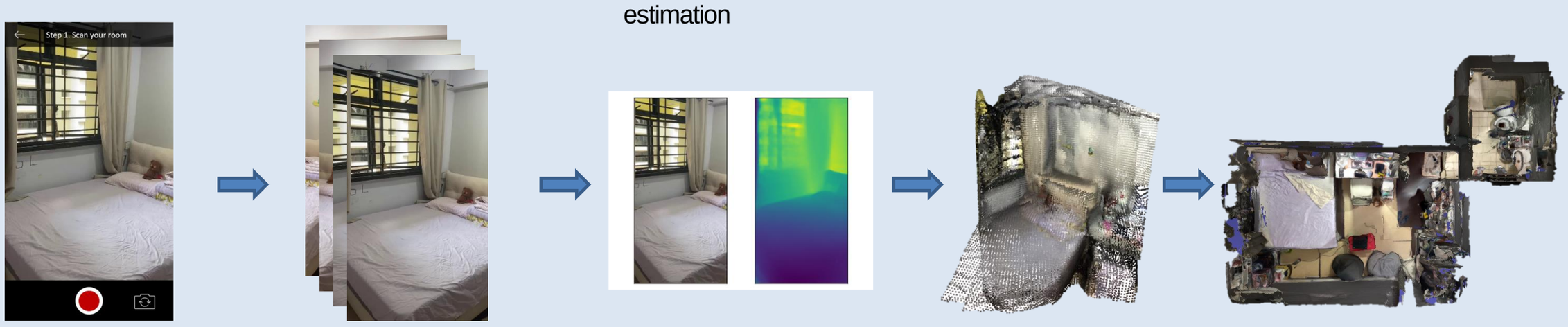
Project Objectives:

This project aims to develop a sensor-based eldercare system for families with elder relative living alone with a focus on 3D reconstruction from video and behaviour analysis model. Elder's home will be reconstructed from video taken, which will be used as the input for the sensor placement optimization model. After the installation of various sensors at elder's home, sensor data will be collected and used for behaviour analysis in this project.

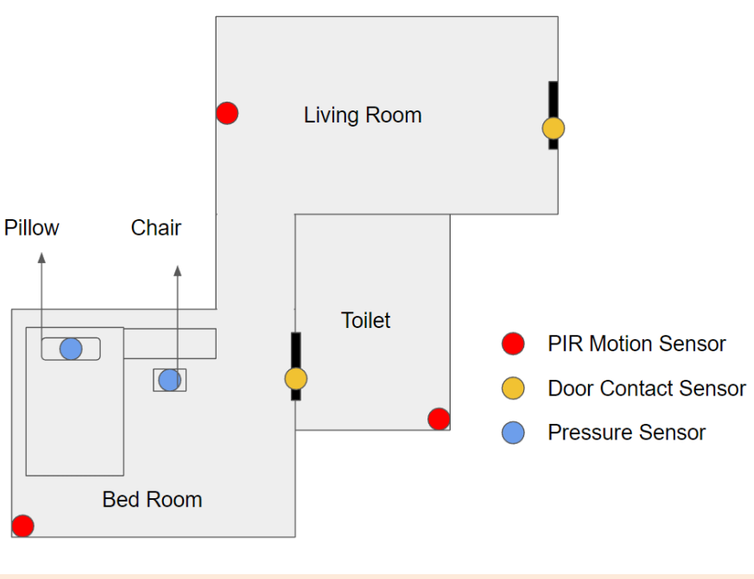
3D Reconstruction from video

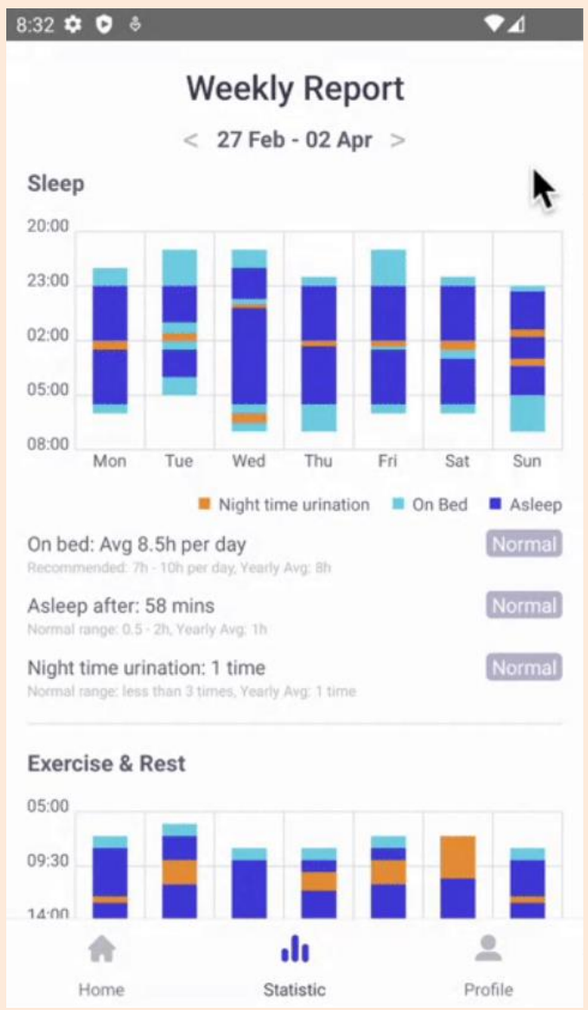
1. After login, user take video of elder's home
2. Split video to a sequence of frames
3. Depth information obtained by monocular depth estimation
4. Construct point cloud based on each frame
5. Multiway registration and post-processing to obtain the 3D model of the room.



Behavior Analysis

Key furniture will be identified from the 3D model generated, which will later be used to generate a customized set of sensor types and locations.





After the installation of sensors at elder's home, data collected from sensors will be used in the behavior analysis model to analyze living patterns.

Locations and behaviors of elder are predicted using machine learning. A weekly health report including sleep and movement status will be presented to the end-user to better understand the health status of elders.