LiDAR-based Indoor Positioning System

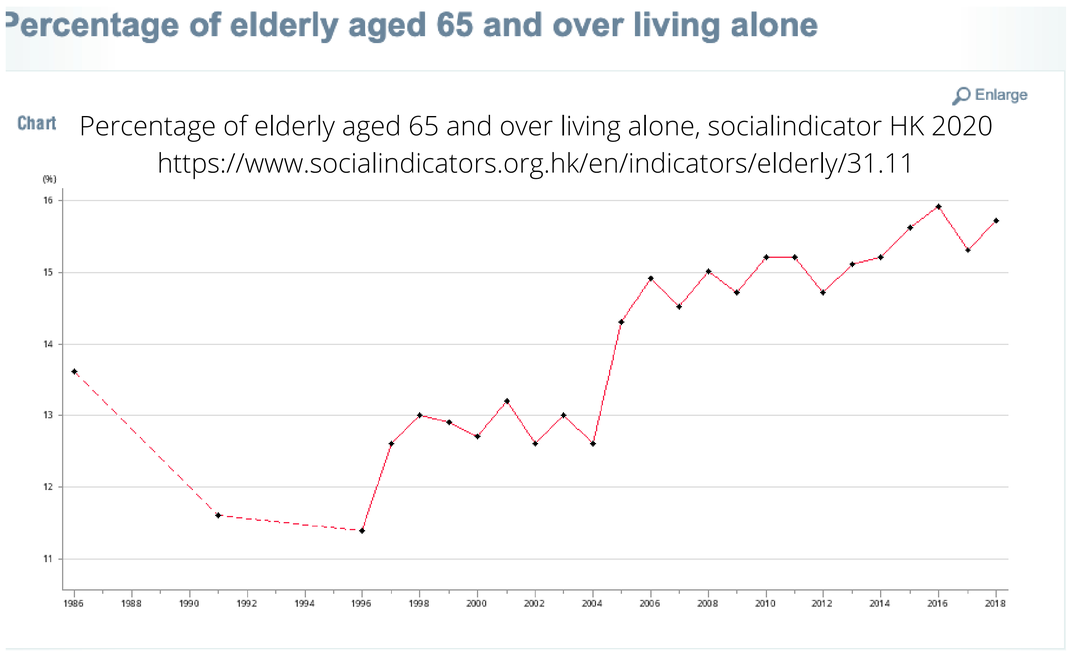
Department of Electrical Engineering
香港城市大學
City University of Hong Kong

Student: Li Kam Hung

Programme: BEngECE

Supervisor: Dr Chan, Andy H P

Problem & Existing limitations



- More elderly living alone has insufficient care/support
- Falling down/Heart attack is fatal to the alone elderly
- 24-hours monitoring at home is necessary for safety

Personal emergency button

Camera-based IPS

Wrist device

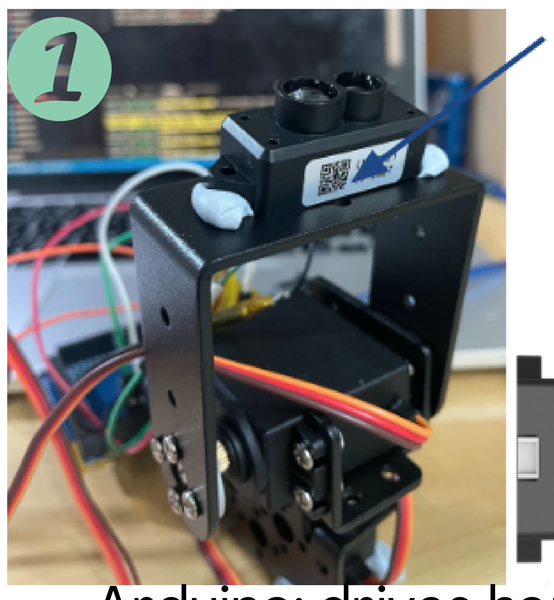
Eyeglasses

- No 3D mapping of inner room
- No feedback of height
- Must be carried Device along
- Data Privacy issue

Main Objectives : Monitoring movement and presence of the elderly

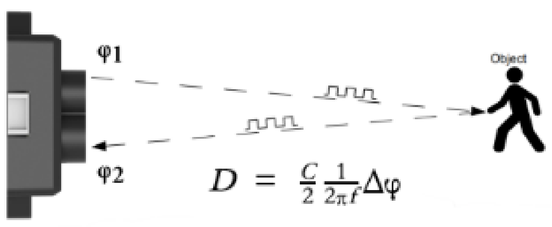
Methodology

1



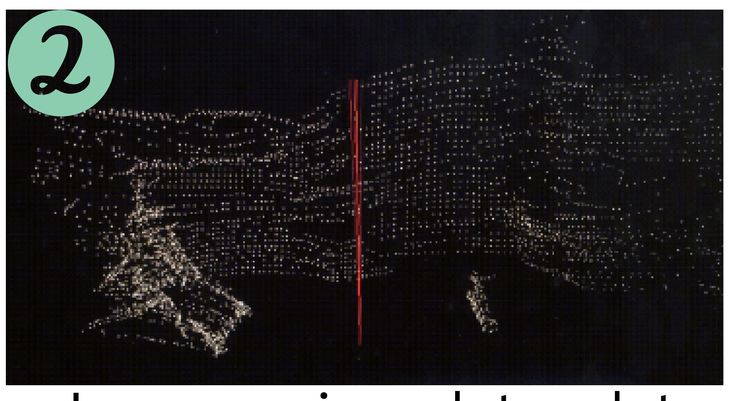
1 X TFMini micro LiDAR

2 X MG996R servo motors



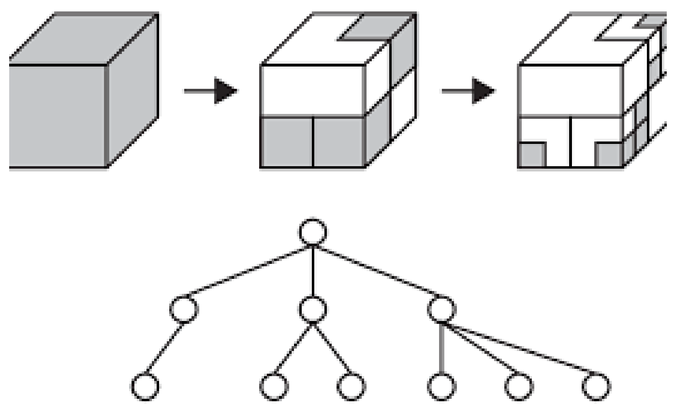
- Arduino: drives hardware & send out basic calculation

2

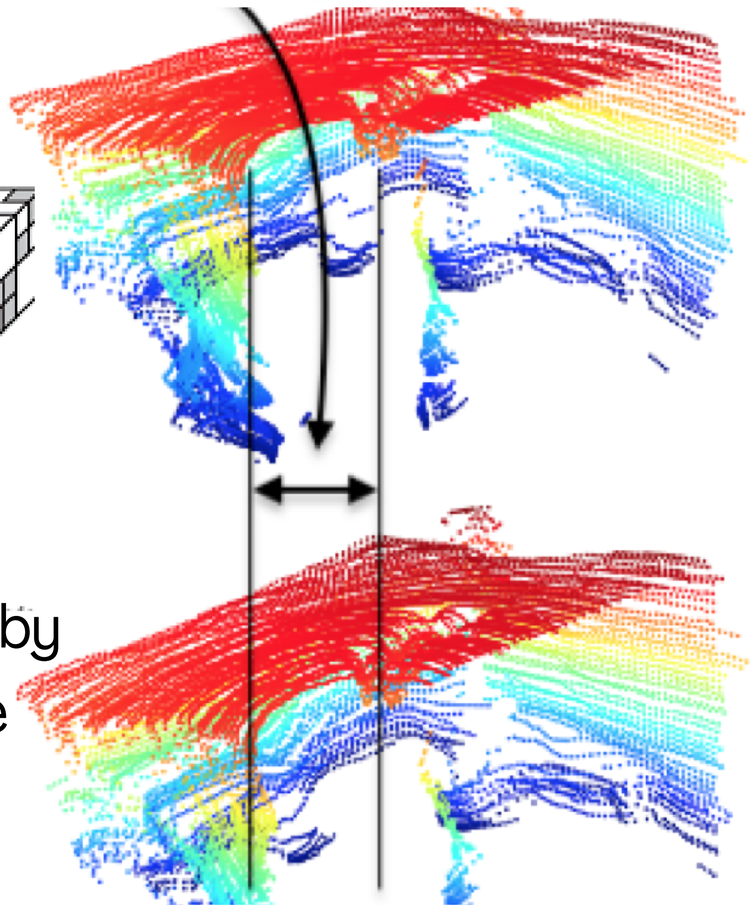


- Java: receives data, plot real-time graph

3 The longest consecutive indices of array of difference between cloud A and B = Moving path



Two point clouds comparsion by Octree Structure Difference



- Python with Open3D: txt-to-pcd & visualization
- C++ with PCL: Calculation & Analysis

Result

Action Classification:

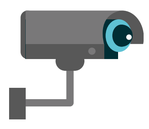
(1) Walking

(2) Staying still

(3) Falling

Error range: 6cm

Unique Advantages: (1) Price (2) Data Privacy



- Cheap (~$450 : X5 less than market)
- Not able to capture face or any personal photo