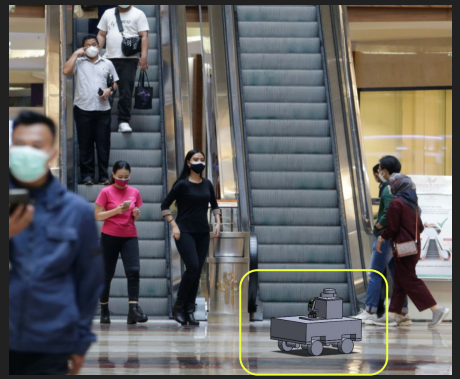
Cluster Tracker v2

Group 4

Contents

Changes



Previously

- Enforce social distancing with an autonomous ground robot via a LiDAR and camera

Now

- Stationary LiDAR tracks the clusters of people
- Autonomous drone alerts people who breach social distancing

Aim

To create an autonomous system that identifies and tracks clusters of people (size, inter-cluster interaction and distance) using LiDAR and enforce social distancing through an autonomous drone.

BOM

Components	Specifications	Total Price (excluding shipping, SGD)	Quantity
Power Supply	- Output voltage: 5V - Output current: 4000mA - Output power: 20W Max	13.80	1
LiDAR (360º)	- Range: 12m - Scan rate: 2-10Hz - Sample rate: 8000/s - Voltage supply: 5V	138.14	1
Drone	- Weight: 80g - Battery: 1.1Ah/3.8v - Flight time: 13 mins max - WiFi: 2.4 Ghz - Rangefinder	136.77	1

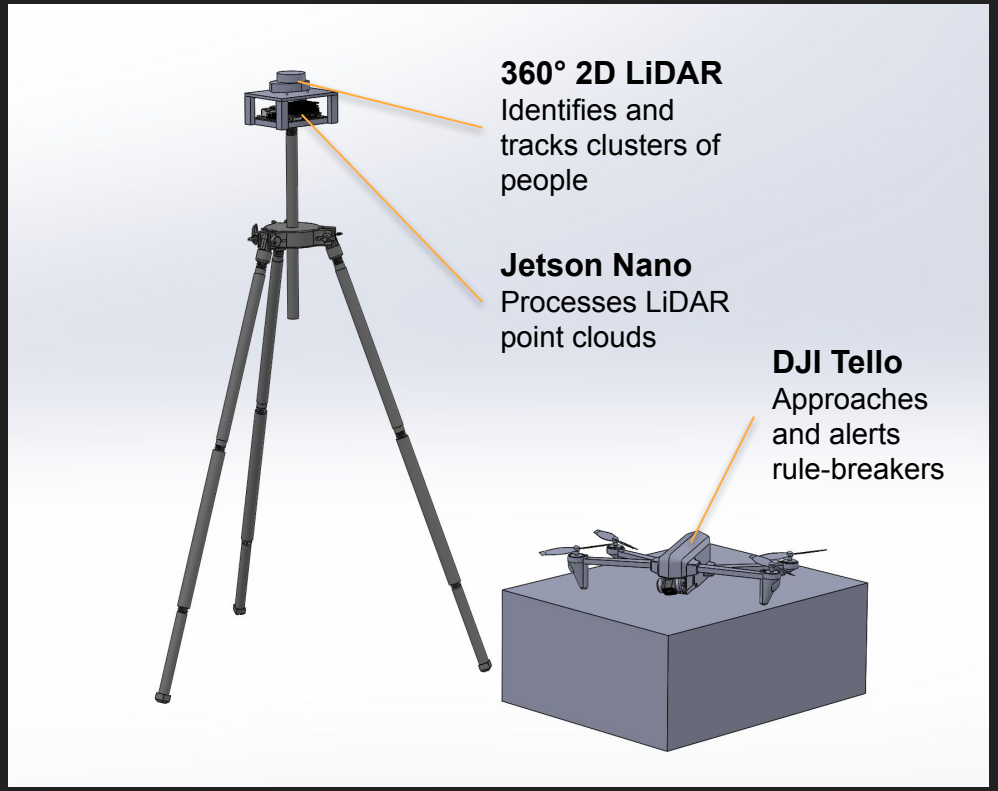
BOM

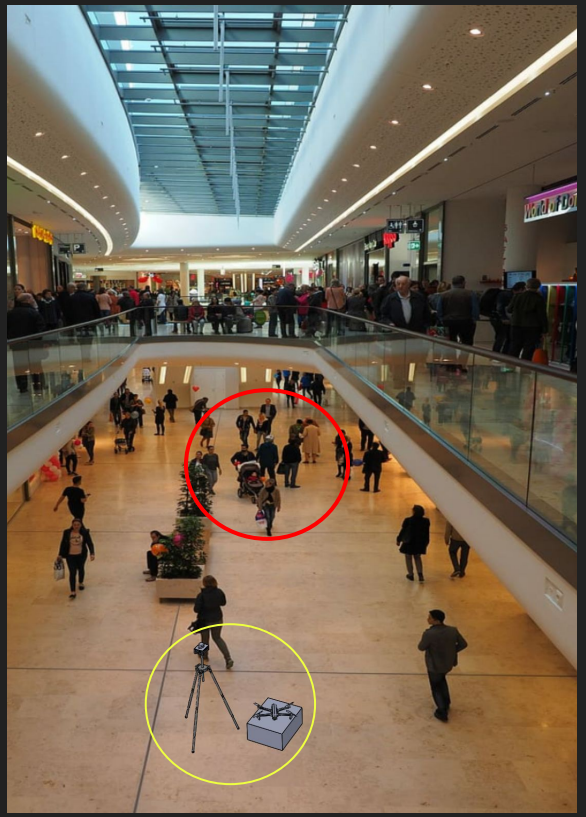
Components	Specifications	Total Price (excluding shipping, SGD)	Quantity
MicroSD Card	- Storage: 64Gb	3.99	1
NVIDIA Jetson Nano Developer Kit	- Memory: 2Gb - Power supply: 5W	87	1
Casing for Jetson Nano	- Material: acrylic - Dimensions : 110 x 88 x 42 mm - Add-ons: 5V cooling fan - Supports 2 WiFi antennas - Version: 2GB	18.90	1

BOM

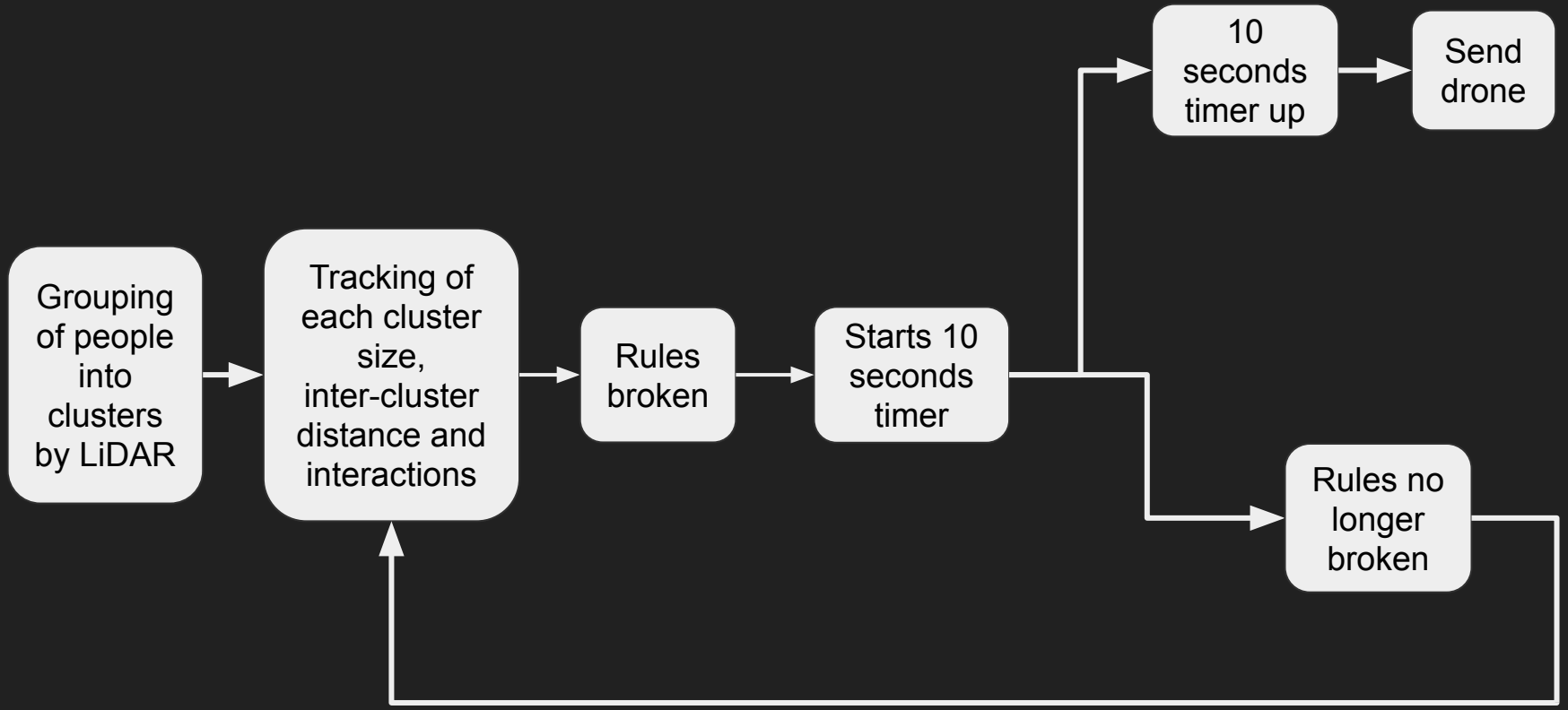
Components	Specifications	Total Price (excluding shipping, SGD)	Quantity
WiFi Card	- WiFi: 2.4/5Ghz dual band - Speed: 300/867 Mbps - Bluetooth: Bluetooth 4.2	19.71	1
		Total cost (incl shipping): **SGD 446.39** The longest estimated lead time: 2 weeks	

Mechanical Assembly





Algorithm


Grouping of people into clusters by LiDAR
Tracking of each cluster size, inter-cluster distance and interactions
Rules broken
Starts 10 seconds timer
10 seconds timer up
Send drone
Rules no longer broken

Models for Object Recognition

- YOLO V3 (point cloud data as people)
- Deep Sort (classify into unique people in the cluster)

Software

- Jetpack sdk (jetson nano)
- ROS

Timeline and milestones

Recess week	Detection of clusters
Week 7	Detection of exceeding cluster size; interim presentation
Week 8	Detection of 1m inter-cluster distance breached
Week 9	Detection of interaction between clusters
Week 10	Drone flying to the coordinates at a specific height; datasheet, initial demo
Week 11	Obstacle avoidance, payload delivery
Week 12	Extra time; project abstract and final datasheet
Week 13	Final presentation

Thank You!