IOT Final Project

Team: 跟不上我的速度吧 哈們!
Member: 309552012 洪立宇 310551134 傅信瑀
310551079 梁友誠 310552016 王廣達
All authors contributed equally to this work

Outline

- Motivation
- Hardware architecture
- Software architecture
- Algorithm
- Experiment and result
- Future work

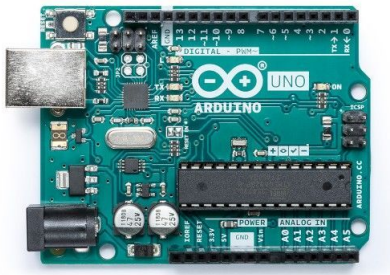
Motivation

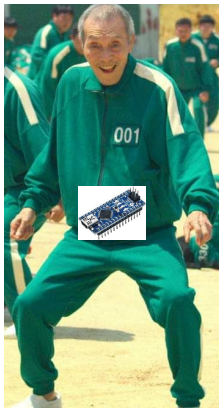

45.6 Billion Won
Is Child's Play
SQUID GAME
A NETFLIX SERIES
SEP 17 | NETFLIX

Hardware

- Arduino Nano 33 IOT * 2
- Web Camera
- Speakers
- Servomotors
- DFplayer (Mini mp3)

Hardware architecture





Player1

Arduino Nano 33 IOT
6-axis IMUs
WiFi module

Player2

\+

Laptop as server to compute the Videos and IMUs information for movement detection

Software architecture

Input

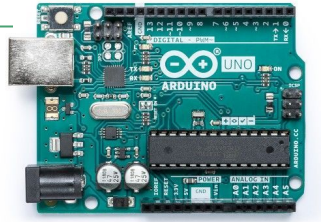
- IMUs accelerometer data
- Camera streaming
- Arduino signal

USB
Serial

Robot
Controls

Algorithm

signal



Nano as
IMU sender

WiFi Module
with MQTT

Output

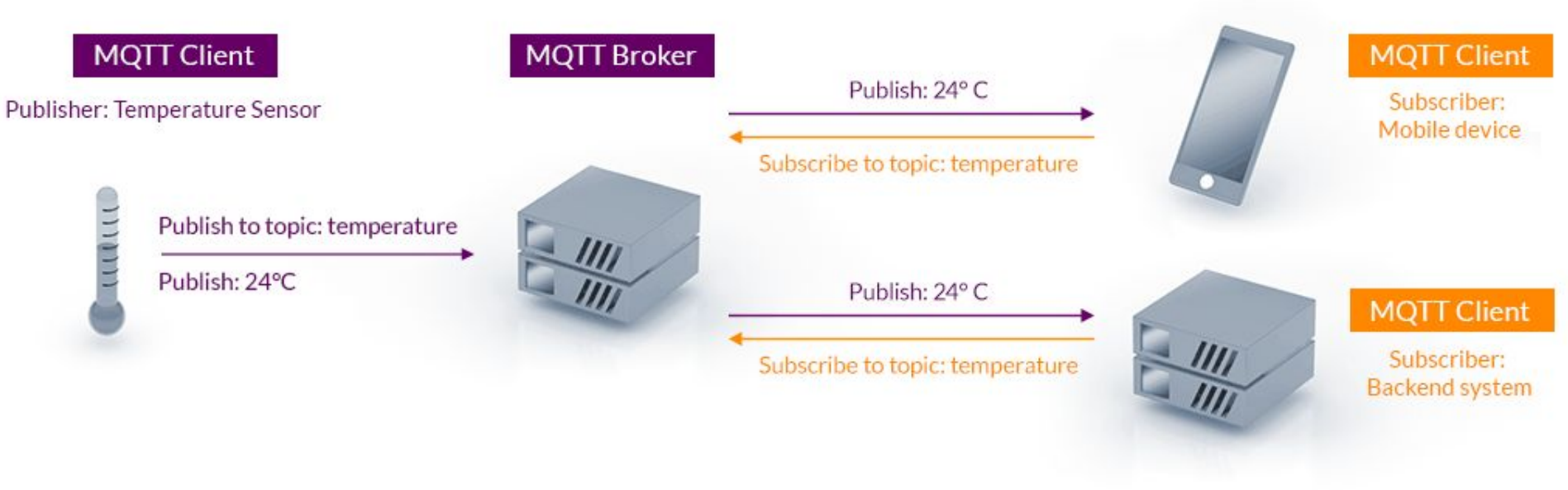
Move or Still

Nano as
result receiver

WiFi Module
with MQTT

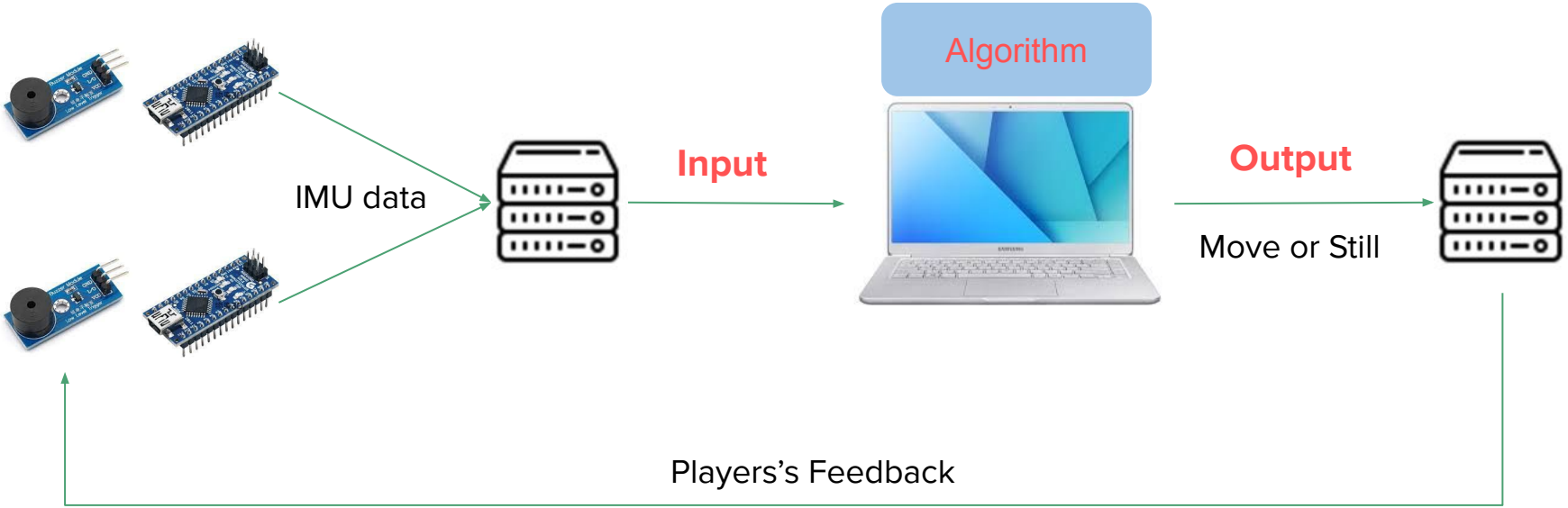
Intergration with MQTT

- MQTT Publish / Subscribe Architecture



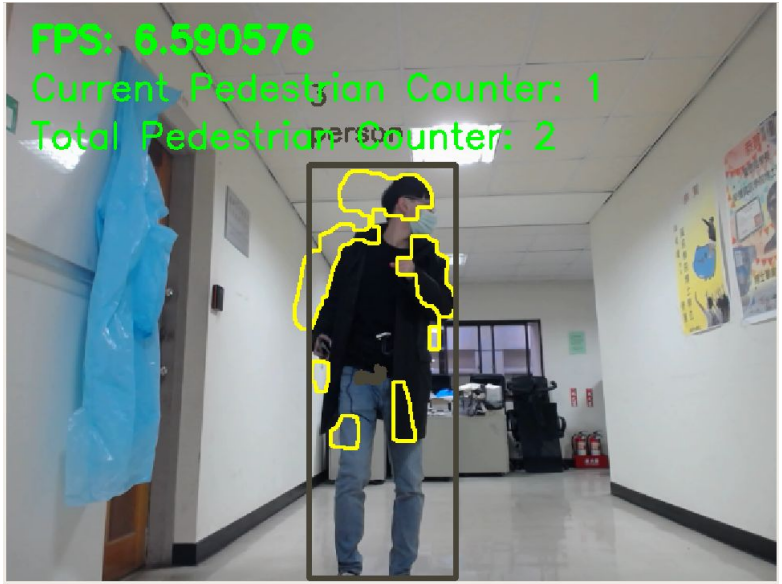
Intergration with MQTT

- MQTT Publish / Subscribe Architecture



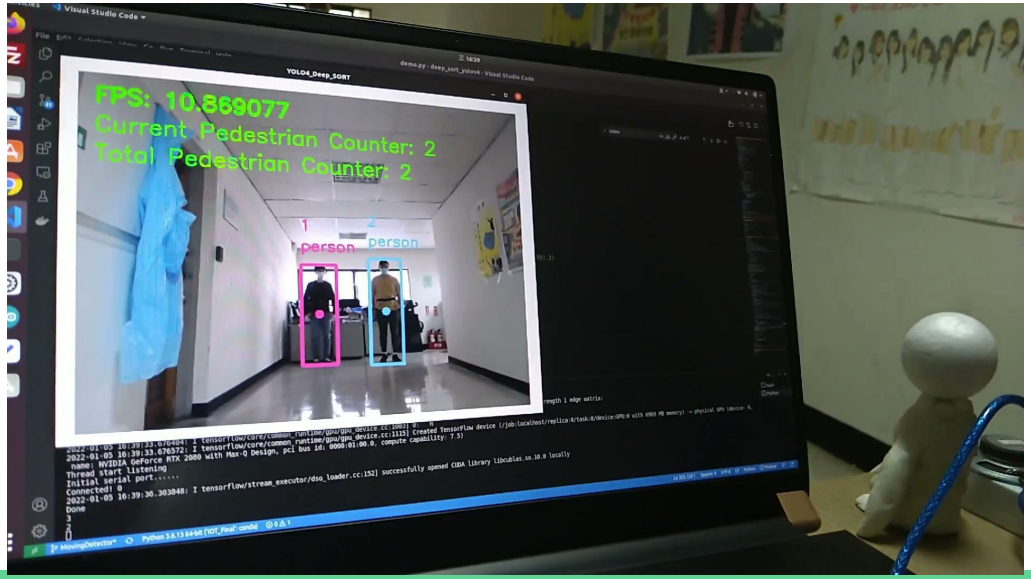
Algorithm

- Human bounding box detection and tracking with Yolov4
- Human movement detection with moving average (OpenCV) algorithm
- Calculate Intersection over Union between bounding box and moving contour

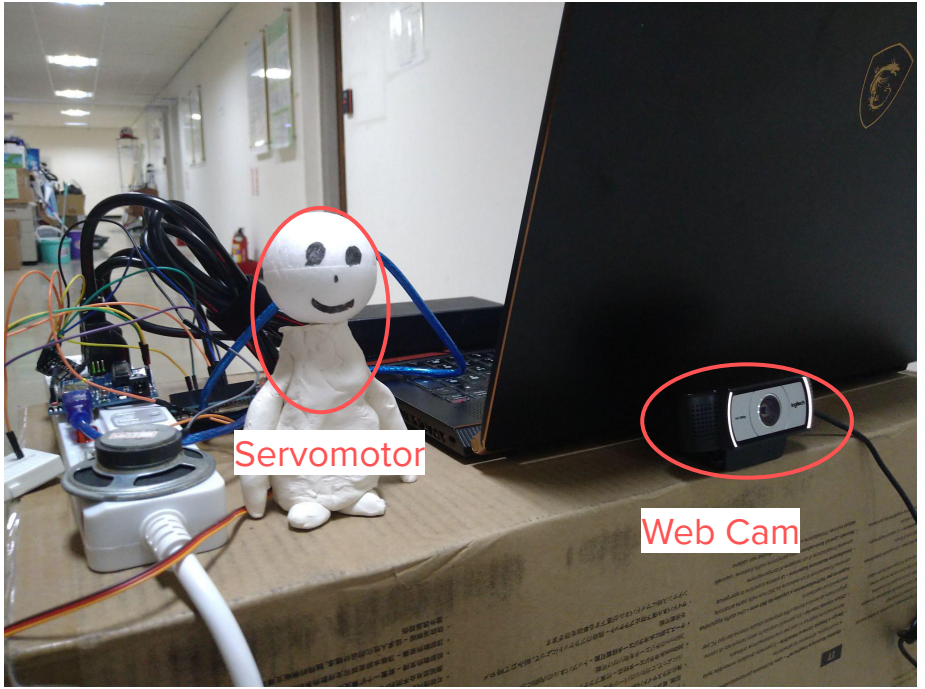


Experiment and result

- Setup:
  - Random rotation frequency (1.5, 3, 6 second)
  - Movement either detected by sensing or viusal movement
  - Win the game if escape from camera scence!

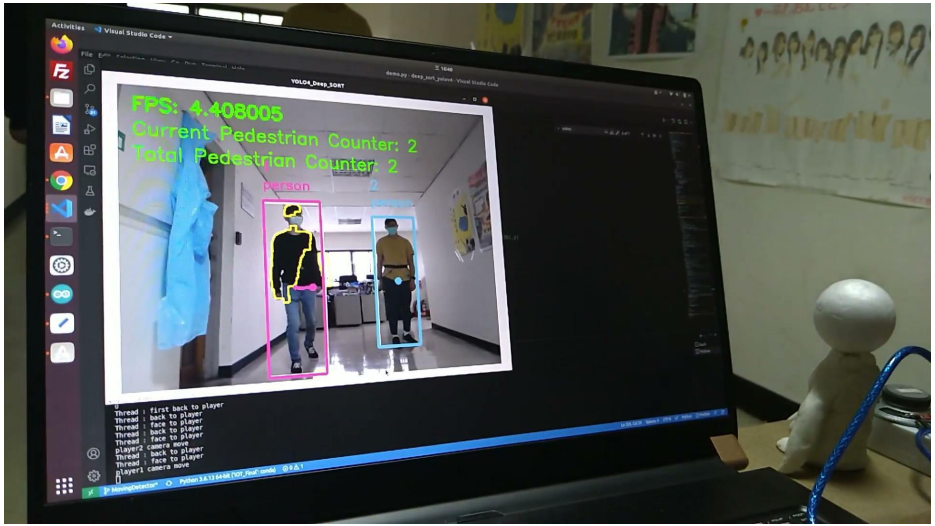


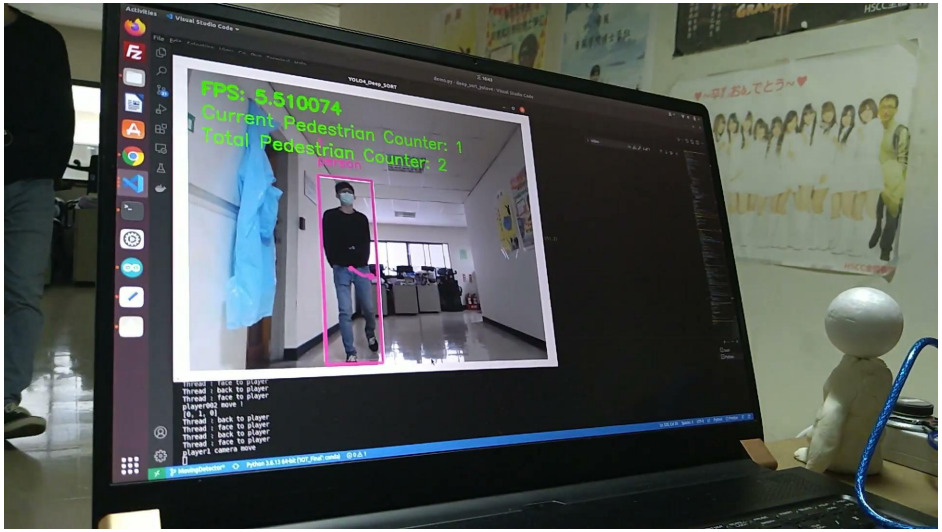
Experiment and result



Experiment and result

Experiment and result





Future work

- Improve the vision-based algorithm to increase and stablize the FPS
- Add human tracking for more complex scences e.g., occlusion, interaction
- Add more sensors to detect movement more accurately, but suffer from synchronization problem
- Use laser sensor and positioning IR camera sensor to add some atmosphere to the game

Thanks for your attention