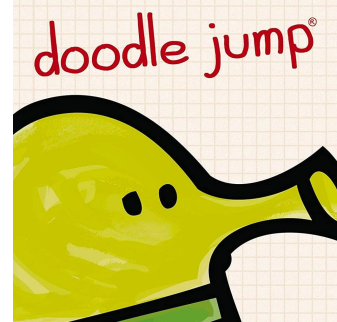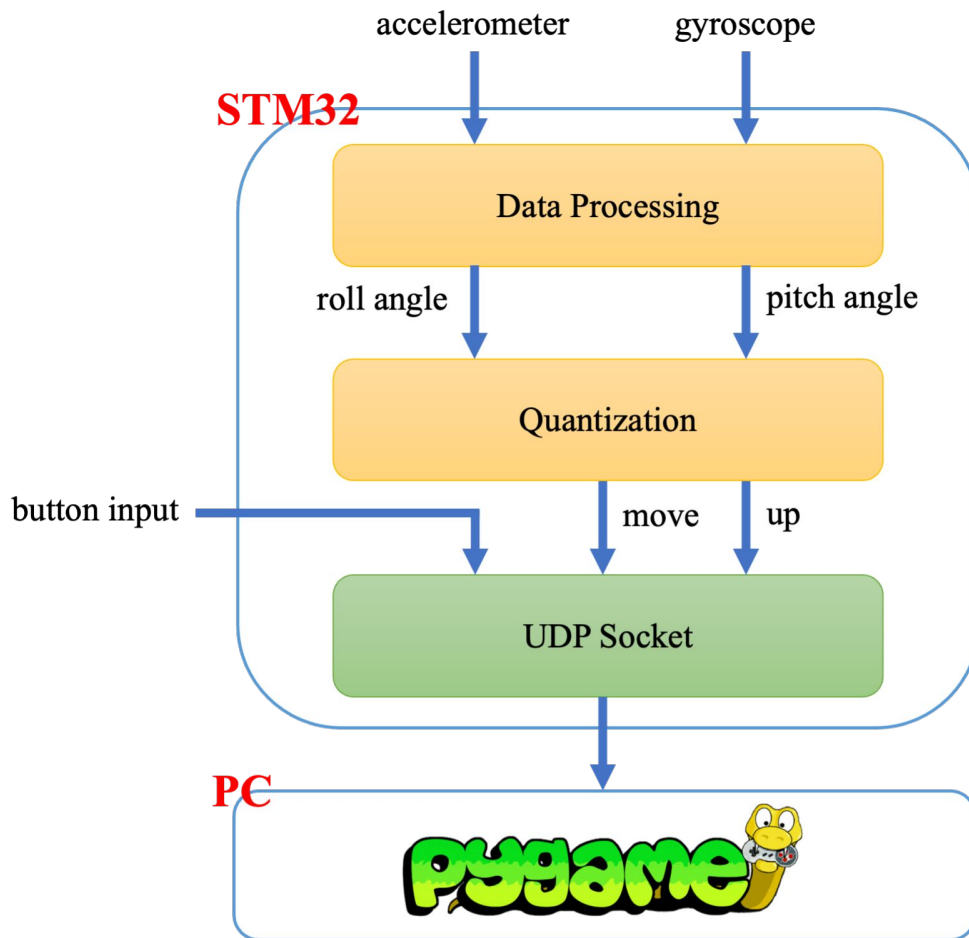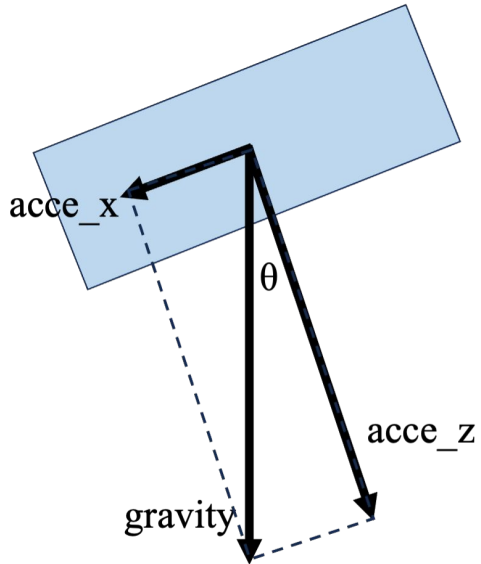# Embedded System Term Project Demo

涂銘洋 毛楷維 古振宏

Framework
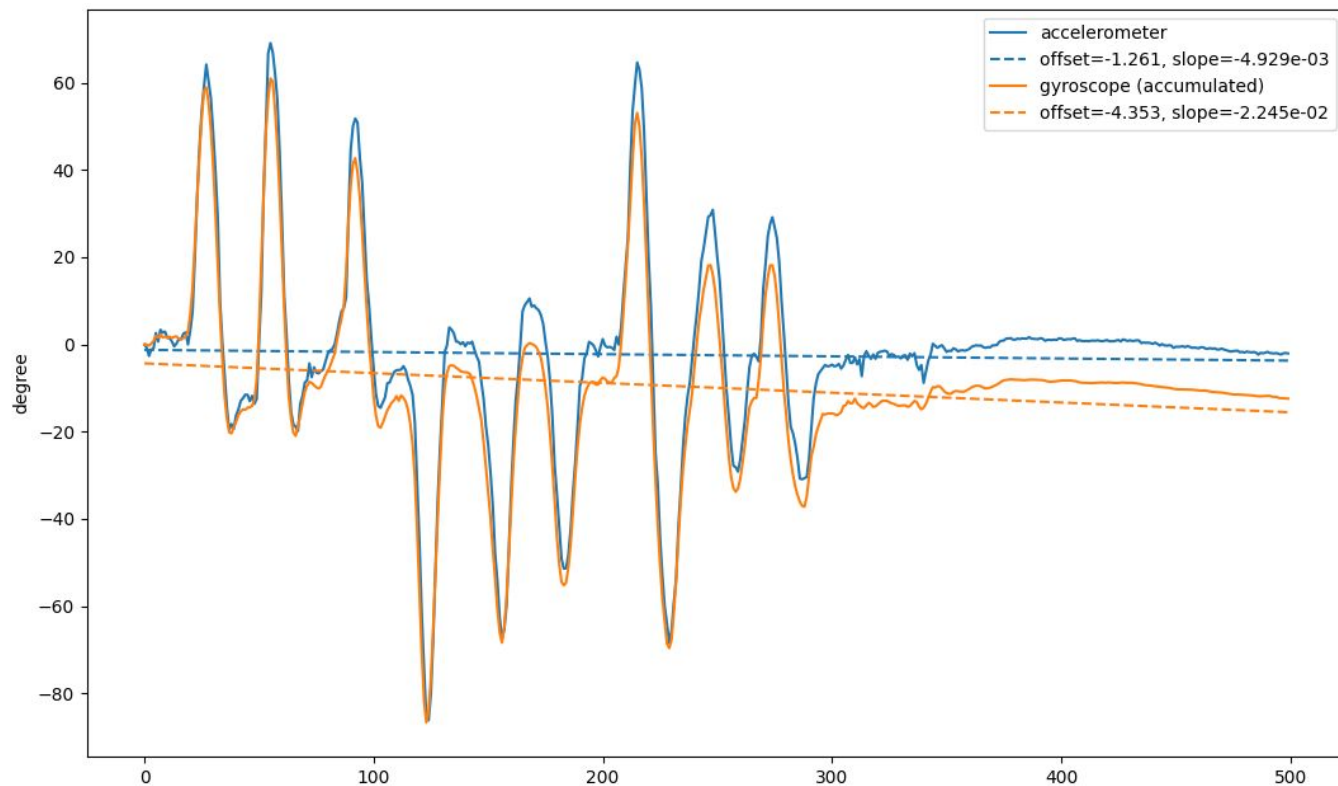
Data Processing: accelerometer + gyroscope

$$angle = \tan^{-1} \frac{acce_x}{acce_z}$$

$$angle = \int gyro_y dt$$
$$= angle + gyro_y \times dt$$
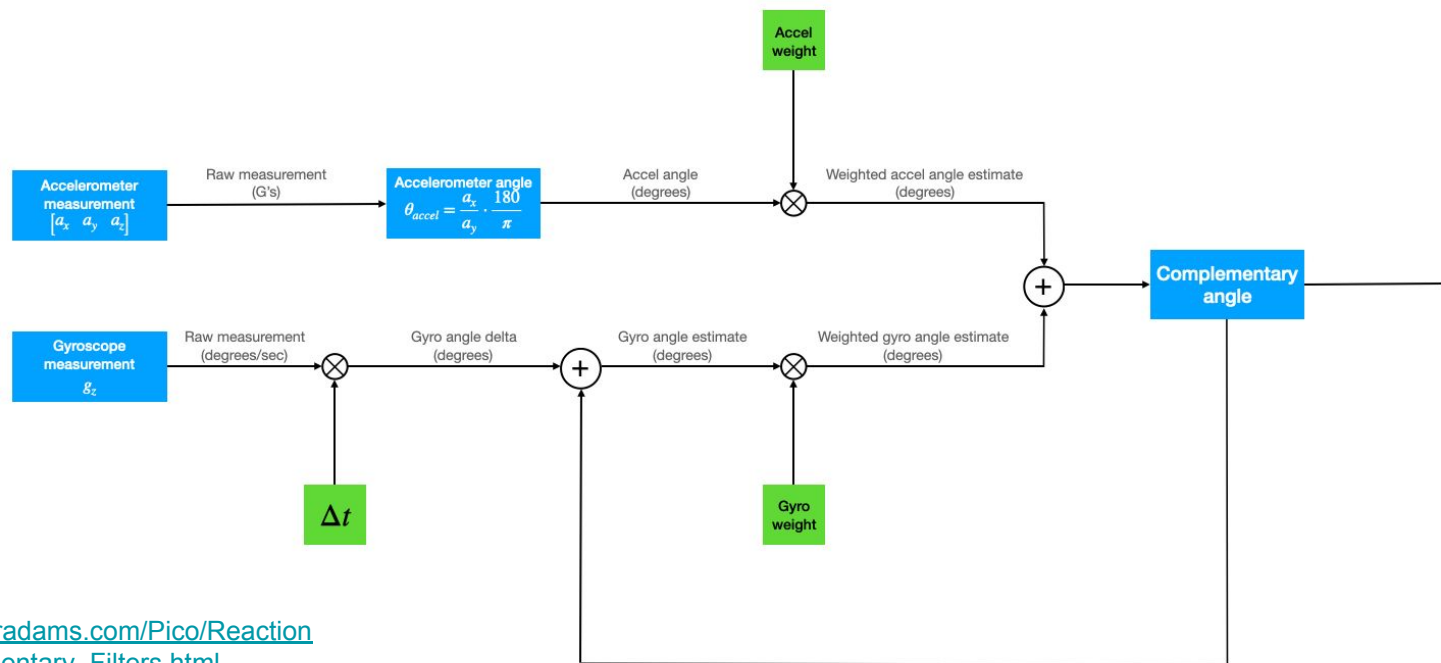
acce_x

θ

acce_z

gravity

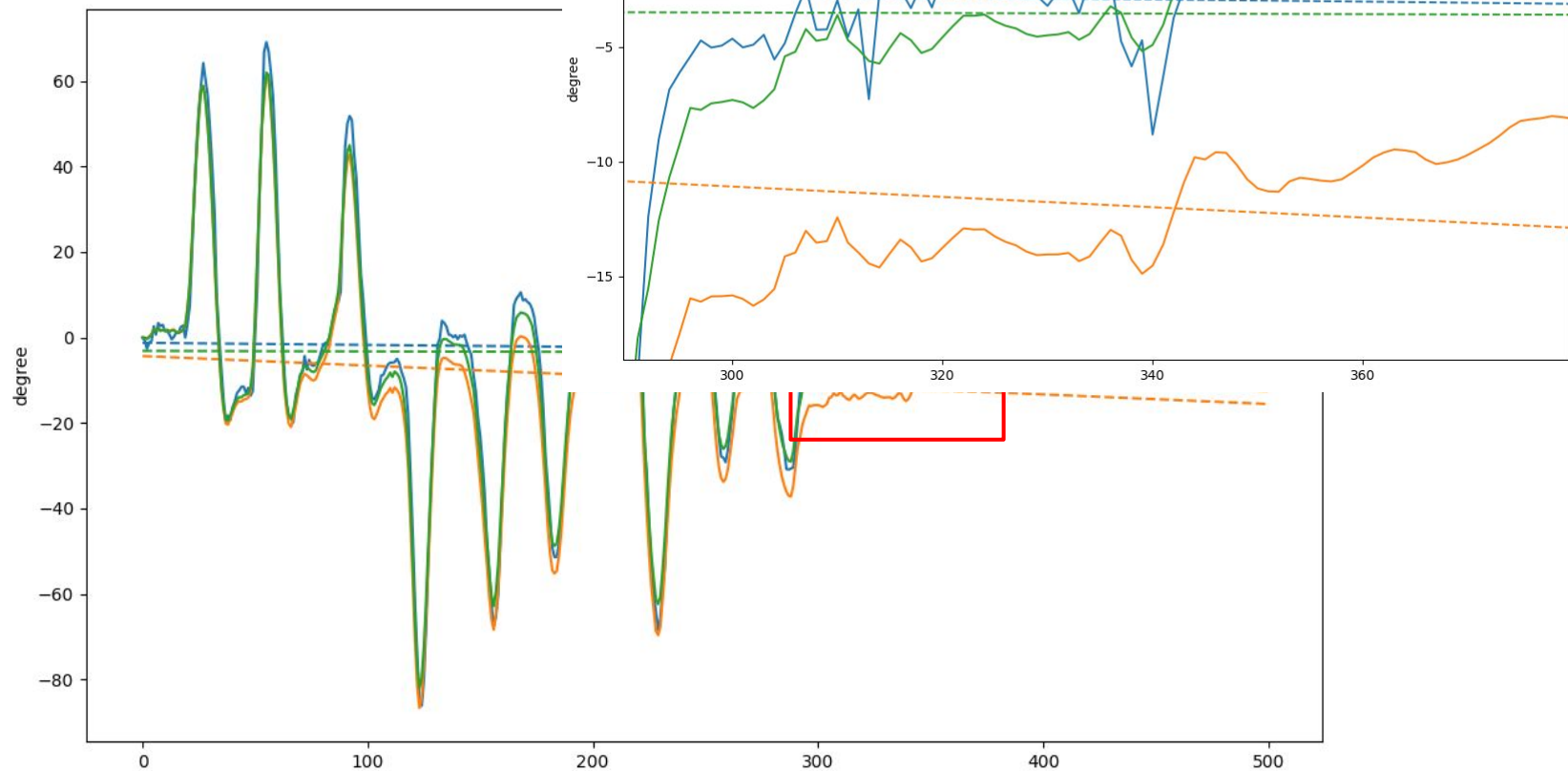# Data Processing: accelerometer + gyroscope

Solution: complementary filter

$$angle = 0.98 \times (angle + gyroData \times dt) + 0.02 \times accData$$

Reference:
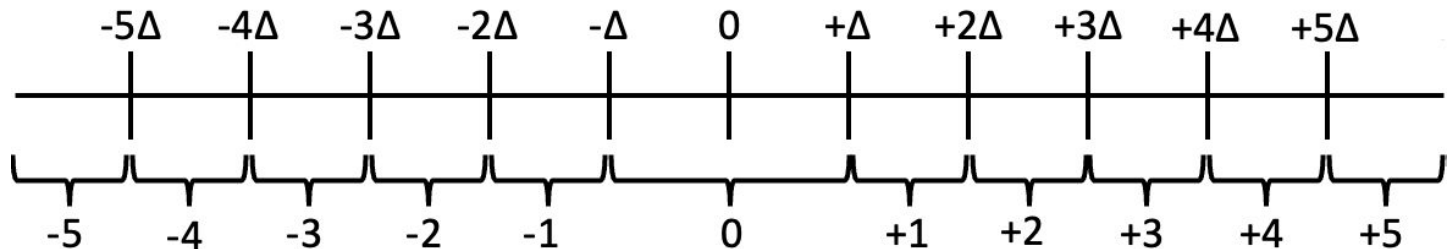https://vanhunteradams.com/Pico/Reaction
Wheel/Complementary_Filters.html

Solution: complementa

Quantization

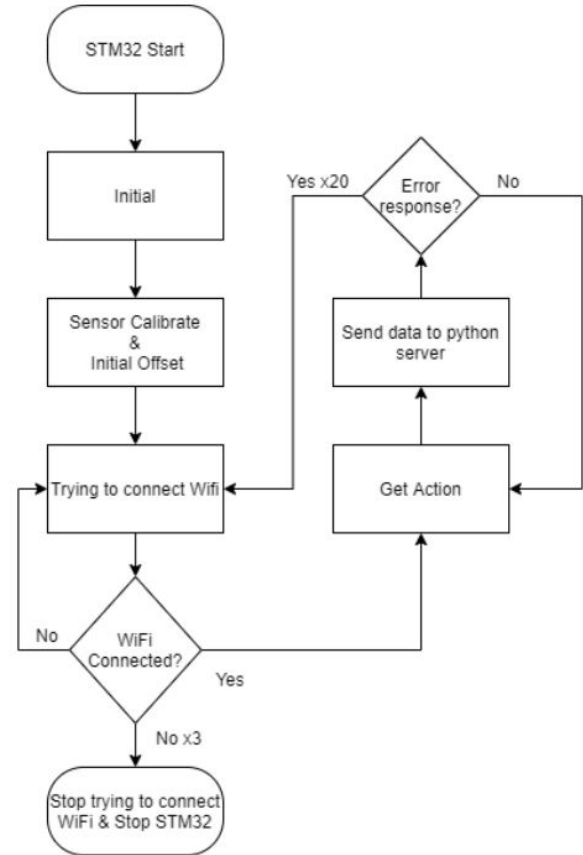Pitch angle (forward/backward): threshold = 15°

Roll angle (left/right): Δ = 4°, range: -10 ~ +10

WIFI Module

- UDP socket : low latency

- Data : move, up, and enter (1 byte each)

- Error response (20 times) → Try reconnecting
  - sendto() returns -1
  - Error code in ERRNO

Reference

1. Colton S, Mentor FRC. The balance filter. Presentation, Massachusetts Institute of Technology. 2007;
2. Adams VH. Complementary filters: https://vanhunteradams.com/Pico/ReactionWheel/Complementary_Filters.html
3. NTUEE-ESLab/2021-pikachu_volleyball: https://github.com/NTUEE-ESLab/2021-pikachu_volleyball

Demo