# Thailand Embedded Systems Association



Government

Academic

Industry

NGO, found in 2001
Strengthen embedded
systems industry
Network of partners

# TESA Top Gun Rally

### Announcement



### MATLAB Onramp



info

prepare

### Reward



finalize

### AIoT/server/MATLAB workshops



practice

### Final sprint



System integration

### Evaluation
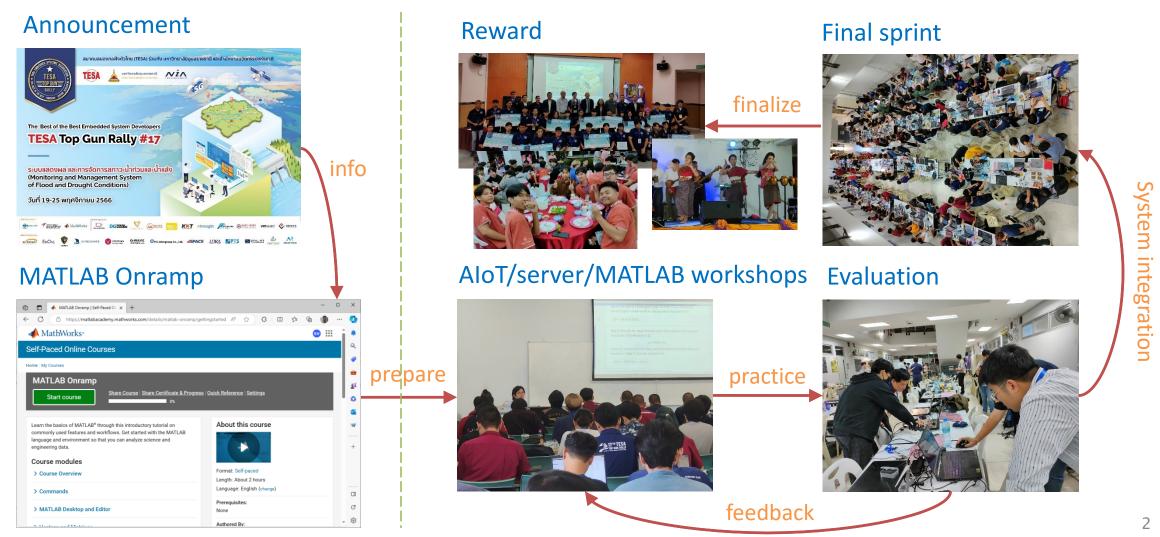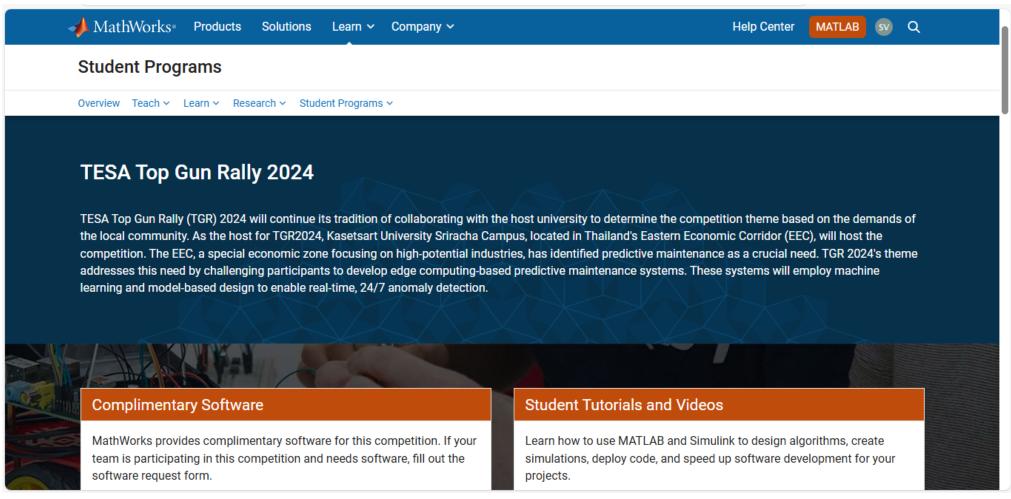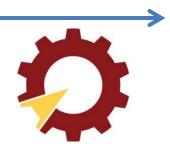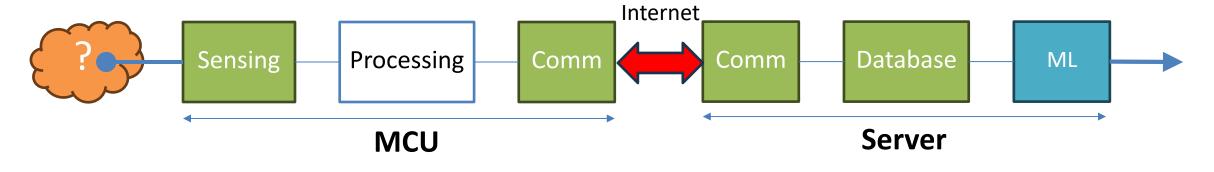


feedback

# TGR2024 as an international event



https://www.mathworks.com/academia/student-competitions/tesa-top-gun-rally.html

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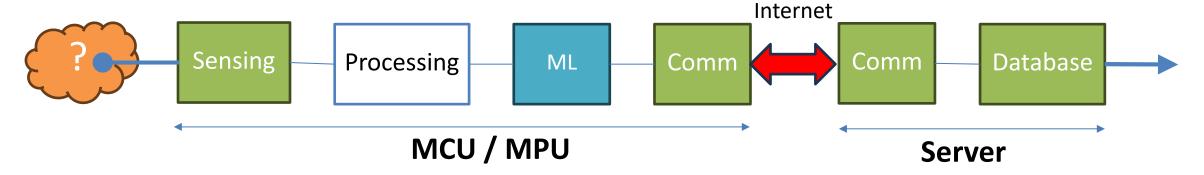# AIoT architecture
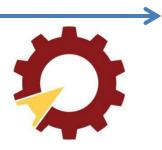
Cloud-computing approach
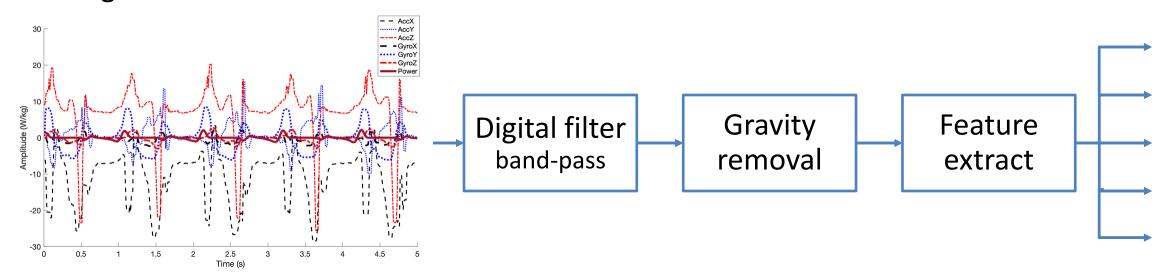


Internet

Sensing — Processing — Comm ⟷ Comm — Database — ML

**MCU**     **Server**

Edge-computing approach



Internet

Sensing — Processing — ML — Comm ⟷ Comm — Database

**MCU / MPU**     **Server**

# How to code signal processing

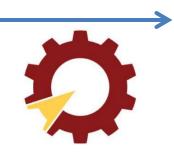IMU signals



Digital filter
band-pass → Gravity removal → Feature extract

- High-frequency noise
- Low-frequency drift
- Effect of gravity

- Windowing
- Adaptive
- Frequency-domain
- Joint time-frequency domain
- Fusion

# MATLAB/Simulink for AIoT application

| | | | |
|---|---|---|---|
| Q1: scope | ☐ Application | ☐ Function | |
| Q2: processor | ☐ Arduino / Raspberry Pi | ☐ Linux board | ☐ MCU |
| Q3: HW support package | ☐ Yes | ☐ No | |
| Q4: Special HW | ☐ No | ☐ On-chip | ☐ On-board |
| Q5: Special SW | ☐ No | ☐ Protocol | ☐ … |
| Q6: Timing | ☐ ≤ 10 Hz | ☐ ≤ 100 Hz | ☐ > 100 Hz |

| Simulink | Simulink + custom block | MATLAB coder + dev toolchain | Embedded coder |
|---|---|---|---|