Advanced Computing Lab

Course:	Internet of Things (Lab)
https://aclab-hcmut.github.io/	

IoT Lab

Overview

IoT Solution based on Core IoT platform.

Requirements

- Scopes (Projects should be related to these areas, but not necessarily all of them):
  - IoT.
  - PCB design.
  - Web & mobile app development.
  - Data Analytics.
  - Data visualization.
  - Edge Computing & AIoT.
  - Embedded Systems Development.
  - Desktop application (Python Tkinter, Electron,...)
- Project description.
  - Submit your team's project description before 2/4/2025.
  - Description which describe your ideas, hardware used, technology used, milestone of your project, and timeline for doing each task.
- Assignment report which should have these sections:
  - Cover page.
  - Table of Content.
  - Introduction.
    - Problem.
    - Proposed Solution.
  - Theory (Keep this section short and concise)
    - Technology used.
    - Library used.
    - Connectivity.
    - ...
  - Requirements & Technical decisions.
  - Hardware used.
  - Power management and Electrical characteristics.

    - Architectural Diagram.
    - Test Plan.
    - Result & Limitations.
        - Outcomes.
        - Further developments.
    - Contribution & Work log.
    - References.
- 5 - 7 slides for a short presentation (7 minutes).
- Demonstration of all features that you implemented.
- Github repository with valid code commit from all members.

Grading Criteria:

1. Bare Minimum Functioning Solutions(4 points):
    a. Error Control (wifi reconnect,...).
    b. Core IoT Dashboard.
    c. Including appropriate sensors for your application.
    d. Alarm.
    e. Github.
2. Report(2 points)
3. Functioning Solutions(1 points):
    a. Easy setup and Configuration.
    b. OTA Update Functionality.
4. Ability to work with Industrial sensors(1 points):
    a. Modbus RS485 Sensors.
5. Utilize Core IoT platform(2 points):
    a. Rule Engine.
    b. Scheduler.
    c. Advance Features.
6. Extra-Functions(1-3 points):
    a. NB-IOT.
    b. ESP-NOW.
    c. AT-Command With ESP-AT.
    d. Web & mobile app development.
    e. Data Analytics.
    f. Data visualization.
    g. Edge Computing & AIoT.
7. Overall (0-3 points).

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Learning Outcomes:

1. Hands-On IoT Hardware Experience:
    a. ESP32 Dev Board.
        i. Schematic.
        ii. Architecture & Function Block.
    b. IoT Beginner Level Sensors.
        i. I2C DHT20.
    c. Communication Protocols:
2. Arduino Framework on ESP32:
    a. FreeRTOS.
        i. RTOS Concepts.
        ii. Scheduler.
    b. Libraries.
        i. DHT20.
3. Core IoT:
    a. Data Flow.
    b. Rule Engine.
    c. Attribute.
    d. Entities and Relations.

Resources