Internet of Things (物聯網) 2018

Lecturer：江振瑞

Teaching Assistant：哈納斯 楊宜昌 范振倫 謝金男 高健賓

Time: Tuesday 14:00~16:50

Place: E6-A205

Web Page: https://staff.csie.ncu.edu.tw/jrjiang/IoT2018/

Course Description:

The Internet of Things (IoT) has been connecting billions of things or machines electronically for them to exchange many different types of information with one another. With all the machines in the world connected, lives will be transformed significantly. Many technologies are involved in the concept of IoT and are worthwhile investigating. This course is intended to provide in-depth examinations of IoT technologies so that students can realize how machines are connected and how information is captured and exchanged. The applications of the IoT concept are also covered in the course.

Furthermore, in view of the evolution (revolution) of Industry 4.0 (I4.0), we also introduce the concept of Industrial Internet of Things (IIoT) and its related technologies, such as the Cyber-Physical System (CPS) and Deep Learning (DL).

Goal:

Students can make their own IoT applications, either web-based or APP-based.

Scoring：

● Midterm Report: 35% (Every student should upload one set of slides and one 10- to 15-min video presentation related to a designated IoT topic.)

● Final Project: 55% (Every student should conduct a final project to implement a web-based or APP-based IoT application to display the information of at least one smart thing on the web or APP, and even to automatically control things in an AI manner.)

● In-Class: 10%

Reference Books:

● Adrian McEwen and Hakim Cassimally, Designing the Internet of Things, Wiley, 2014.

● 超圖解物聯網 IoT 實作入門：使用 JavaScript/Node.JS/Arduino/Raspberry Pi/ESP8266/Espruino, ISBN：9789863123439, 趙英傑, 旗標 , 2016.

● 打造 Web 物聯網：使用 Node.js 與 Raspberry Pi, ISBN：9789864764693, Dominique Guinard Vlad Trifa (吳致佑, 李健榮), 碁峰, 2017.

● Node.js 物聯網裝置開發, ISBN：9789864764594, Kelsey Breseman and Patrick Mulder, 歐萊禮, 2017.

● AIoT 人工智慧在物聯網的應用與商機, ISBN：9789864768066, 裴有恆, 陳玟錡, 碁峰, 2018.

● Android App 程式設計教本之無痛起步：使用 Android Studio 2.X 開發環境, ISBN：9789863123989, 施威銘/主編, 旗標, 2017.

- Android 程式設計入門、應用到精通：修訂第四版(使用 Android Studio 3.X，適用 Android 8.X/7.X 和 Android Wear), ISBN：9789864767274, 孫宏明, 基峰, 2018.

Syllabus:

1. Introduction to (Internet of Things) and and IIoT(Industrial Internet of Things)

2. Introduction to Internet: ISO OSI, TCP/IP, UDP/IP, Ethernet

3. Introduction to WWW: HTML, CSS, JavaScript

4. Introduction to network programming and web programming: socket, Node.js

5. Introduction to wireless network: WiFi, Bluetooth, RFID, LoRA

6. Introduction to SQL and NoSQL databases

7. Midterm report

8. Introduction to WSN (wireless sensor network)

9. Introduction to positioning methods

10. Introduction to APP programming (1)

11. Introduction to APP programming (2)

12. Introduction to Deep-learning

13. Introduction to Deep-learning programming

14. Final project

The first Web Application Example: CHMER WEDM CPS

The second Web Application Example: UDE CPS

The third Web Application example: PINE (PiNeedle) CPS
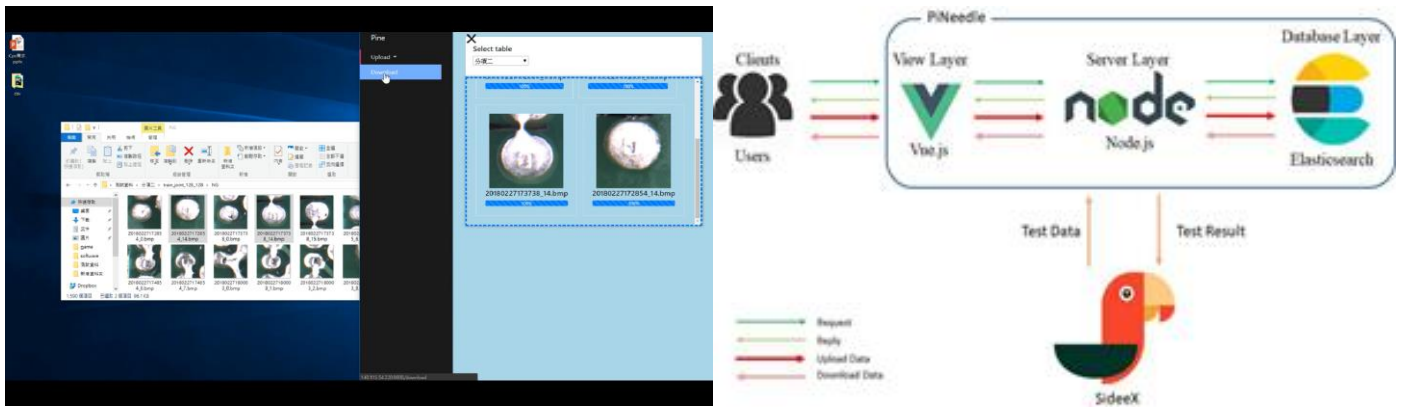
The first APP example: PINUS (Industrial IoT Smart Factory Indoor Positioning APP)

- Critical Technologies: Bluetooth Low Energy (BLE) Beacon Advertisement, Weighted Centroid Localization (WCL)
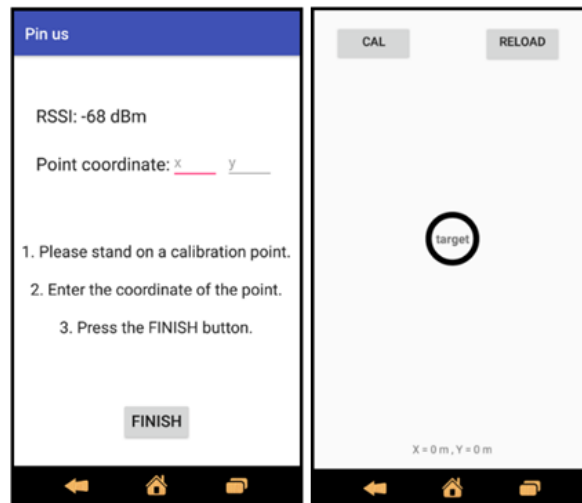
The second APP example: IIoT Smart Factory AR

- APP Function: When facing a portion of a smart factory machine, the APP will show related information of the portion, such as the name, descriptions, production parameters, and/or states of the portion.
- Critical Technology: Google MobileNet, IoT Networking