Lecture 0

Course Introduction

Artificial Intelligence of Things (SWS3025)
NUS SoC Summer Workshop 2024

Lecturer: A/P TAN Wee Kek

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Learning Objectives

- At the end of this lecture, you should understand:
  - The course schedule.
  - The assessment tasks, including the group project.

Teaching Team

- **Course Facilitator – A/P TAN Wee Kek（陈伟克）**
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Teaching Team (cont.)

- My WeChat ID is tanweekek:

Course Synopsis

IoT: Internet of Thing.
IIOT: Industrial Internet of Thing.
AIoT: Artificial Intelligence of Thing.

Artificial Intelligence of Things (AIoT) *lies at the intersection of* ***Artificial Intelligence (AI)*** *technologies and* ***Internet of Things (IoT)*** *infrastructure. AIoT aims to achieve smart IoT operations that optimise human-machine interaction, and data management and analytics.*

More specifically, IoT is set to disrupt the way we live and work. Smart homes that are filled with connected devices are loaded with endless possibilities to make our lives easier, more convenient, and more comfortable. Industry 4.0, which is powered by Industrial IoT (IIoT), promises to turn smart manufacturing and smart factory into a reality.

IoT devices are expected to generate a huge volume of data. AI techniques such as machine learning and deep learning can help individuals and organisations alike to realise unprecedented business values from these data.

In this course, you will learn how to work with single-board microcontrollers and computers in conjunction with various connected devices such as sensors, actuators, smartphones, smartwatches, Bluetooth Low Energy beacons, and other interesting hardware to build various smart home and industry scenarios. You will also learn how to integrate a real-time data pipeline for visualising and analysing the data that are collected by these devices to create a ***smart AIoT system****.*

Course Synopsis (cont.)

Opening Case

- **Nest Labs** is a home automation producer of programmable, <u>self-learning</u>, <u>sensor-driven</u>, Wi-Fi-enabled devices:
  - It introduced the Nest Learning Thermostat in 2011 as its first product.
  - This was quickly followed by smoke detectors, security cameras, and other security systems.
- Relies on sensors and algorithm for <u>self-learning</u> capability and also capable of self-communication among devices.

Opening Case (cont.)

Course Schedule

- Morning – 9 am to 12 noon
- Afternoon – 2 pm to 5 pm

Phase	Date/Time	Topics	Key Activities
Intro Lectures	Sun 19 May, Morning	0 – Course Introduction	Preliminary assessment
		1 – Introduction to Artificial Intelligence of Things (AIoT)	
		2 – Single-board Microcontroller (I)	
Actual Lectures	Tue 2 Jul, Morning	3 – Single-board Microcontroller (II)	Project Kickoff
		4 – Single-board Computer (I)	
	Tue 2 Jul, Afternoon	5 – Single-board Computer (II)	

Course Schedule (cont.)

Phase	Date/Time	Topics	Key Activities
Actual Lectures	Wed 3 Jul, Morning	6 – IoT Backend Integration (I)	Prepare Project Proposal
	Wed 3 Jul, Afternoon	7 – IoT Data Preprocessing	
	Thu 4 Jul, Morning	8 – Machine Learning for IoT Data (I)	Submission of Project Proposal
	Thu 4 Jul, Afternoon	Collection of Equipment	Please form your project group beforehand as the equipment is issued at the group-level.

Course Schedule (cont.)

Phase	Date/Time	Topics	Key Activities
Actual Lectures	Fri 5 Jul, Morning	9 – Machine Learning for IoT Data (II)	Review of Project Proposal
	Fri 5 Jul, Afternoon	10 – Machine Learning for IoT Data (III) – Computer Vision	
Project	Mon 8 Jul Onwards	-	Commencement of Project

Topic Selection

- Topic selection will be done in the week of 27 May.
- Only students who eventually select this topic would be issued with hardware equipment.

Assessment

- The course assessment is divided into two phases:

Phase	Assessment Component	Weightage
Introductory Lectures	Quiz	20%
Actual Lectures	Group Project	80%
Total		100%

- Preliminary assessment for <u>Introductory Lectures</u> phase:
  - Quiz consists of MCQs and short structured questions.

Group Project

- Conceptualise, design and develop an AIoT project:
  - Must demonstrate both elements of IoT and AI.
  - Can be any business domain or industry.
- The group size is 4 students.
- Each group of students would be issued with a set of standard project equipment.
- More details would be provided during project kickoff in July.

Sample Projects

SWS3025 July 2023 (Physical) – 10 Projects

Sample Projects (cont.)

SWS3025 July 2022 (Online) – 21 Projects

Sample Projects (cont.)

SWS3025 July 2023 – AIoT – Intelligent Adaptive Streetlights (First Prize 一等奖)

Sample Projects (cont.)

SWS3025 July 2022 – AIoT – Sitting Monitoring Intelligent System (First Prize 一等奖)

Sample Projects (cont.)

SWS3025 July 2021 – AIoT – Smart Water Bottle (First Prize 一等奖)