Introduction to IoT Course (IOT102)

Lê Thế Dũng, Ph.D.

Dep. of Computing Fundamentals, FPT University, Viet Nam

January 2024

Class Rules and Contact Information

- Attendance is checked at the beginning of the class and may be checked again at the end of class.

  - 10 minute-late is consider a no-show.

- Any activities which are not relevant to the course is restricted.

- Keep you table clean and tidy.

- Should you have any issues, ask me during break time of at the end of each class.

- Submit your homework on time.

- Only contact me through email when you really need help.

  - dunglt96@fe.edu.vn

Syllabus Description

- This is a 3-credit course.

- The content includes basic concepts and applications of IoT, practical exercises on the learning KIT.

- Students are taught how to learn online, and practice some parts at home.

- Q&A sessions, the guidance for important issues, as well as performance assessments, will be conducted in the classroom.

Main Objectives

- ## Knowledge

  – Understanding the basic concepts of Internet of Things: "things" of the Internet of Things, networking IoT, programming IoT, securing IoT.

  – Knowing about electrical circuits and electronics.

  – Understanding the applications of IoT.

- ## Skills

  – Programming IoT

  – Planning project concept and implementation.

Schedule

SLOT 1	
Lectures	Labs
Introduction of IoT Course	Getting Started with Arduino and Genuino UNO
What in the world is the Internet of Things?	Fritzing – Building Circuit
Arduino (ATmega328/p) Architecture	Tinkercad Arduino Simulator Tutorial
The 'things' of the Internet of Things?	

SLOT 2	
Lectures	Labs
Networking IoT	Analog Input – Analog Read
Programming IoT	Fading – Analog Write
[*Give Topics for Presentation*]	

Schedule

SLOT 3	
Lectures	Labs
Securing IoT	State Change Detection for Pushbuttons
	LED Array Effect

SLOT 4	
Lectures	Labs
Electrical Circuits and Electronics	Ping Ultrasonic Range Finder
[*Project Concept Planning*]	Photoresistor – Analog Input

Schedule

SLOT 5	
Lectures	Labs
[Presentation]	Servo Motor – Sweep
	Servo Motor – Knob

SLOT 6	
Lectures	Labs
[Progress Test 1]	7 Segment Display
	RGB LED Color Mixing

Schedule

SLOT 7	
Lectures	Labs
	LCD Display 1602
	Temperature Sensor LM35

SLOT 8	
Lectures	Labs
	Keypad 4x4
	Serial Input

Schedule

SLOT 9	
Lectures	Labs
[Progress Test 2]	Blink Without Delay
[*Team Work Prepares for The Final Project*]	Debounce
[*Self Review*]	

SLOT 10	
Lectures	Labs
[*Team Work Prepares for The Final Project*]	
[*Check Project*]	

Schedule

- 8 Lectures

- 23 Labs

- 1 Presentation

- 2 Progress Tests

- 1 Project

Student's Tasks

- Students must attend at least 80% of offline sessions in order to be accepted to the final examination.

- Student is responsible to learn all VIDEOs (theory) online given by instructor on Syllabus at home (See Guide documentation).

- Student is responsible to do all LABs given by instructor on Syllabus at home (See Tutorial documentation).

- Constantly follow announcements on intranet/LMS at https://lms-hcmuni.fpt.edu.vn for up-to-date course information.

Studying Resources

- Slides

- Video

- Course from Edx:
  - https://www.edx.org/course/introduction-to-the-internet-of-things-iot
  - https://www.edx.org/course/sensors-and-devices-in-the-iot

- Books:
  - Cuno Pfister , Getting Started with the Internet of Thing, Oreilly, 2011
  - Alan G. Smith, Introduction to Arduino: A piece of cake!, 2011.

- Documents:
  - https://www.arduino.cc

- Instructables.com - 20 Unbelievable Arduino Projects

- Tutorials

- Electronics Component List

Assessment Scheme

On-going assessment	60%
01 Presentation	10%
02 Progress Test	5% + 5%
01 Project	30%

Active Learning
  - Check results at progress at the Progress tab of each Student (5%)
  - Active Participant in Labs (5%)
	10%

Final exam	40%

- Completion Criteria:
  - 1. Every on-going assessment component > 0
  - 2. Final Exam Score ≥ 4 & Final Result ≥ 5

THANK YOU ALL FOR LISTENING

QUESTIONS AND ANSWERS

Presentation Guide

- Students observe and learn IoT's applications in real life, then propose ideas, solutions.

- To achieve that, students learn more about presentation skills, teamwork. Students can read technical materials in English and analyze, synthesize, and write in slides.

- Students can also read the reference books below to better understand other aspects of IoT applications.

- Scoring:
  - Slide Preparation
  - Presentation Skills
  - Teamwork
  - Quality and Content of The Presentation

Project Guide

- Students need to practice all the labs in the process to gain basic knowledge.

- A careful understanding of each statement, interface, etc. will allow students to effectively implement projects.

- Lecturer can suggest projects for students, or students can suggest projects that incorporate the knowledge they have learned in previous labs or from ideas based on the components provided. Encourage students to research the use of external components. Students can refer to the projects listed below. Note that these projects are for reference only. Students will have to design their own circuit and project code.

- The project must combine at least 5 components in the KIT (or external components outside of the KIT) not counting wire and board, for example: Arduino, Led, push button, infrared receiver, IR transmitter. The more complicated the more better.

Project Guide (cont.)

- Some general ideas, for example: (Prototypes of) sticks for the blind, 3D drawing based on distance sensors, versatile controllers for smart homes,...

- Please refer to additional tutorials for sensors, actuators, which are not directly guided. These materials are for lecturers only.

- Scoring: Student must understand how to use components, connect them together to make a meaningful piece of hardware. Use C or C++ to program the circuit that has been designed.

  – Presentation (include slide, presentation skills) (10%)

  – Design circuit (Fritzing or TinkerCad) (40%)

  – Source code (40%)

  – personal questions (10%). Lecturer need to ask more questions about the program, command line, component pairing, etc. for accurate individual grading.