LEGO Robotics Syllabus - EN

Instructor

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Office Location

Carrefour Happy Sport, Makepe

Office Hours

17:00-20:00

Tuesday, Friday

Course Overview

This course is a Robotics course using LEGO kits, especially LEGO EV3.

It includes an introduction to some Robotics Concepts as sensors, actuators and microcontroller. You will also go through the pathway of designing, realizing and testing your own robot.

Course Learning outcomes

At the end of this course, the student will know how to:

- Brainstorm an idea as a solution of a problem
- Design the solution by himself
- Build the solution using LEGO Blocks
- Set the behavior of the robot through a program
- Test and fix bug from the solution he or she just realized.

Prerequisites

- There is no prerequisite to this course
- But a problem solver mindset is an advantage

Course Structure

This is a Four (04) weeks course. Divided into Two (02) session per week. That means a total of Eight (08) sessions. More details about the content of each week in the following part:

Week 1: Beginner

At the end of this week 1, the learner will be able to:

- Use efficiently our e-learning platform

- Build a robot using LEGO Mindstorms EV3 kit.

- Start a Project on LEGO Software

- Build a software to make a direct movement with a robot

- Master the types and functions of LEGO EV3 BRICK outputs

- Make a robot to turn
- Draw texts and pictures on robot's screen
- Use personalized images and sounds on a robot
- Get started with sensors (e.g. touch sensor and color sensor)
- Use sensor to collect information from real world

- Use loop and commutators in an algorithm
- Import additional LEGO blocks
- Use ultrasonic sensor (for example to compute distance or detect obstacles)
- Build a line following robot
- Final Challenge: Build a robot of your choice with knowledge already acquire.

Week 2: Intermediate

At the end of this week 2, the learner will be able to:

- Get started with actuators
- Use motors and other actuators
- Build an ultrasonic wall following robot
- Use EV3 buttons as sensors
- Use data files
- Get started with embedded system
- Build an embedded system with inputs and outputs
- Build a color line following robot with a block for distance
- Build a color line following robot that stop moving on a specific color
- Get started with infrared sensor
- Calibrate the color sensor
- Master debugging methods
- Use efficiently the different moving blocs (power regulation, motor synchronization, etc.)
- Reliability methods
- Variables
- Logical operation and decisions
- Get started with parallel beams

Week 3: Advanced

At the end of this week 3, the learner will be able to:

- Parallel beams synchronization

- Tables

- Use Proportional control

- Proportional line follower

- Use proportional control with sound sensor

- Ramp Up speed

- Introduction to gyro sensor

- Turns with gyro sensor

- Squaring off or aligning on a line

- Stall Detection

- Menu system

- Saving data for scientific experiments

- Saving data with program blocks

- Bluetooth

- Random Blocs

- Files management

Week 4: Beyond

At the end of week 4, the learner will build a final training project and will participate to a training:

- **Use LEGO EV3 with python programming language**
- Brainstorm projects ideas
- Build a final Training Project.
- Test and evaluate the project
- Final Training competition.

Online Resources

During the training, you'll have to access some online resource hosted on https://www.tek.zone

Course Materials

- Laptop Computer
- Internet connection (DSL, LAN, or cable connection desirable)
- Access to Web site: https://www.tek.zone
- Robots or electronic components (LEGO MINDSTORM EV3) provided by Tekzone center.

There are some additional software resources needed to follow this course:

- LEGO DIGITAL DESIGN SOFTWARE
- LEGO PROGRAMMING SOFTWARE
- PYTHON INTERPRETER

Course Schedule

Week	Day & time	Subjects
Week 1	Tuesday 16 October 2018: 17:00 – 20:00 Friday 19 October 2018: 17:00 – 20:00	Get Started with LEGO and Sensors Line following robot.
Week 2	Tuesday 23 October 2018: 17:00 – 20:00 Friday 26 October 2018: 17:00 – 20:00	Actuators and Embedded systems Colored line following robot with regulated power.
Week 3	Tuesday 30 October 2018: 17:00 – 20:00 Friday 02 November 2018: 17:00 – 20:00	Proportional control and gyro sensor Self-balancing robot, Bluetooth, data saving and file management
Week 4	Tuesday 06 November 2018: 17:00 – 20:00 Friday 09 November 2018: 17:00 – 20:00	LEGO EV3 with Python programming, and **idea Brainstorming** FINAL TRAINING COMPETITION

Course Policy

Attend Class

Students are expected to attend all class sessions as listed on the course calendar.

- Student will attend to each class session 15 minutes before the beginning of the course.
- In case of unavailability, student must get in touch with the instructor the day before

Participate

The student should participate actively to the class, ask questions if needed and answer question given by the instructor. He (she) should also follow the course on our e-learning platform answer the quizzes and participate to the discussion forum.

Build Rapport

If you find that you have any trouble keeping up with assignments or other aspects of the course, make sure you let your instructor know as early as possible. As you will find, building rapport and effective relationships are key to becoming an effective professional. Make sure that you are proactive in informing your instructor when difficulties arise during the semester so that they can help you find a solution.

Commit to Integrity

As a student in this course you are expected to maintain high degrees of professionalism, commitment to active learning and participation in this class and integrity in your behavior in and out of the classroom.

Sincerely Romaric Tsopnang.