Lab work 2 for introduction to Robotics

Basic Course Information

Course Number	01005122	Subject Category	Compulsory IMI
Class Format	Experiment / Practical training	Credit Type and Number of Credits	1.5
Department	Mechatronics	Student Category	Year 1
Period of Study	Semester 2	Classes per Week	1
Required Materials	Laptop or /and Tablet (for writing reports and recoding measurements)		
Instructor	Arnon Sakonkanapong	Jirapat Anuntahirunrat	Apichat Chayaratri

Course Objective

Lab work 2 for introduction to Robotics is the continuation of Lab Work l. This course provides students with lab-work such as basic electrical and electronic measurements as well as mechanical measurements for the basis of mechatronics. The students will learn various measurement techniques and theoretical concepts by practical lab work experience. Students should work collaboratively in a small group in the lab.

Evaluation (Rubric)

Evaluation (Rubric)	Ideal Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)
Following and Doing Procedure	Demonstrates very good knowledge of the lab procedures and principles	Demonstrates good knowledge of the lab procedures and principle	Lacks the appropriate knowledge of the lab procedures and principles
Data Collection	Measurements are both accurate and precise	Measurements are mostly accurate and precise	Measurements are incomplete, inaccurate and imprecise
Report writing	Content is comprehensive, and accurate. Important points are stated clearly with supported data.	Some contents are not comprehensive or incomplete. Important points are addressed, but not well supported.	Most of the content is incomplete. Important points are addressed and /or inconsistent.
Safety	Proper safety precautions and awareness are consistently used	Proper safety precautions and awareness are generally used	Proper safety precautions and awareness are missed

Relationship with Learning Outcomes

G(1) Wide knowledge on Science and Engineering and practical ability to apply them to solve problems in the society.

M(1) Ability to design, propose and develop robotic/ mechatronic systems to solve specific problems

M(2) Ability to design, propose and develop electrical and electronic systems for robotics/ mechatronic systems

Teaching Method

Outline:	Students will conduct some measurements and assembling tester kits
Class Format:	Lab work
Please Note :	Complying with safety rules. Lab work topics are subject to be changed due to the school schedule. All reports must be submitted and accepted to get the credit.

Course Plan

Semester 2	Contents and Method of Course	Goals	Related MCC		
1st week	Introduction to laboratory equipment (1) Digital OSC and AWG	Understand how to use the Digital OSC and AWG for experiment and data analysis	V-C VI-A VI-C VI-C VI-C	6 1 1 1 1	91 1 2 3 4
2nd week	Introduction to laboratory equipment (2) Digital OSC and AWG	Understand how to use the Digital OSC and AWG for experiment and data analysis			
3rd week	Introduction to laboratory equipment (3) Digital power supply and digital multimeter	Understand how to use the Digital power supply and digital multimeter for experiment and data analysis			
4th week	Capacitor (1) (Charge)	Understand how capacitors store electrical charge and energy	VI-A VI-A VI-A VI-C	1 1 1 1	3 19 20 4
5th week	Capacitor (2) (Discharge)	Understand how capacitors store electrical discharge and energy			
6th week	Magnetic field observation (1) Wire and Loop	Understand how to wire and loop generate magnetic fields	VI-A VI-A	1 1	3 19
7th week	IR sensor and its characteristics	Learn how to measure the rotation speed of a motor using an IR sensor	VI-A VI-C	1 1	3 3
8th week	IR sensor and basic DC motor rotational speed measuerment	Understand the concept of Fleming's right-hand rule from the measurement	VI-A VI-C VI-C	1 1 1	3 3 4
9th week	Report				
10th week	Midterm examination				
11th week	Material resistance measurement	Understand the electrical properties from the electrical measurement	V-C VI-A VI-C	6 1 1	87 3 4
12nd week	Gear train power transmission	Understand how gear and crank work in mechanical systems	VI-A VI-A VI-A	1 1 1	19 3 20
13rd week	Torque measurement	Understand how to applied the basis of motor to measure torque	VI-A VI-A VI-A	1 1 1	19 3 20
14th week	Crank and linear motion system (LEGO parts)	Understand the convert of circular motion to linear motion	VI-A VI-A VI-A	1 1 1	3 19 20
15th week	LEGO Mindstorms (1) Robot assembly	Learn the creativity and collaboration to make a robot			
16th week	LEGO Mindstorms (2) Development	Learn how to collect the measurement data, analysis, and improvement the robot			
17th week	LEGO Mindstorms (3) Line tracing challenge	Creates the strategies to make a robot trace the line			
18th week	Report				
19th week	Final examination				
20th week	Warp up and report	Review and summarize			

Do not

	Examination	Quiz	Mutual Evaluations between students	Report	Portfolio	Performance
Basic Ability				50		20
Technical Ability						20
Interdisciplinary Ability						10