

Faculty of Engineering & Technology

Robot Mechanics

Information:

Course Code: MKT 471 Level: Undergraduate Course Hours: 3.00- Hours

Department: Specialization of Mechatronics Engineering

Instructor Information :				
Title	Name	Office hours		
Lecturer	MOHAMED ABDELBAR SHAMSELDIN ALY	9		
Lecturer	MOHAMED ABDELBAR SHAMSELDIN ALY	9		
Teaching Assistant	Fady Ayman Mohamed Naguib Mahmoud Noah	2		
Teaching Assistant	Fady Ayman Mohamed Naguib Mahmoud Noah	2		

Area Of Study:

Repare students to analyze rigid motion with coordinate transform.

ADevelop the students' ability to derive robot manipulator kinematics and use DH convention.

A rain students to solve simple inverse kinematics problems.

Arain students to solve robot motion planning problems.

Description:

Robotics overview and applications; Robot sensors and actuators, Robotic technology and systems; Kinematic Modeling: Spatial Representations and Transformations; DH and Homogenous transformations; Forward and inverse Kinematics; Jacobian for velocities and static analysis; Problem solving using up to date standard S/W robotics tools (Matlab); implementing the right industrial robotics system for a plant.

Course ou	itcomes :			
a.Knowledge and Understanding: :				
1 -	Define robot terminology and taxonomy.			
2 -	Explain the Denavit-Hartenberg, DH convention for axis transformation and building table.			
b.Intellect	ual Skills: :			
1 -	Analyze the forward kinematics of robot chain.			
2 -	Create homogenous transformation matrices.			
3 -	Derive inverse kinematics of serial robot chains.			
c.Professi	onal and Practical Skills: :			
1 -	Use the suitable software for analysis of robot kinematics.			
2 -	Select right robot type for a motion application need.			
d.General	and Transferable Skills: :			
1 -	Manage tasks, time, and resources.			



- 2 Search for information and engage in life-long self-learning discipline through self-learning assignments.
- 3 Collaborate effectively within multidisciplinary team.

Course Topic And Contents :			
Topic	No. of hours	Lecture	Tutorial / Practical
Introduction	4	4	0
Rigid motion	6	4	2
Forwards kinematics	10	4	6
Inverse kinematics	10	4	6
Jacobian matrix and singularity	16	8	8
Project discussion	8	4	4
Project presentation	6	2	4

Teaching And Learning Methodologies: Interactive Lecturing Problem solving Discussion Project Research

Course Assessment :						
Methods of assessment	Relative weight %	Week No	Assess What			
Assignment Assessments	5.00					
Final Exam	40.00					
Mid- Exam 1I	15.00					
Mid- Exam I	15.00					
Participation	5.00					
Project	10.00					
Quizzes	10.00					

Recommended books:

^{*}ABruno Siciliano, Robotics, Modeling, Planning and Control. Springer 2009.

Écraig, John J, R. Introduction to Robotics: Mechanics and Control, Pearson Education International, 2005, 3rd Edition.

Saeed B. Niku, Introduction to Robotics, Prentice Hall, 2001.

[&]quot;ÁK.S. Fu, R.C. Gonzalez, and C.S.G. Lee, Robotics: Control, Sensing, Vision and Intelligence, McGraw-Hill, 1987

[&]quot;ÁH. Asada and J. Slotine, Robot Analysis and Control, John Wiley & Sons New York, 1986, 3rd Edition."

[&]quot;Æu, K.S., Gonzalez, R.C., and Lee, C.S.G. Robotics: Control, Sensing, Vision, and Intelligence, McGraw Hill, 1986.

Megahed, S.M., Robotics: Principles of Robot Modelling and Simulation, John Wiley, 1993.

