Sungkyunkwan University (SKKU) International Summer Semester (ISS) 2018

Introduction to Robotics

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SHORT COURSE DESCRIPTION

In the last two decades, there has been a tremendous surge of activity in robotics, both at in terms of research and in terms of capturing the imagination of the general public as to its seemingly endless and diverse possibilities. This course aims to provide mathematical background of robot technologies. It is design to provide an overview of robot mechanisms, dynamics, and intelligent controls. Topics include planar and spatial kinematics, and motion planning; mechanism design for manipulators and mobile robots, parallel robots, legged robtos, multi-rigid-body dynamics, control design, actuators, and sensors; with special topics including, human-machine interface, and embedded system and software.

READING MATERIALS

The following text book is recommended to assist your learning with this course:

- Murray RM, Li Z, Sastry SS, Sastry SS. A mathematical introduction to robotic manipulation. CRC press; 1994 Mar 22. ISBN-10: 0849379814.
- Craig, John J. *Introduction to robotics: mechanics and control*. Vol. 3. Upper Saddle River, NJ, USA:: Pearson/Prentice Hall, 2005. ISBN-10: 0201543613
- Corke, Peter. *Robotics, Vision and Control: Fundamental Algorithms In MATLAB® Second, Completely Revised*. Vol. 118. Springer, 2017. ISBN-10: 3642201431
- Merlet, Jean-Pierre. *Parallel robots*. Vol. 128. Springer Science & Business Media, 2006. ISBN-10: 1402041322

COURSE REQUIREMENTS AND GRADING

Student academic achievement evaluated by grades on a scale of 100 points
Grade of 60 or above is Pass.
SKKU regulations require students to attend at least 80% of all classes.

Grading Percentages

Attendance:	10%
Quiz:	20%
Assignments:	20%
Final Exam:	50%

COURSE SCHEDULE

- Introduction
- Rigid body motion
- Representing Position and Orientation
- Serial Manipulator Kinematics
  - Forward Kinematics
  - Inverse Kinematics
- Manipulator Velocities
- Jacobians
- Motion Planning
- Joint Dynamics and Control

- Parallel Manipulator Kinematics
    - Forward Kinematics
    - Inverse Kinematics
- Mobile Robots
- Legged Robots
- Robot Vision and Control