(双足移动机器人技术及强化实践)

ARTICULATED ROBOTS

An Introduction

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Overview

- **Organization**

  7 class hours a week

  2 class hours lectures + 5 class hours labs

Week	Lectures
1	Mechanisms of robots
2	Rotation geometry
3	Forward kinematics I
4	Forward kinematics II
5	Inverse kinematics
6	Differential Kinematics
7	Trajectory planning
8	Control of Walking

Week	Labs	Marks
1 - 2	CAD modeling of robots	10
3 - 4	Simulation of kinematics	10
5 - 6	Pick and place - simulation	10
7 - 8	Pick and place - experiment	20
9 - 12	Course project	10
13	Oral reports of research plan	10
14-15	Course project	10
16	Demonstration + Reports	10+10

Goals

Students are expected to obtain

1. **Knowledge on mechanical structure of articulated robots including industrial manipulators and humanoid robots**
2. **Knowledge on forward\inverse kinematics of articulated robots**
3. **Knowledge on path and trajectory planning for articulated robots**
4. **Skills in programming industrial manipulators to achieve point-to-point movements**
5. **Knowledge on forward\inverse kinematics of bipedal walking robots**
6. **Knowledge on ZMP-based balance control of bipedal walking**
7. **Skills in programming the NAO humanoid robot to achieve stable walking**

Examination

- **Scoring method:**

Assignments	**80%**
Demonstration & Reports	**20%**

- **Reference books**

1. Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, and Giuseppe Oriolo. *Robotics: Modelling, Planning and Control*, Springer-Verlag London Limited, 2009

2. (日)梶田秀司 著，管贻生 译， 《仿人机器人》，清华大学出版社，2007.

RULES

- Drinking is allowed in the classroom but DO NOT eat.
- Sleep is not forbidden but DO NOT snore
- DO NOT make noise unless you want to discuss course related topics with your teacher
- DO NOT cross the classroom if you are late. Take a seat near the door as quietly as possible instead
- …