

# Robotics

Syllabus Number

3E231

Special Subjects

Elective 2 credit

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## 1. Course Description

Knowledge and technology of the many fields are indispensable to design the robots. In this lecture, the mechanism, the control engineering, the electrical engineering, electronics and mechanics of materials which are needed to design the robots are shown. This lesson is related to DP4E.

## 2. Course Objectives

Recently the robots are also known in our life in addition to the field of industry and the medical welfare. The principles of the sensors and the actuators and the kinematics which control the robots are learned in this lecture.

The students learn about now and the future of the robots.

## 3. Grading Policy

Students will be evaluated at 60% regular report and 40% report only if all reports are submitted. Feedback and added explanations about points to be corrected when returning the report.

## 4. Textbook and Reference

Textbook

Text is distributed in LMS.

## 5. Requirements(Assignments)

In class, students often watch videos to help students understand the content, and students are required to submit assignments in time.

## 6. Note

## 7. Schedule

- [1] Basic concept of robots and social significance: Investigate in advance what mechanism and control the fully automatic washing machine and automatic ticket gate are working on, and summarize them.
- [2] History and present state of robots: Let's examine the origins of robots and the current state of industrial robots in advance and summarize them. Let's consider the fundamental difference between the control methods of Astro Boy and Tetsujin 28.
- [3] Robots seen in daily life: Deepen the mechanisms and control methods of fully automatic washing machines and automatic ticket gates learned in the first class.
- [4] Sensor type and principle: Check in advance why the camera is in focus and how to control the temperature of the air conditioner. Investigate the types and principles of sensors required for robots.
- [5] Types and principles of actuators: Learn the types and operating principles of actuators such as motors and solenoids.
- [6] Types of structural materials and mechanical properties: Learn the types and mechanical properties of structural materials such as steel, aluminum and carbon. It also mentions why the Jumbo Jet crash occurred.
- [7] Disaster rescue robots: Consider the present and future of rescue robots based on the Hanshin-Awaji Earthquake and the Great East Japan Earthquake.
- [8] Software and Programs LabVIEW: Understand the use cases of LabVIEW, a graphic language used by NASA, and present their ideas using FFT analysis of speech.
- [9] Summary of the first half lesson, midterm examination
- [10] Robotic system control: Understand the use cases of "PID control" of classical control, and present their ideas using PID control.
- [11] Robot Venture Company in University: Understand the examples of robot suits and solar panel cleaning robots, and plan a robot startup in Teikyo University.
- [12] Agricultural Robot: Consider the trend of agricultural robot development in view of the declining working population and the global food problem.
- [13] Nursing care robot: try to design a care robot for reducing the burden on the caregiver
- [14] Robots playing an active role in the industrial world: Japan's proud industrial robots and the current and future of the global market. Students devise and present ideas for industrial robots.
- [15] Summary, Test