UNIVERSITY OF GOTHENBURG

DEPARTMENT OF PHYSICS

FIM800 Humanoid Robotics, 7.5 credits

Humanoid Robotics, 7,5 högskolepoäng

Second Cycle

Confirmation

This course syllabus was confirmed by Department of Physics on 2006-10-25 and was last revised on 2018-08-16 to be valid from 2018-08-16, autumn semester of 2018.

Field of education: Science 100%
Department: Department of Physics

Position in the educational system

FIM800, Humanoid Robotics is a course within the Masters Programme Complex Adaptive Systems, and can also be given as a stand-alone course in physics at University of Gothenburg

The course can be part of the following programmes: 1) Physics and learning, Master's Programme (N2FOL), 2) Complex Adaptive Systems, Master's Programme (N2CAS), 3) Physics of Materials and Biological Systems, Master's Programme (N2PMB) and 4) Physics, Master's Programme (N2PHY)

Main field of studies	*Specialization*
Physics	A1N, Second cycle, has only first-cycle course/s as entry requirements

Entry requirements

Basic mathematical and programming skills are required. In addition, it is advantageous (but not absolutely necessary) to have taken the course FIM760 (Autonomous Agents).

Applicants must prove knowledge of English: TOEFL test result of at least 600 points (computerized 250 points, on Internet 100 points) or IELTS test result of at least 6.0, including at least 6.5 for the Writing. This requirement does not apply to students with a Bachelor degree from an English speaking university, or to students having passed

English level B at Swedish/Nordic Upper Secondary School.

Learning outcomes

The course aims at giving the students (1) a basic understanding of the theory of humanoid robots, i.e. bipedal walking robots with an approximately humanlike shape, and (2) practical knowledge concerning humanoid robots, through a robot construction project.

After having taken "Humanoid Robotics" the student should be able to:

- Understand and describe the basic properties of humanoid robots.
- Implement and apply different methods for bipedal gait generation, such as e.g. central pattern generators and linear genetic programming.
- Implement other motor behaviors (such as dexterous manipulation) for humanoid robots.
- Discuss and describe the advantages and disadvantages of humanoid robotics in relation to other kinds of robots.
- Describe the potential uses of humanoid robotics in society.
- Construct a part (e.g. a head or an arm) of a humanoid robot, and use the construction in a variety of experiments.

Course content

The contents of the course are as follows

1. Theory of humanoid robots, kinematics and dynamics.
2. Methods for gait generation, including classical control theory, central pattern generators and linear genetic programming.
3. Applications of humanoid robots.
4. Humanoid robots in society - current and future applications, comparison with other types of robots.
5. Hardware construction, including the use of microcontrollers and servo motors in connection with humanoid robots.

Form of teaching

The construction project is graded and represents 75% of the grade. The remaining 25% are based on the results of a small exam in the fifth or sixth week of the course. The final grade for the course is obtained when all compulsary parts of the course have been approved.

Students that have failed the course twice has the possibility of asking for another examiner. Such a request must be registered to the relevant institution.

Language of instruction: English

Assessment

Grades
The grading scale comprises: Pass with Distinction (VG), Pass (G) and Fail (U).
If there are established criteria for G and VG, they have to be made avaible to the student. The instructor must be informed within a week after the course starts if the student would like to receive ECTS grades.

Course evaluation
The evaluation of the course is done by the teacher and students together during and after the course.

Additional information
The Masters Programme in "Complex Adaptive Systems" is given in collaboration with other Departments at Chalmers University. The course is identical to and given together with the course TIF160 "Humanoid Robotics" in a corresponding Masters Programme at Chalmers. The course is limited to 20 participants.