Computational Robot Dynamics

Unit code: (filled by Unige administrative office)

Scientific Disciplinary Sector: ING-INF/04

Number of hours: 12

Credits: 5

AIMS AND CONTENT

Learning Outcomes (short)

The course covers the fundamentals of computational robot dynamics: dynamic models of robots; inverse and forward dynamics; and the process of dynamics simulation.

Learning Outcomes (further info)

Most dynamics simulation today is performed by specialized 'black-box' simulators that hide the details from the user. Unfortunately, many of these simulators are inaccurate, buggy, or suffer from a variety of limitations. This course provides students with the necessary knowledge to become competent users (and producers) of dynamics software. Topics range from building a dynamic model of a robot through to what is happening inside the dynamics simulator, plus detailed descriptions of the main dynamics algorithms and how to implement them efficiently.

Syllabus/Content

- dynamic models of robots
- inverse dynamics, and the idea of a recursive algorithm
- efficient implementation of spatial vector arithmetic
- forward dynamics
- how a dynamics simulator works

Prerequisites: It is desirable, but not necessary, that students take the preceding course on spatial vectors. Students who have not taken this course should nevertheless have a basic knowledge of classical Newtonian dynamics (i.e., dynamics using 3D vectors).

WHO

Teacher: Roy Featherstone, roy.featherstone@iit.it

HOW

Teaching Methods

The course will be taught by means of lectures, class exercises and practical exercises using the software package *spatial_v2*. Students will need access to Matlab and Simulink in order to run this software. Lecture notes will be provided.

Exam Description

There will be an oral exam based on the lecture material and exercises.

Assessment Methods

The course will be assessed by oral exam only. Students wishing to take the exam must make an appointment with the teacher.

WHERE AND WHEN

Lesson Location

IIT Morego (room not allocated yet).

Lesson Schedule

Four 3-hour sessions in the afternoon from Monday 23rd to Thursday 26th May inclusive.

Office hours for students

The teacher is available at most times and on most days to answer students' questions face-to-face or by email. No appointment is required.

CONTACTS

The teacher’s office is on the top floor of the new IIT building on via San Quirico (CRIS). Students can contact him via email: roy.featherstone@iit.it