



THE UNIVERSITY *of* EDINBURGH
informatics

Advanced Robotics

0 - Course Introduction
16 Sep 2024

Subramanian Ramamoorthy / Steve Tonneau
School of Informatics
University of Edinburgh

ARO: Course Details

The team

Lecturers

Prof. Subramanian Ramamoorthy

<https://edin.ac/3RiACn3>

s.ramamoorthy@ed.ac.uk



Dr. Steve Tonneau (+ tutorials)

<https://edin.ac/3R0D7Lj>

stonneau@ed.ac.uk



Tas / Lab assistants

Lab TAs:

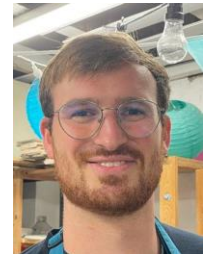
George Kamaras – PhD student

s2083375@ed.ac.uk



Ciaran Johnson - PhD student

Ciaran.Johnson@ed.ac.uk



Hardware lab TAs:

George Kamaras

Jiaji Li – Minf2

s2047311@ed.ac.uk

Markers:

Peter Fagan



Course structure

ARO has 3 essential parts:

- ❑ Lectures / Tutorials / Practical labs
- ❑ Theory --> Coding --> Robot systems (**Simulation + robots**)

Assessment:

- ❑ Written examination **50%**
- ❑ Coursework 1: **10%**
- ❑ Coursework 2 (Software lab - **in pairs!**)
 - ❑ practical report **15%**
 - ❑ Practical demo / code-submission **25%**.

Course structure

📄 Lectures

📄 Mondays 13:10 - 15:00 week 1 - week 10. AT 2.12

📄 **Some** Tuesdays 10:00 - 11:00 / Announced during semester.

You should have badge access to level 3 beginning of week 2 – let me know if not

📄 Tutorials (**in pairs**) – AT 3.01

Mondays: 15:10 - 16:00 or 16:10 - 17:00 **week 2 - week 7**

📄 Software labs (**in pairs - Assessed**) – AT 3.01

Tuesdays: 13:10 - 14:00 or 14:10 - 15:00 from **week 3 to week 10**

Self-assign and organise yourselves I'll intervene only if needed

📄 Hardware labs (**in pairs**) – AT 3.01

Thursdays: 14:10 - 15:00 or 15:10 - 16:00 from **week 4 to week 8**



Lectures

- ❑ Lecture slides made available in Drupal.
- ❑ Monday lectures: core assessed material
- ❑ Irregular Tuesday lectures: **Lecture tomorrow !**
 - ❑ Deeper discussion on some topics
 - ❑ Guest talks about specific aspects of robotics

Tutorials

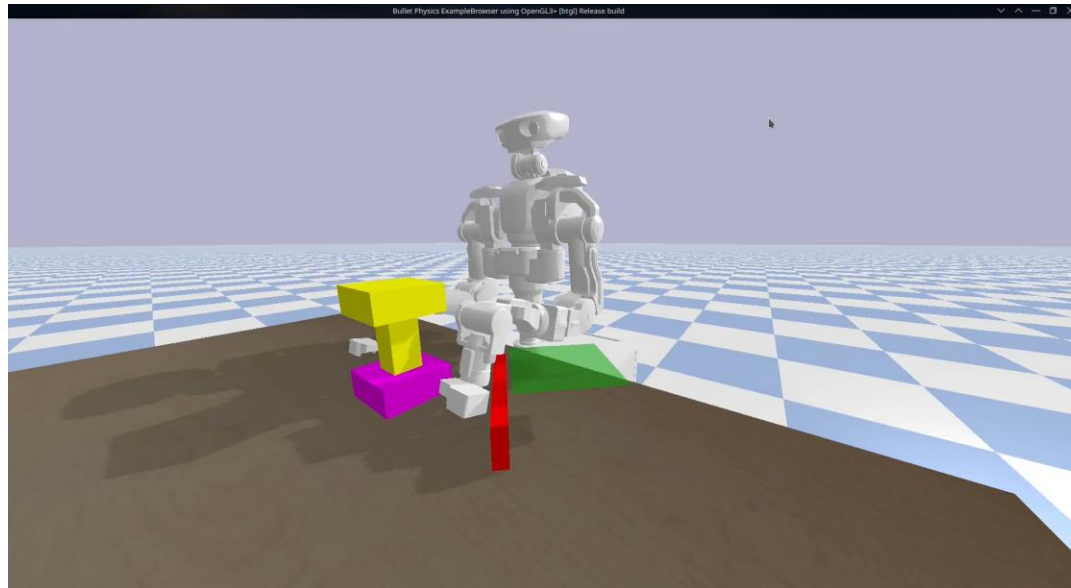
- ❑ Coding exercises on course key concepts to prepare for the practical
- ❑ **Week 1/2: self taught tutorial!** Available on Drupal

Configure your python environment + intro to python

You need to achieve this on your DICE machine **before** week 2 tutorial!

Software labs

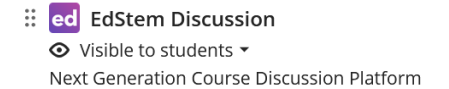
- ❑ Two time slots for the same practical session **week 3 - week 10 on Tuesdays**
- ❑ Objective: Synthesise moving / grasping motions for the Kawada nextage



© Kawada

Staff interaction

- ❑ Weekly email / announcement on Learn with next week's content
- ❑ Course material available on Drupal
- ❑ Default interaction on ~~Piazza~~: **EdStem** (accessible from learn)!
 - ❑ Students are expected to answer by themselves when possible => Post public questions !
 - ❑ One staff member monitors 1 hour / day during working hours
- ❑ Email Steve stonneau@ed.ac.uk for personal matters



Course outline (order subject to change)

- ❑ Forward and inverse geometry of articulated robots
Configuration of a robot (finding a pose)
- ❑ Forward and inverse kinematics of articulated robots
Lie Algebra
Motion of a robot / velocities
- ❑ Dynamics
Forces and torques. Forward and inverse dynamics. Control
- ❑ Motion planning
Planning robot motions, escaping local minimas, handling collisions
- ❑ From numerical optimisation to machine learning
- ❑ **+ Guest lectures from industry / researchers on various aspects of robotics**

