Robot Vision and Navigation (COMP0130)

Description

Aims:
Students will gain knowledge about robot real-time pose estimation and mapping, with an emphasis on the use of vision as a primary sensor for mapping the environment. The module will provide students with an understanding and practical experience of how to combine information from satellite navigation and inertial navigation systems, recover geometry from optical sensors and creating an environment map which a robot can use for navigation and motion planning.

Learning outcomes:
On successful completion of the module, a student will be able to:
1. understand the fundamental techniques used for real-time estimation in linear and nonlinear systems;
2. understand how to formulate algorithms to fuse data from satellite and inertial systems to estimate robot position;
3. understand how to formulate mapping and localisation problems in which robots construct sparse maps of their environment;
4. understand how to use camera data to create 3D reconstructions of the environment;
5. programme with Matlab or Python or C++

Availability and prerequisites;

Content:
For navigating safely, robots need the ability to localize themselves autonomously using their onboard sensors. Potential tasks include the automatic 3D reconstruction of buildings, inspection and surveillance. This module will teach current techniques for 3D localization, mapping and navigation that are suitable for robotics covering the following topics:
- Filtering techniques and data fusion;
- Motion estimation and mapping using Simultaneous Localisation and Mapping (SLAM) techniques;
- Non-linear minimization for 3D reconstruction using structure-from-motion.

Key information

Year 2019/20
Credit value 15 (150 study hours)
Delivery PGT L7, Campus-based
Reading List View on UCL website
Tutor Dr Simon Julier
Term Term 2
Timetable View on UCL website

Assessment

Coursework: 33%
Coursework: 33%
Coursework: 34%

Find out more

For more information about the department, programmes, relevant open days and to browse other modules, visit ucl.ac.uk

Disclaimer: All information correct as of June 2019. Please note that aspects of the module may be subject to change. UCL will make best efforts to inform applicants of major changes.
Requisites:
In order to be eligible to select this module, a student must be registered on a programme for which it is a formally-approved option or elective choice AND must take COMP0127, COMP0128, and COMP0129 in Term 1.