Optimal Control

Integrated Master Degree in Mechanical Engineering

Scientific Area of Control, Automation, and Industrial Informatics
Spring Semester 2017/2018

Laboratory Projects

Upon completion of the initial phase of the selected project by each group, where dynamical models for the underlying systems were developed, it is now required to formulate and solve control problems. The solutions foreseen are based on the classical tools studied in previous courses (e.g Control Systems), some of them reviewed in this course. Solutions must be validated in simulation.

Phase II

The following tasks should then be accomplished in this second phase of the project:

i) To analyze the characteristics of the systems, in terms of linearity, stability, controllability and observability and discuss on the disturbances present

ii) Identify partial goals of the control system to be developed and propose a classical control solution, namely based on pole placement, PID, lead-lag compensators, etc.

For these goals:

1. Identify the inputs, outputs, and propose a functional to be optimized;
2. Design (sub-) optimal controllers;
3. Check that the solution works, in the simulator developed in phase I, both for the linearized versions and for the full nonlinear model;
4. Verify the performance of the solutions proposed, under realistic disturbances (noise or external). Ideally the disturbances should match those in the real system/sensor package;

iii) Discuss and implement the conditions to switch among goals of the project.

A written report, three slides in Powerpoint, and Matlab/Simulink scripts should be delivered upon conclusion of this second phase.

February 2018