**COIL project Amsterdam - Lisbon: Inverted pendulum**

The project begins on November 10, 2025, and runs for six weeks. The aim of the project is to develop a device which keeps an (inherently unstable) flywheel inverted pendulum upright by utilizing PID-controllers. This project involves programming skills, analyzing sensor data, and practical application of electronics and mechanics. In addition to various technical skills, students acquire intercultural competences and practice language skills. Furthermore, students gain experience in interdisciplinary and online collaboration.

The students are divided in ‘international teams’: Each team consists of an equal number of Portuguese students and Dutch students. The teachers provide the same basic kit to all teams (Arduino, motor, sensor, …). Each international team adapts a standard blueprint to design a unique inverted pendulum. Next, they build twin copies of their pendulum in Amsterdam and Lisbon. In a joint effort, the pendulums are then tested, calibrated, and improved. The final product is a pair of near-identical pendulums in Portugal and the Netherlands.

Each international team has one weekly online meeting at a designated time, prescribed by the teachers and included in students’ schedules. For every meeting the teachers assign a ‘meaningful task’, e.g. brainstorm, peer feedback, peer review of technical documentation. The international teams can also present progress, share difficulties, troubleshoot, and discuss improvements. Students themselves are responsible for running/organizing these meetings.

Additionally, one afternoon per week is reserved for lab work. This is the appropriate time for students to build, test and improve the physical pendulum. During this time Portuguese and Dutch team members can contact each other through messages or short video calls if necessary/desired.

The final week ends with common online meeting for all students together. Every international team presents their findings and performance analysis to the other teams and the teachers.