EPFL

Section Sciences et Ingénierie de l'environnement
Design Project 2024 (semestre de printemps)

Proposition n°52

Environmental Field Robotic Simulations

Partenaire externe ou laboratoire IIE

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Descriptif du projet

The rapid changes in our environment caused by climate change must be tackled with a multitude of instruments and technologies. In particular, the employment of robotic platforms could be beneficial for several tasks, from environmental monitoring and mapping to search and rescue operations.

The many difficulties related to conducting real robotic experiments have prompted the robotics community to rely on powerful and realistic simulators for their research. These simulators focus on modelling the robot and its interactions with its surroundings, but the environmental conditions are often ignored or greatly simplified.

Enhancing the capabilities of high-fidelity robotic simulators by providing more realistic modelling of environmental phenomena would allow researchers to envision systems targeted at solving real and urgent problems efficiently.

In a first step, we focus on designing a variety of scenarios useful to expose environmental engineering students to robotics simulation tools. Therefore, in the scope of this SIE Design Project, students will propose relevant applications of field robotics to environmental issues and will represent their scenarios in the high-fidelity robotic simulator Webots, developed by the EPFL spin-off company Cyberbotics Sarl, which most of the SIE students have been already acquainted with in the context of DISAL educational activities.

Objectif et buts

The general objective of this project is to work on creating environmentally relevant scenarios for field robotics applications.

The students will :
- Propose relevant scenarios for the application of robotics to environmental problems.
- Use a powerful and realistic robotic simulator, Webots, to replicate the environmental conditions of the proposed scenarios.
- Include appropriate robotic platforms in the simulation and showcase their work.

Descriptif tâches

The project will follow these steps:
- Students will familiarize themselves with the capabilities and limitations of Webots for replicating environmental scenarios.
- Students will draw from the expertise acquired during their studies so far and propose applications of robotics to environmental sensing.
- Students will modify the simulator to reflect the environmental conditions of interest.
- Students will add robotic platforms to their simulator and showcase their work.

Divers
Students applying for these projects should be motivated to work with Webots and write code.