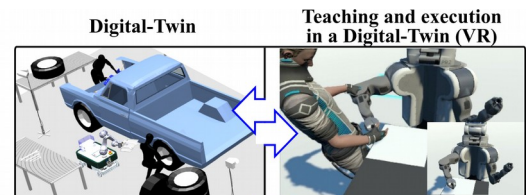


Project proposal for SSY226: Collaborative-Robot Assistant for Technicians



Background

The next generation of Collaborative Robots (Cobots) will help humans with repetitive and high-loaded tasks. Such Cobots will foster service, medical, and industrial sectors by becoming a standard technology. The crucial challenge is to deploy Cobots in naturalistic human spaces, where humans and robots can share spaces, information, and skills to achieve a common purpose. In services such as maintenance, where automation solutions have shown limited results, the deployment of Cobots offers a promising solution. Maintenance is an essential component in the aftermarket business which is present in many industrial domains. For automotive companies, such as AB Volvo, the aftermarket team tries to minimize the downtime during the maintenance of their trucks. This service involves tasks with uncomfortable postures for the workers, such as carrying heavy objects and working in forced postures. Such problems can be mitigated by introducing Cobots to assist the technicians.



Problem and goal

This project aims to investigate the use of a digital environment, also known as a digital twin, which will be used to develop general-purpose robots for an industrial setting. Concretely, this project has the following objectives:

- Design and development of a digital twin that resembles a truck maintenance bay, as shown in the above figure.
- Develop the robot controller that ensures that the robot executes the given actions needed in the maintenance bay.
- Design and develop a multimodal control framework for a safe human-robot interaction in virtual environments, e.g. Kinesthetic teaching. The goal is to have a virtual robot collaborating and interacting with the technicians in the digital twin.
- Assessment of the acquired skills from the digital twin and their possible transference to the real robot.

This project involves programming a collaborative robot to assist a technician with the task of changing a truck's wheel. For this project, we will use the TIAGo robot and the Oculus device for the digital twin. This project is in collaboration with Volvo trucks.

Number of students: 3

Prerequisite: Basics of Automatic Control, Learning algorithms, Basics on Computer Programming (ROS, Python or C++, basics of Unity, and C#).

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