

## Faculty of Engineering

### Summer Research Program 2024-2025

#### Project Title: **Evaluating the impact of different human models in model-free and model-based robot control**

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#### Objective

Investigate how different human models used to train model-free and model-based robot policies affect robot and human-robot performance in a shared-autonomy scenario.

#### Project Details

Interacting with others necessitates being able to predict each other's decisions and actions in a fast and accurate manner. Learning-based robot control algorithms can be categorized into model-free and model-based. While model-free algorithms never attempt to explicitly learn how humans behave, model-based algorithms work by building a model of the human user and optimizing a cost or reward function under this learned model.

This project aims to investigate the influence that different human models have on the performance of both model-free and model-based robot controllers. Evaluations both in simulation and with human users will be conducted as part of this project.

#### Relevant references:

- Choudhury, Rohan, et al. "On the utility of model learning in HRI." *2019 14th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*. IEEE, 2019. [link](#).
- Backman, Kal, et al. "Learning to Assist Drone Landings," in *IEEE Robotics and Automation Letters*, vol. 6, no. 2, pp. 3192-3199, April 2021, doi: 10.1109/LRA.2021.3062572. [link](#)

#### Prerequisites

- Good Python and C/C++ programming skills are needed for this project
- Practical experience with deep reinforcement learning, sampling-based control and/or model-predictive control

#### Additional Information

Applicants may be required to attend an interview.