



Digital Prototypes for Robotic Drive Systems

About maxon

At maxon, we develop and build electric drive systems that are among the best in the world. Our drive systems can be found wherever extreme precision and the highest quality standards are indispensable – on Earth, and on Mars.

Motivation

Our drives are used in a wide range of applications. In specialized and more complex robotic applications selecting the optimal specifications for the drives is often not straight forward. To address this challenge, we want to develop a customized simulation toolchain for robotic applications.

In this thesis we want to start with the simulation of kinematics, dynamics and control of parameterizable robotic manipulators using ideal or simplified component models (motors, sensors, electronics and gears). In a second step we want to add the existing component models from maxon to the simulation. Finally, we want to use the complete model to predict the performance of a robotic manipulator using drive system components from maxon. The complete model will be denoted as *digital prototype* and will allow us to study the advantages and disadvantages of using different maxon drive system components.

The main challenges in the thesis are:

- ... finding good trade-offs between complexity, accuracy and computational performance;
- ... ensuring that the simulation approach is compatible with existing components models;
- ... providing a solution with good usability for technical experts in engineering and in customer-facing roles.

The thesis will be conducted at RSL and/or in the maxon offices in Zurich Oerlikon.

You will:

- ... analyze our existing models and simulation toolchains for drive systems;
- ... model the kinematics, dynamics and control of selected robotic applications;
- ... develop digital prototypes of robotic applications allowing for the calculation of achievable dynamics when using existing drive systems.

You are a perfect fit if you:

- ... are studying towards a degree in robotics, mechatronics or a related field;
- ... are curious, independent and motivated to work with academic and industry experts;
- ... possess strong skills in control systems and mathematical modeling;
- ... have programming and scripting skills (Python, MATLAB).

Contact

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