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B A C H E L O R T H E S I S
for
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Mechatronic analysis of lightweight robotic joints

Problem description:

Flexible, distributed, and smart automation, involving close and physical human-robot inter- action (pHRI) has become one of the core concepts of the Industry 4.0 initiatives. Opening the compatibility between humans and robots is the final step in manufacturing using tactile robots. The ultimate goal is to have a flexible and dynamic production environment where robots and humans work side by side. The key enabler technology for this current trend is a fundamentally novel class of lightweight robots. The term lightweight robot refers to manipulators, which go beyond the classical payload-to-weight ratios of conventional industrial robots. Such robots will become a major driving economical force in the industrialized world. This thesis is located in the field joint analysis of possible robotic joint concepts. The task includes the identification of non-idealities, such as stiffness, friction, hysteresis, as well as the identification of non ideal sensor behaviour (e.g. torque sensor and position encoder). Therefore, suitable test mechanism have to be designed or adapted. Existing test benches including the related software have to be adapted to fulfill the requirements of a precise identification.

Tasks:

- Literature review on parameter identification of flexible joint and specific joint devices
- Improvement of existing identification frameworks for robotic joints and specific joint devices
- Validation based on experimental data of real joint prototypes and specific joint devices

Bibliography:

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[3] Baur, J. et. al. "*Experimental Friction Identification in Robot Drives*", 2014 IEEE International Conference on Robotics & Automation (ICRA), 2014

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