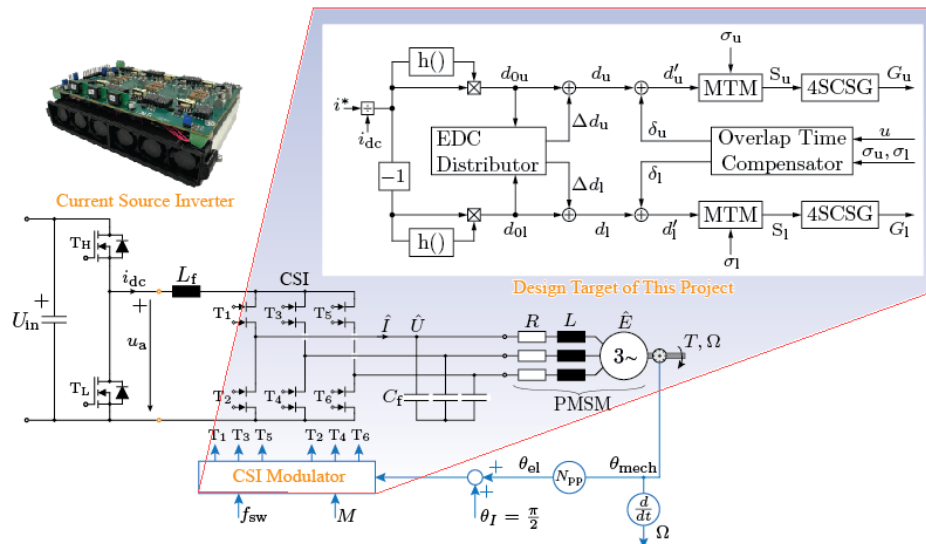


## Bachelor Thesis @InstitutFürMechatronik

### Carrier-Based Modulation for Multi-Phase Current Source Inverter Drive Systems



**Background:** Current Source Inverters (CSIs) are gaining increasing attention as a promising alternative for modern drive systems, particularly in high-frequency applications where problems caused by high  $dv/dt$  become critical. Traditionally, CSIs have been controlled using Space Vector Modulation (SVM), but this method is not well-suited for systems with more than three phases. This project investigates the application of carrier-based modulation methods to multi-phase motor drives using CSIs, aiming to achieve current control with low total harmonic distortion (THD), which has not been possible with conventional approaches.

**Objectives:** Derive optimal switching patterns for multi-phase CSIs. Design a modulator capable of generating these switching patterns. Implement the designed modulator on a controller and experimentally validate its performance in driving a multi-phase CSI.

**Approach:** The project begins with a theoretical study of modulation methods for CSIs, followed by the design of a carrier-based modulator suitable for multi-phase systems. The modulator will be verified through PLECS simulations and then programmed into a controller. Finally, experiments will be conducted to evaluate the modulation performance on a multi-phase CSI. All necessary hardware will be provided.

**Tools/Software:** C, PLECS

**Prerequisites:** Strong interest in novel power electronics systems, but no specific prerequisites required.

#### Application and Supervision:

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