

Tutorial Title

Embedded Code Generation for Electrical Drives Using the PLECS Toolchain

Instructor Team

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Co-Speakers: Lino Capponi

Abstract

Developing an electrical drive system is a multidisciplinary endeavor. It includes not only the inverter and electrical motor design, but also the development of advanced controls, which are often implemented on a microcontroller (MCU). The computational complexity of such algorithms and the hardware requirements have risen dramatically. Model-based-design tools like embedded code generation aim to support the implementation (real-time capable C-code) of such algorithms on dedicated and cost-friendly microcontroller platforms. Power electronics and control engineers design and validate these control algorithms using simulation software. This leads to reduced costs and shorter development times as well. In this tutorial participants will design a control for a small electrical drive using the PLECS toolchain. The participants will start with a predefined model to develop their control algorithm in offline simulations. Real-time capable C-code running on a TI or STM microcontroller will be generated using the PLECS toolchain

Instructor Team Biographies

Christopher Ranisch (Student member IEEE) was born in Darmstadt Germany, in 1991. He received the Master of Science (M.Sc.) degree from the University of Applied Sciences in Darmstadt in 2017. From 2017 to 2021, he was with the smart structure division of the Fraunhofer institute LBF, Darmstadt, Germany. Since 2021 he has been a research assistant with the University of Applied Science Darmstadt. He is currently working towards the Dr.-Ing. (Ph.D.) degree with the Brandenburg University of Technology. His main research interests include energy management systems, control of power electronics and renewable energy systems.

Lino Capponi was born in Brig, Switzerland, in 1992. He received his M.S. degree in electrical engineering from the Haute école spécialisée de Suisse occidentale (HES-SO), Lausanne, Switzerland, in 2019. Afterwards, Lino joined Plexim, a company that develops the software PLECS for fast simulation of power electronic systems. Currently, he is the Head of Power Electronics Engineering at Plexim. His research interests include digital control of switched-mode power converters, grid integration of renewable energies and real-time HIL simulation.