The general architecture of the modular SST for MVAC to LVDC conversion, based on ISOP topology applied per each phase. All of the topologies, yet, without any commercial products on the market. In the following survey, the solution that has the similar input and output voltage and current to this project are surveyed.

>> MMC concept and MMC principles, along with practical work on offline and real-time simulations, DSP programming, and experimental tests.

The research activity is focused on the development and optimization of advanced and optimized control algorithms for CHB converters, considering grid-connected and electric drive applications. They combine theoretical studies, numerical simulations, and practical work on offline and real-time simulations. Each SM is made of several electronic circuits and the eager to learn are required. The range of topics is offered, which include but not limited to:
- Reliable and ultra fast short circuit protection
- Compact isolated power supply devices
- Crosstalk voltage elimination of gate driver
- Thermal managements of electronics
- Characterization of power devices

GATE DRIVER OF HIGH-Power SIc MOSFETS

Superior: Yangic Kalluri ELH17
Keywords: #SiC #MMC #ISOP #Balancing #Control

Description: The next generation power devices, SiC MOSFETS are gradually increasing their presence in power electronics applications. Theoretically, these devices are ideal for high voltage, high temperature and high frequency operation. However, only having power electronics device with an equally important issue is the gate driver of the devices to fully utilize these benefits. A car is only as good as its driver. The project aims to solve the scientific and technical challenges on gate driving of SiC MOSFETS, which will make a strong impact in both academia and industry. Basic topology of circuits and the eager to learn are required. The wide range of topics is offered, which include but not limited to:
- Reliable and ultra fast short circuit protection
- Compact isolated power supply devices
- Crosstalk voltage elimination of gate driver
- Thermal managements of electronics
- Characterization of power devices

FLEXIBLE PHOTONIC ELECTRONICS SOLUTIONS FOR HYDRO-POWER

Superior: Philippe Bonnemps ELH17
Keywords: #Hydro #Control #MMC #PHEV

Description: The focus of this research is to demonstrate the viability of a DC-DC converter for high power and high efficiency applications such as marine propulsion systems. The project is focused on the hardware design and development, mainly including the following tasks:
- Development of a DC-DC converter with a flexible interface to the high voltage-level, which can be adapted to different applications
- Design and development of a new control strategy for the converter

PEBB OF CASCADED H-BRIDGE CONVERTER

Superior: Jing Sheng ELH17
Keywords: #PEBB Design #CHB Converter Control

Description: A single Power Electronics Building Block (PEBB) of the Cascaded H-Bridge converter consists of two units: the active front-end (AFE) rectifier and the H-bridge (H-Bridge) unit. The primary aim of this project is to develop a converter for grid-connected applications, where the power electronics converter is connected to the grid through a medium-voltage AC-DC converter. The project will focus on the hardware design and development, mainly including the following tasks:
- Development of a new control strategy for the converter
- Design and development of a new control strategy for the converter
- Design and development of a new control strategy for the converter

SOLID-STATE TRANSFORMERS WITH ISOP STRUCTURE

Superior: Tianyu Wei ELH17
Keywords: #SST #Control #Simulation

Description: Solid-State Transformer (SST) is the power electronics interface between a medium-voltage (MV) and a low-voltage (LV) level. This project will focus on the development of a high-power solid-state transformer with an ISOP structure. The main objectives of the project are:
- Design and development of a new control strategy for the converter
- Design and development of a new control strategy for the converter

DC POWER DISTRIBUTION NETWORK WITH DC TRANSFORMERS

Superior: Renan Pittenbaron ELH17
Keywords: #DC grids #RFID #Modeling #Simulation

Description: The focus of this research is to develop a model of a DC distribution network with DC transformers. The project aims to develop a new control strategy for the converter, mainly including the following tasks:
- Development of a new control strategy for the converter
- Design and development of a new control strategy for the converter
- Design and development of a new control strategy for the converter

HIL FOR THE 40 ROBICON

Superior: Jerome Savary ELH17
Keywords: #Robicon #Control #HIL

Description: The 40 Robicon is a bidirectional converter with a Cascaded H-Bridge (CHB) based topology, whose architecture is very promising for medium and high voltage applications. However, there are still some open issues that need to be addressed. The project aims to develop a new control strategy for the converter, mainly including the following tasks:
- Development of a new control strategy for the converter
- Design and development of a new control strategy for the converter
- Design and development of a new control strategy for the converter

WIRELESS POWER SUPPLY FOR MEDIUM VOLTAGE CONVERTERS

Superior: Xiaotong Du ELH17
Keywords: #Optimization #PCB coil #ISOP #GUI

Description: This project is on optimization of wireless power supply (WPS) with PCB based coils (1500-5000kHz). The designed WPS has the potential to be used as auxiliary power supply for power electronics converters. The design is composed of power factor correction stage, inverter stage, compensation network, transmitter and receiver coil and rectifier stage. You can gain a close look into novel WPS technology in addition to technical skills.

Keywords: #WPS #Optimization #PCB coil #ISOP #GUI

The available topics would be on the optimization of the existing systems, and it is a very interesting and valuable topic. The project will focus on the following tasks:
- Design and development of a new control strategy for the converter
- Design and development of a new control strategy for the converter
- Design and development of a new control strategy for the converter

PLL DRIVER FOR MVAC SYSTEMS

Superior: Philippe Bonnemps ELH17
Keywords: #Hydro #Control #MMC

Description: The focus of this research is to develop a PLL driver for MVAC systems. The project aims to develop a new control strategy for the converter, mainly including the following tasks:
- Design and development of a new control strategy for the converter
- Design and development of a new control strategy for the converter
- Design and development of a new control strategy for the converter

Keywords: #Hydro Power Solutions for MVAC #Control #Simulation

The existing project is on optimization of wireless power supply (WPS) with PCB based coils (1500-5000kHz). The designed WPS has the potential to be used as auxiliary power supply for power electronics converters. The design is composed of power factor correction stage, inverter stage, compensation network, transmitter and receiver coil and rectifier stage. You can gain a close look into novel WPS technology in addition to technical skills.

Requirements:
- Good knowledge of power electronics
- Experience with simulation tools (e.g., MATLAB, Simulink)
- Willingness to work as part of a team

Some topics/subparts include protecting features, energy storage, gate drivers, thermal management, and control algorithms.