

# EENX15-21-04 Design of a smart charging control unit for electric vehicles

## Bakgrund

The popularity of electric vehicles (EV) is growing. The strict emission goals is promoting the fossil-free transportation, leading to higher integration of EVs. It is expected that the EVs will also become economically competitive compared to other types of vehicles in the near future, considering the purchase cost and ownership cost. The increasing integration of EVs has raised concerns for the power grid industry. It can stress power grids and create operational challenges for distribution networks. Most of the grids are not dimensioned to accommodate the high peaks caused by EV charging. Reinforcing the grid to meet the peaks is also not socioeconomically profitable. Controlled charging of the EVs is a solution to reduce the peaks and enable efficient usage of the existing network and the charging infrastructure. It can also increase the self-consumption of electricity from the PV sources.

The project is nominated for the Bachelor thesis award by Elkraftrådet

## ELKRAFTRÅDET

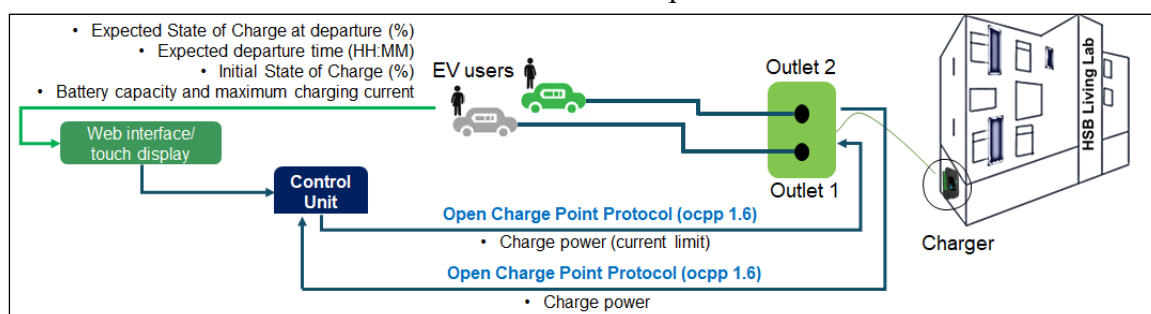
vid Chalmers Tekniska Högskola

## Problembeskrivning

This project aims to develop a control unit for the Chargestorm charger installed at the HSB Living Lab, a smart building in the Chalmers Campus, to optimize the charging current. The control unit will update the charging current every 5 minutes.

The optimization model as the core part of the control unit has been previously designed and implemented. The frequent update of the charging current, the web interface to receive the values from the users, and the communication between the control unit and the charger via the test portal have also been tested. The models were developed in Matlab and GAMS. The tasks to be accomplished are as follows:

- Run the optimization model on a Python-based microcontroller (e.g., pycom.io)
- Establish the connection between the microcontroller and the charger
- Establish the connection between the microcontroller and the user interface
- Add a touch screen for the user to insert the preferences



Charger connection with the EV

**Målgrupp:** TKAUT, TKMAS, TKELT, TKDAT, TKTFY

**Gruppstorlek:** 3–6 students

**Antal grupper:** 1 group

**Förkunskapskrav:** Programming

**Kontaktperson:** Ali Fotouhi, ([ali.fotouhi@chalmers.se](mailto:ali.fotouhi@chalmers.se))

**Handledare:** Ali Fotouhi ([ali.fotouhi@chalmers.se](mailto:ali.fotouhi@chalmers.se)) and  
David Steen ([david.steen@chalmers.se](mailto:david.steen@chalmers.se))

**Examinator:** Jimmy Ehnberg