Bachelor/Master Thesis:
Characterizing cyber-physical resilience for distribution grids with high levels of electromobility integration

Electric vehicles are poised to be the drivers of the era of sustainable transportation. Electrification of transportation is leading to an increasing integration of electric vehicle charging stations (EVCS) in the distribution grids, creating new challenges and opportunities for secure operation of power grids. EVCS introduce new cyber vulnerabilities in the digitalized distribution grid, which can be utilised to disrupt the operation of power grids. At the same time, EVs can also be utilised to make the grid more resilient towards cyber-threats as well towards high-impact low-probability events. There is no consensus on the definition of resilience in literature. It can be broadly defined as the ability of the network to minimize discontinuity of power supply to critical loads during stressful operating conditions, and recover from any damages during unfavourable events [1].

Your tasks will include:
1. Conducting an extensive literature review on the topic of power system cybersecurity and resilience for distribution grids with high levels of electromobility integration.
2. Designing a metric that quantifies cyber-physical resilience in this context
3. Application of the designed metric for resilience analysis of a benchmark distribution grid using simulations.

The detailed description of tasks can be discussed based on your interests and further discussions. The supervision language can be English or German. In case of interest, please send an email with your transcript and CV.

Your Profile:

1. Bachelor/master student in Electrical Engineering
2. Good knowledge Python/C++
3. Good understanding of power system automation
4. Interest in inter-disciplinary research topics

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[1] Kandaperumal, Gowtham; Srivastava, Anurag K. (2020): Resilience of the electric distribution systems: concepts, classification, assessment, challenges, and research needs. In *IET Smart Grid* 3 (2), pp. 133–143. DOI: 10.1049/iet-stg.2019.0176.