Transilvania University of Brașov
INTERDISCIPLINARY DOCTORAL SCHOOL

ADMISSION TO DOCTORAL STUDIES **Session September 2025**

Field of doctoral studies: Electrical Engineering
Doctoral supervisor: Prof dr ing Corneliu Marinescu

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

TOPIC 1: *Software for optimal management of energy resources in smart cities, integrating microgrids based on renewable energy sources and electric vehicle charging capabilities.*

Contents / Main aspects to be considered

- Identification of key challenges and limitations in the current state of the art of smart residential microgrids (MGs) with electric vehicle (EV) charging capabilities;
- Research and analysis of existing software environments and technologies that can support the management and operation of smart residential MGs with EV charging capabilities in the context of Smart Cities;
- Use of a 24/48-hour weather forecast for renewable energy sources (RES);
- Development of a database of charging stations (CS), including those based on RES, with information on geographic location, availability, and charging schedules, as well as other conventional CSs;
- Implementation of an online payment facility using blockchain technology;
- Redistribution of EV charging based on grid load, to avoid grid overloading;
- Redistribution of EV charging based on CS congestion.

Recommended bibliography:

[1] N. Hatziargyriou, Microgrids: Architectures and Control. John Wiley & Sons Ltd., 2014, p. 4, ISBN 978-1-118-72068-4.
[2] I. Serban, S. Cespedes, C. Marinescu, et al., "Communication Requirements in Microgrids: A Practical Survey," IEEE Access, 2020, DOI: 10.1109/ACCESS.
[3] C. Marinescu, "Design Considerations Regarding a Residential Renewable-Based Microgrid with EV Charging Station Capabilities," Energies, vol. 14, no. 16, p. 5085, 2021.
[4] C. Marinescu, "Progress in the Development and Implementation of Residential EV Charging Stations Based on Renewable Energy Sources," Energies, vol. 16, no. 1, p. 179, 2023.
[5] Congress of Smart Cities – Proceedings ICSC-CITIES 2022. Available online, https://icsc-cities.com/proceedings/2022.pdf
[6] D. Bakken (Ed.), Smart Grids: Clouds, Communications, Open Source, and Automation. CRC Press, 2014.

Prerequisites / Remarks:

- Bachelor's degree and/or master's degree in electrical engineering or in a similar domain;
- Good command of English ;

- Good programming skills.
☒ **Scientific Doctorate (full-time only)** **x Professional Doctorate (full-time or part-time)**
☒ **without tuition fee (state budget funded)** **x with tuition fee or with funding from other sources than the state budget**

Doctoral supervisor,

Prof. Dr. Ing. Corneliu Marinescu

Signature

Coordinator of the field of doctoral studies,

Prof. Dr. Ing. Ioan SERBAN

Signature