Universitatea Transilvania din Brașov

Interdisciplinary Doctoral School

ADMISSION TO DOCTORAL STUDIES Session September 2024

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

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

TOPIC 1: *RES based Residential Charging stations for EV*
X Scientific Doctorate (full-time only) ☐ Professional Doctorate – in the fields of Music and Science of sport and physical education (full-time or part-time)
X without tuition fee (state budget funded) ☐ with tuition fee or with funding from other sources than the state budget
Contents / Main aspects to be considered -Renewable Energy Sources, RES, usable in Residential applications -Inteligent Microgrids; -Residential loads and their energy requirements; - Electric energy storage; -Charging performant batteries - Communication and Control requirements in Smart Microgrids
Recommended bibliography: 1. Marinescu C., et a. *Retele Hibride cu Surse Regenerabile de Energie. Evolutii moderne,(Hibrid Networks with Renewable Energy Sources)* 2011, Ed Univ Transilvania, ISBN 978 973 -598-049-1 2. *Hatziargyriou, Nikos (2014). Microgrids Architectures and Control. John Wiley and Sons Ltd. p. 4. ISBN 978-1-118-72068-4.* 3. Eric Tervoa et al.,An economic analysis of residential photovoltaic systems with lithium ion battery storage in the United States, Renewable and Sustainable Energy Reviews,94,2018 4. David Bakken editor, SMARTGRIDS Clouds, Communications, Open Source, and Automation, CRC Press, 2014. 5. I Serban, Sandra Cespedes**, C.Marinescu**, et al., *Communication requirements in Microgrids: a practical survey*, IEEE Access, DOI 10.1109/ACCESS, 2020, FI 4,08, 6. C. Marinescu, *Design Consideration regarding a Residential Renewable based Microgrid with EV Charging Station capabilities*. Energies 2021, Volume 14, Issue 16, 5085 7. C. Marinescu, *Progress in the Development and Implementation of Residential EV Charging Stations Based on Renewable Energy Sources*. Energies 2023, Volume 16, Issue 1, 179.
Prerequisites / Remarks: - degree in electrical engineering or compatible; - Knowledge on power electronics (hardware and control);

TOPIC 2: SMART CITY SOFTWARE ENVIRONMENT FOR SMART RESIDENTIAL MGs WITH EV CHARGING CAPABILITIES
X Scientific Doctorate (full-time only)

☐ Professional Doctorate – in the fields of Music and Science of sport and physical education (full-time or part-time)

X without tuition fee (state budget funded)
☐ with tuition fee or with funding from other sources than the state budget

Contents / Main aspects to be considered –

1. Identification of key challenges and limitations in the current state of the art of smart residential MGs with EV charging capabilities;
2. Research and analysis of existing software environments and technologies that can be used to support the management and operation of smart residential MGs with EV charging capabilities in Smart Cities context
3. Creation of a weather forecast of 24/48 hours for RES (solar; wind, temperature)
4. Database with Charging stations, CS, based on RES (geographic position, availability, scheduling for charging) and other CSs.
5. Payment on line facility;
6. Instantaneous Redistribution of charging for EVs according grid load (to avoid grid overcharging).

Recommended bibliography:

1. Hatziargyriou, Nikos (2014). Microgrids Architectures and Control. John Wiley and Sons Ltd. p. 4. ISBN 978-1-118-72068-4.

2. *** **Congress of Smart Cities** Proceedings ICSC-CITIES 2022, available on web

3. David Bakken editor, SMARTGRIDS Clouds, Communications, Open Source, and Automation, CRC Press, 2014.

4. I Serban, Sandra Cespedes**, C.Marinescu**, et al., *Communication requirements in Microgrids: a practical survey*, IEEE Access, DOI 10.1109/ACCESS, 2020,

6. C. Marinescu, *Design Consideration regarding a Residential Renewable based Microgrid with EV Charging Station capabilities*. Energies 2021, Volume 14, Issue 16, 5085

7. C. Marinescu, *Progress in the Development and Implementation of Residential EV Charging Stations Based on Renewable Energy Sources*. Energies 2023, Volume 16, Issue 1, 179.

Prerequisites / Remarks:

- degree in electrical engineering or compatible;
- Knowledge on RES (hardware and control);

Doctoral supervisor,

Prof. Dr ing Corneliu Marinescu

[redacted]

Coordinator of the field of doctoral studies,

Prof. Dr ing Corneliu Marinescu

[redacted]