Transilvania University of Brașov
INTERDISCIPLINARY DOCTORAL SCHOOL

ADMISSION TO DOCTORAL STUDIES **Session September 2025**

Field of doctoral studies: Automotive Engineering

Doctoral supervisor: Prof. Duguleana Mihai

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

TOPIC 1: Intelligent connected vehicle system based on emergent technologies

Contents / Main aspects to be considered –

The automotive industry is undergoing a profound transformation driven by the ACES trends: **Automation, Connectivity, Electrification, and Shared mobility**. In this context, connected and autonomous vehicles (CAVs) are becoming central components of the intelligent mobility ecosystem. The integration of emerging technologies—such as **Artificial Intelligence (AI), 5G, edge computing, and Vehicle-to-Everything (V2X) communication**—enables the development of cooperative systems between vehicles, infrastructure, and users, aiming to enhance road safety, energy efficiency, and personalized user experiences.

This research proposes the development of an **intelligent vehicular cooperation system**, capable of:

- **Monitoring and analyzing driving behavior** in real-time using machine learning algorithms and data collected from vehicle sensors, smartphones, and OBD modules;
- Communicating with other vehicles and smart infrastructure via **V2V, V2I, and V2X protocols**, in order to anticipate hazards, optimize routes, and reduce traffic congestion;
- Providing **personalized insights** to insurers and fleet operators regarding driver behavior, enabling dynamic insurance pricing models and predictive maintenance;
- Leveraging **edge computing** for local processing of sensitive data, reducing latency and improving system resilience;
- Utilizing **smartphones and social media platforms** as user interfaces to deliver real-time feedback and gamified incentives for responsible driving.

The innovation lies in the **multi-dimensional integration of data sources and communication networks** to enable collaborative and sustainable mobility. Harnessing collective data from both fleets and individual users will allow the development of predictive and adaptive urban mobility models, supporting the transition toward **smart cities**.

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Prerequisites / Remarks:

☒ **Scientific Doctorate (full-time only)**

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

☐ **without tuition fee (state budget funded)**

☐ **with tuition fee or with funding from other sources than the state budget**

Doctoral supervisor,

Prof. Dr. Duguleana Mihai

Signature

Coordinator of the field of doctoral studies,

Prof. Dr. eng. Adrian SOICA

Signature