

Transilvania University of Braşov

Faculty of Mechanical Engineering

Department of Automotive and Transport Engineering

Proposed topic for doctoral studies admission contest – September 2019

Doctoral field **Mechanical Engineering**

Doctoral coordinator **Prof.dr.ing. Csaba Antonya**

Topic: Driver-in-the-loop simulation of vehicles for comfort and safety tests.

Testing of virtual cars in a multi-modal virtual environment is an important step in the validation process of new concepts and technologies. A driving simulator with realistic interaction, operating environment and feedback eliminates the difficulties of the road tests but allows the understanding of driving behavior, testing driver assistant systems and for traffic research. In a driver-in-the-loop simulation, the driver is operating the car with pedals and the steering wheel and the simulator, while a Moog motion platform, with a chair and displays, is responsible to feed back the proper visual, haptic and kinesthetic information. The required motion trajectory of the driving simulator is generated with a parallel robot (Stewart platform), capable of moving with 6 degrees of freedom. The dynamic model of the vehicle can be developed with different complexity, depending on the considered interaction with the external environment. The research will focus on understanding the driver's role in the simulation process and developing/validating comfort and safety testing scenarios.

Recommended bibliography

Blundell, Michael, Damian Harty. Multibody systems approach to vehicle dynamics. Elsevier, 2004.

Kypuros, Javier. System dynamics and control with bond graph modeling. CRC Press, 2013.

Mellodge, Patricia. A Practical Approach to Dynamical Systems for Engineers. Woodhead Publishing, 2015.

Meywerk, Martin. Vehicle dynamics. John Wiley & Sons, 2015.