ICT PHD

Research project for a PhD curriculum Computer Engineering

**Tutor**:

**(\*) Italian Co-tutor:** Prof. Maurizio Casoni – Prof.ssa Maria Luisa Merani

 **(\*\*) Foreign Co-tutor:**

**Proposed Title of the research:**

Safety of Vulnerable Road Users

**Keywords: (5)**

*Road Safety, Vulnerable Road Users (VRUs)*

**Research objectives: --(max 10 rows)**

*The research project will be centered on road safety themes and on the support that vehicular connectivity solutions offer to safety applications. The focus is on the upcoming Release 2 of ETSI Cooperative Intelligent Transport, with the aim of identifying the most suitable approaches for the protection of Vulnerable Road Users (VRUs), namely, pedestrians, cyclists and motorbikers, relying on both Day 1 and Day 2 safety services. The most suitable multichannel communication architectures will be identified, carefully crafting their design to the unique constraints that each category of VRUs exhibits, and the performance they can achieve will be assessed.*

**Proposed research activity -- (max 10 rows)**

*The research activity envisions two parallel strands: when examining Day 1 safety services, the focus will be on connected VRUs equipped with a single radio transceiver, moving in an urban environment and broadcasting VRU Awareness Messages (VAMs). In this context, the experimental approach will be favored and algorithms for the effective delivery of VAMs will be proposed and tested. The energy requirement that the VAM transmission places on VRUs will be evaluated to determine the most proper solution for every VRU category; as a matter of fact, energy provisioning for prompt GNSS localization is not an issue on vehicles, but significant restrictions apply to lighter means of transportation. When considering Day 2 safety services, the focus of the investigation will shift to a multichannel operation architecture, where vehicles and VRUs synergically protect the latter ones through proper communications. Different scheduling algorithms will be put forth, which natively prioritize VAMs, as well as more sophisticated, perception-oriented messages originating from vehicles to enhance VRU safety.*

**Supporting research projects (and Department)**

*The project will be supported through funding by Professors Casoni and Merani*

**Possible connections with research groups, companies, universities.**

* *Joint Research Center (JRC) of the European Commission, Intelligent Mobility Division*
* *Technische Hochschule Ingolstadt, Ingolstadt, Germany*

 (\*) optional

(\*\*) optional/to be completed on the second year