ICT PHD

Research project for a PhD curriculum in ICT – Electronics and Telecommunications

**Tutor**:

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

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

**Proposed Title of the research:**

Vehicular Communications in 6G

**Keywords: (5)**

*6G, Vehicle-to-Everything (V2X), Connected Autonomous Vehicles (CAVs), Intelligent Transport Systems (ITS), Cooperative Perception Services*

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

*The research project will be centered on vehicular connectivity solutions and cooperative perception services as foreseen in 6G networks. Cooperative perception traffic will be modeled in different reference scenarios (urban, suburban, highway); for each setting the most suitable communication architectures will be identified and the role of edge computing investigated. The intent is to guarantee extremely confined latency, very high levels of reliability and the exchange of massive volumes of data to enhanced V2X safety services.*

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

*The research activity will initially generate the actual perception messages broadcasted by Connected Autonomous Vehicles (CAVs), through the analysis of annotated datasets collected by autonomous vehicles recording video scenes, LADAR and LIDAR points. This step will serve as the basis for the development of models that capture the salient characteristics of perception traffic; namely, generative models based on neural networks and models based on queuing theory will be investigated and confronted. Once these tools are properly validated and tuned, they will be employed for different communication architectures and in various driving scenarios, and the system models which most aptly capture the distributed nature of 6G networks will be put forth. Key Performance Indicators (KPIs) related to the access layer technology, as well as KPIs that capture the safety level guaranteed to road users at the facility layer will be determined.*

**Supporting research projects (and Department)**

*The project will be partly supported by CNIT, Consorzio Nazionale Interuniversitario per le Telecomunicazioni, through a PNRR research collaborator grant, as well as by Professor Merani’s funding*

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

* *Joint Research Center (JRC) of the European Commission, Intelligent Mobility Division*
* *Department of Telecommunication Systems, TU Berlin, Germany*

 (\*) optional

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