PhD position (M/F) – Cooperative Vehicular Communications for High Precision Positioning Services
(Reference: CM_JH_PhD_connectedVehicle_082015)

Research topics
Cooperative Vehicular Communications for High Precision Positioning Services

Department
Mobile Communication

Publish date
August 1st 2015

Start date
October 1st 2015

Duration
Duration of the Thesis

Description
The Mobile Communications department of EURECOM invites applications for a PhD position in the area of Cooperative Communications for High Precision Positioning Services in the context of Highly Autonomous Vehicles.

The automotive industry completed in 2015 the specification of vehicular communications standard for the first generation of Cooperative Connected Vehicles (C2V) applications. It is currently moving toward the second generation of C2V applications, including Autonomous Driving, or Safety of Vulnerable Road Users. These applications will require high precision positioning services at the sub-meter level, which is not yet available to C2V applications by any mass market GNSS technology operating in any environment.

This opens new horizons to benefit from C2V advanced communication and processing capabilities to develop distributed rather than centralized, relative rather than absolute, positioning systems. Yet, considering that reliable data exchanges between C2V have been shown to be already challenging for small individual data volumes, the significantly higher expected data volume (contextual data rather than just GPS positions), and the need for stringent latency and dependability levels will require a new way of thinking and designing C2V data communication for such positioning systems.

The goal of this position is to propose, model and analyse new dependable C2V communication strategies, satisfying jointly the high volumes of data required to be exchanged between vehicles, as well as new C2V communication constraints required by cooperative positioning services for highly autonomous vehicles.

The work will be carried out in the framework of the European project HIGHTS [1]. The HIGHTS project aims at providing sub-meter (<0.5m) cooperative positioning for autonomous vehicles, and its consortium comprises strong industrial partners as well as a number of world-class universities. It is funded by the European Commission under the H2020 Framework Program. The candidate will actively participate to the progress of the project.

Specifically, the focus of this position will be around the topics of: (i) Abstraction, modelling and analysis of connectivity properties of cooperative vehicular networks, (ii) Methodology for C2V communication and congestion control mechanisms adapted for cooperative positioning, (iii) extensions of C2V communication protocols for cooperative positioning services.

Finally, this thesis has also an experimental aspect. First, the evaluation of the C2V cooperative positioning will be conducted on simulators adapted to C2V (ITETRIS [2], ns-3 [3]). And second, they will be implemented on HIGHTS C2V Experimental testbed, including test vehicles.

Requirements

- **Education Level / Degree:** Master-level degree or equivalent
- **Field / specialty:** Electrical or Telecommunication Engineering, Computer Science
- **Technologies:** A very good background in WLAN and LTE radio access protocols. Knowledge in localization, vehicular communication (DSRC, ETSI ITS-G5) and standards (ETSI, IEEE, ISO), as well as good analytical skills is highly appreciated.
- **Languages / systems:** Past experience in C or C++ programming. Knowledge in simulators (ns-3, iTETRIS) is highly appreciated.
- **Other skills / specialties:** Experimental experience
- **Other important elements:** Strong communication skills and keen to operate in a multidisciplinary team. Fluent in English (speaking, writing), French not required.

Application

The application must include (I, II and III):

- I-Curriculum Vitae
- II-Motivation letter of two pages also presenting the perspectives of research and education
- III-Names and addresses of three references

Applications should be submitted by e-mail to haerri@eurecom.fr AND secretariat@eurecom.fr with the reference: CM_JH_PhD_connectedVehicle_082015

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EURECOM is a French graduate school and a research center in communication systems based in the international science park of Sophia Antipolis, which brings together renowned universities such as Télécom ParisTech, Aalto University (Helsinki), Politecnico di Torino, Technische Universität München (TUM), Norwegian University of Science and Technology (NTNU), Vietnam National University Ho Chi Minh Ville (VNU) and Chalmers University (Sweden). The Principality of Monaco is a new institutional member. The Institut Mines-Télécom is EURECOM's founding member.

EURECOM benefits from a strong interaction with the industry through its specific administrative structure: Economic Interest Group (kind of consortium), which brings together international companies such as: SFR, Orange, ST Microelectronics, BMW Group Research & Technology, Symantec, Monaco Telecom, SAP, IABG.

EURECOM deploys its expertise around three major fields: Networking and security, Multimedia Communications and Mobile Communications. EURECOM is particularly active in research in its areas of excellence while also training a large number of doctoral candidates. Its contractual research is recognized across Europe and contributes largely to its budget.

Thanks to its strong ties set up with the industry, EURECOM was awarded the “Institut Carnot” label jointly with the Institut Telecom right from 2006. The Carnot Label was designed to develop and professionalize cooperative research. It encourages the realization of research projects in public research centers that work together with socioeconomic actors, especially companies.