PhD Position in Mobility and Connectivity Modeling
of 2-Wheels Traffic for ITS Applications (M/F)

Research topics	**Mobility and Connectivity Modeling of 2-Wheels Traffic for ITS Applications**
Department	EURECOM - Mobile Communications / INRIA - OPALE
URL	http://www.eurecom.fr/cm/ / (http://www-sop.inria.fr/opale)
Start date	4th Quarter 2014
Duration	Duration of the thesis
Description	The fellowship is funded by the LABEX UCN@Sophia (http://ucnlab.eu/), and addresses the Intelligent Transport Systems (ITS) application domain of the LABEX. Traffic in the area between Nice and Sophia-Antipolis is famous for being saturated with no alternative road to reduce congestions. An increasing trend by commuters is to replace their 4-wheel vehicles by 2-wheel vehicles (scooters or motorcycles). Yet little is known of the impact of such modal swap in terms of traffic safety, capacity, and even pollution. What are the benefits and drawbacks of a gradual swap between 4-wheel and 2-wheel vehicles? How to adapt road infrastructure for them? What are the new safety concerns? The ambition of this project is to produce a set of models allowing an easy study of 2-wheel vehicular traffic trends and vulnerabilities, forecasting rather than enduring traffic events, and assisting decision making in providing sustainable and safe mobility in a controlled environment.

The focus of this position will be to develop mobility models capable of jointly modeling cars as well as vulnerable 2-wheel vehicles in highway and urban environments at macroscopic and microscopic scales. In particular, the candidate will have to propose a methodology to analyze and evaluate the peculiar mobility characteristics of 2-wheel vehicles alone, as well as integrated with 4-wheel traffic. Also, the candidate will assess the impact of the proposed models on the vehicular connectivity characteristics of urban and highway traffic as well as on User-Centric ITS applications.

The technical and scientific objectives of this position may be summarized as follows:
- Integrate 2-wheel traffic characteristics into mobility models at both macroscopic and microscopic scales.
- Analyze shockwave and fundamental flow diagrams to extract 2-wheelers'specific dynamics.
- Evaluate the impact of 2-wheel traffic on vehicular communication & networking by jointly applying transportation theory and complex network science
- Identify safety conditions of 2-wheel traffic and propose cooperative behavior between 2-wheel and 4-wheel vehicles to respect safe inter-distances.
- Apply the developed models to evaluate the cost and benefits of 4-wheel to 2-wheel swap in terms of safety, efficiency and carbon footprint.

The candidate will be located at EURECOM with regular contact with INRIA, situated 500m away. EURECOM (http://www.eurecom.fr) is an elite French graduate school and research center conducting high quality research in the areas of Mobile Communication, Networking and Security, and Multimedia. INRIA (http://www.inria.fr/en/), the French National Institute for Research in Computer Science and Control, is a public science and technology institution fully dedicated to computational sciences, combining computer sciences with mathematics. Both EURECOM and INRIA are situated in Sophia Antipolis (between Nice and Cannes), Europe's leading international science park. They are in close proximity with a large number of research units of leading multi-national corporations in the telecommunications, semiconductor and biotechnology sectors, as well as other outstanding research and teaching institutions. A freethinking, multinational population and the unique geographic location provide a quality of life without equal.

Requirements   We are looking for candidates who are self-motivated and eager to conduct high quality research, publish in top venues, and pursue a doctoral degree. Candidates should have a Master's Degree (or equivalent) in Mathematics, Telecommunication or Traffic Engineering, Computer Science, or a closely related area, preferably with a focus on traffic modeling and communications. They are also expected to have good analytical skills and some background in the area of partial differential equations, mobility modeling and wireless access technologies(WLAN). Good programming skills in C++ and Matlab is a plus. A good level of written and spoken English is mandatory (knowledge of French is not required).

Application   Screening of applications will begin immediately, and the search will continue until **October 15th 2014**, or until the position is filled, whichever comes first. Applicants should send, to BOTH addresses below under the reference [**2Wheels Mobility Modeling PhD studentship**] (i) a one page statement of research interests and motivation, (ii) a CV (iii) contact details of at least TWO referees who are willing to provide detailed recommendation letters about the candidate, and (iv) - transcript of courses undertaken and their grades.

Contact   To submit your application and if you have questions or need more information about the position, please contact both:

Prof. Härri - **jerome [dot] haerri [at] eurecom [dot] fr**
(http://www.eurecom.fr/en/people/harri-jerome)

Dr. Paola Goatin **- paola [dot] goatin [at] inria [dot] fr**

 (http://www-sop.inria.fr/members/Paola.Goatin/ **)**

Postal address   EURECOM, Campus SophiaTech, 450 route des Chappes, 06410 BIOT, France

Web page   http://www.eurecom.fr/main/institute/job.en.htm

EURECOM is a graduate school and a Research center in Communication Systems, located in Sophia Antipolis technology park, in close proximity with a large number of research units of leading multinational corporations in the telecommunications, semiconductor and biotechnology sectors, as well as other outstanding research and teaching institutions. EURECOM was founded in 1991 by TELECOM ParisTech (Ecole Nationale Supérieure des Télécommunications) and EPFL (Swiss federal institute of Lausanne) in a consortium form, combining academic and industrial partners[1].

EURECOM deploys its expertise around three major fields: Networking and security, Multimedia Communications and Mobile Communications and has a strong international scope and strategy. 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

INRIA (http://www.inria.fr/en/), the French National Institute for Research in Computer Science and Control, is a public science and technology institution placed under the supervision of the French ministries of research and industry. INRIA research activity is fully dedicated to computational sciences, combining computer sciences with mathematics. INRIA is structured in 8 research centers located throughout France (Rocquencourt, Rennes, Sophia Antipolis, Grenoble, Nancy, Bordeaux, Lille and Saclay). INRIA's s research is organized in about 180 project-teams. OPALE project –team (http://www-sop.inria.fr/opale) is located in the Sophia-Antipolis Center, and is specialized in the numerical simulation and optimization of systems of partial differential equations. A recently opened research direction concerns the study of macroscopic models for vehicular (4- and 2-wheels) and pedestrian traffic derived from fluid dynamics.

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[1]   Academic partners : TELECOM ParisTech, EPFL, Politecnico di Torino, Helsinki University of Technology, Technische Universität München, Norwegian University of Science and Technology, Vietnam National University, Ho chi Minh ville) –

Industrial partners: Swisscom, Orange, SFR, ST Ericsson, CISCO, BMW Group research & technology, SAP, Monaco Telecom, Symantec

EURECOM & INRIA specifically encourage women to apply with a view towards increasing the proportion of female researchers.

EURECOM Campus SophiaTech - CS 50193, F-06904 Sophia Antipolis Cedex – **www.eurecom.fr**