Call for application for research scholarships

for post-graduate international candidates

RESEARCH PROJECT N. 50

Title
Systems and Data Science to Design, Optimize, and Control Mobility On Demand Systems

Scientific responsible (name, surname, role)
Alessandro Rizzo, PhD, Associate Professor – Department of Electronics and Telecommunications (alessandro.rizzo@polito.it)

Short description of the research activity (max 250 words)

Remarkable advancements in science and technology of intelligent transportation systems have raised the interest in the field of Mobility On-Demand (MOD) systems. The principle underlying MOD systems is to provide customers with the opportunity of using a wide range of vehicles at any time, within an easy-to-use and affordable transportation service, through the sharing of combustion-, electric-, or human-powered vehicles. The great success obtained by MOD systems resides in the possibility of obtaining the same benefits of privately-owned vehicles without requiring additional roads and parking spaces; in the advantage of paying only for the actual use of the vehicle, avoiding costs related to ownership; and in obtaining access to zones with traffic restrictions.

Effective design, implementation, monitoring and control of MOD systems are indeed complex problems. Several scientific and technological challenges must be addressed to achieve such objectives, involving all the actors in the system: vehicles, providers, customers, and not less important, the environment. Such challenges include, for example, optimal vehicle assignment, fleet balancing, predictive maintenance, and the achievement of low operational costs while preserving quality of service.

The goal of this project is to strengthen the applicant's skills in the analysis, modeling and control of MOD systems, through an intense research activity in preparation for a PhD program. Building on sound preliminary results obtained in collaboration with ToBike (the sharing-bike provider in Turin), the applicant will use data science and dynamical system modeling and control techniques to design and implement effective strategies to optimize the performance of MOD systems from the often-contrasting point of views of both providers and customers. The devised strategies, in fact, will aim at concurrently increasing the providers' revenues and the customers' satisfaction.

Specific requirements (experiences, skills)

Good knowledge of optimization theory, dynamical systems science, and nonlinear control. Skills in data processing, statistics, coding, visualization. Basic knowledge of graphs and network theory will constitute a strong plus.

Website of the research group (if any)

staff.polito.it/alessandro.rizzo

staff.polito.it/giuseppe.calafiore/SDS/sds.html

Keywords (min 3, max 6)

Mobility on demand, transportation systems, shared mobility, smart cities, complex systems, optimization

Research Area (max 1)

Electronics, Control and Telecommunication Engineering

The present form should be filled in English and sent to scudo@polito.it by 2nd October 2017