

Master internship proposal

Simulation of Online Routing Recommendations in Grenoble's Traffic Network

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Duration: up to 6 months

Salary: Standard internship compensation

Starting date: As soon as possible.

Context: This work will be carried out in the [DANCE team](#) (Dynamics and Control of Networks), a joint CNRS/INRIA research team at [GIPSA-Lab](#) laboratory in Grenoble, France. The team's research concerns modeling, estimation and control of network systems, with a broad spectrum of theoretical and applied topics including traffic networks, intelligent vehicles, social dynamics, and analysis of large-scale complex networks.

Candidate profile: The candidate will be seeking a MS degree in Applied Mathematics, Control Systems, Electrical Engineering, or disciplines related to Transportation and Civil Engineering. Prior experience with microscopic simulation software will be an advantage, but is not needed.

Topic description: Nowadays, millions of users regularly seek routing advice from Online Routing Applications (ORAs) like Waze, Google Maps and TomTom. Their adoption is so pervasive that ORAs have the potential to influence the patterns of congestion in traffic networks and the modal split in multimodal transportation networks. Online routing can be seen as an example of "social feedback" from the users, where information is collectively gathered from and used to influence back a complex dynamical system, whose evolution depends on the users' choices.

The **objective of the internship** will be to create, in collaboration with other members of our team, a detailed simulation of a relevant portion of the traffic network of Grenoble. The simulator will be implemented with the AIMSUN software for microscopic simulation and will leverage the team's extended experience and available data about Grenoble's mobility system. The simulations will have the purpose to validate recent theoretical results by the team about the impact of ORAs on traffic.

References:

Toso, T., Kibangou, A. Y., & Frasca, P.. [Modeling the impact of route recommendations in road traffic](#). In *22nd World Conference of the International Federation of Automatic Control*. IFAC PapersOnLine 56-2: 4179–4185, July 2023

Toso, T., Kibangou, A. Y., & Frasca, P.. [Impact on traffic of delayed information in navigation systems](#). *IEEE Control Systems Letters*. 7: 1500–1505, 2023