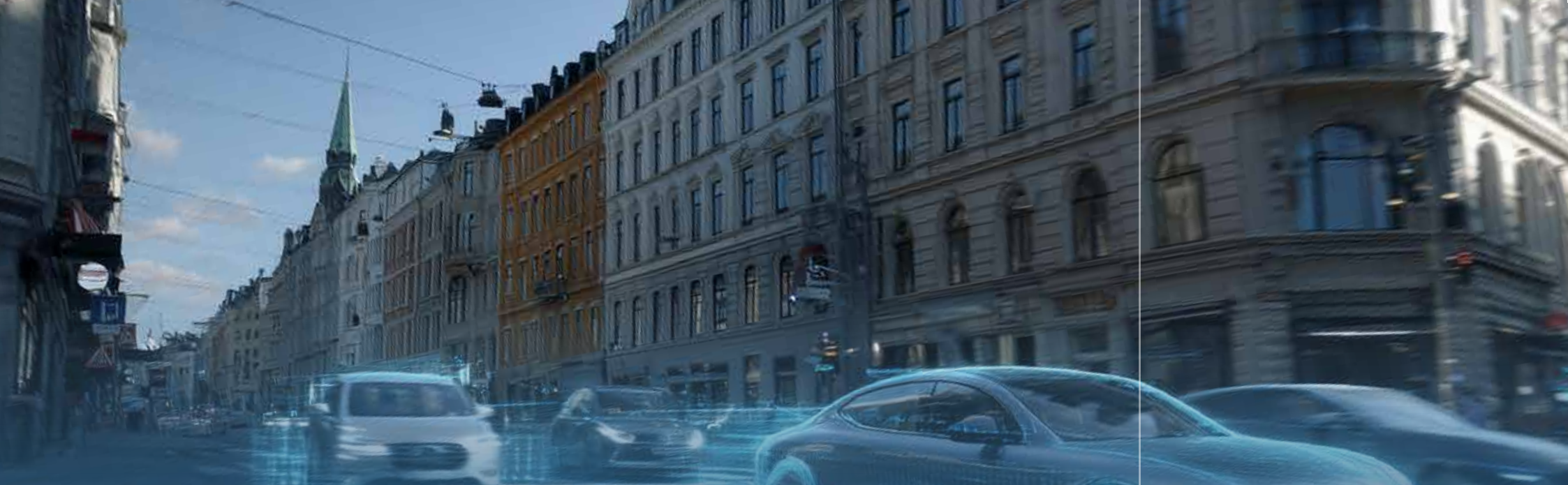

IT Talks

A SEMINAR SERIES FOR PHD STUDENTS IN INFORMATION TECHNOLOGY

17th September
11:30 am - 1:00 pm
Emilio Gatti Conference Room, Building 20

Presentation 1
***Behnam Gavili Kilaneh*: Revise and Enhance: Win-Win Insights for Home Delivery Services**
The rapid growth of e-commerce and in-home services has significantly increased the demand for efficient and reliable Attended Home Delivery (AHD) systems.
While customers expect flexible delivery windows, logistics providers must cope with uncertain operating conditions that often lead to poor vehicle utilization, higher transportation costs, and service delays. Balancing customer satisfaction with operational efficiency therefore remains a major challenge in last-mile logistics.
This PhD research develops optimization and decision-support methodologies to improve the efficiency of AHD systems. The research focuses on stochastic dynamic vehicle routing problems with applications in home appliance repair services, where critical information, such as customer service times, is uncertain and only revealed during service operations. Consequently, routing and scheduling decisions must be made sequentially as new information becomes available.
To address these challenges, the problem is modeled as a sequential decision-making process, and effective lookahead decision policies based on approximate dynamic programming are developed to support real-time routing and scheduling decisions. By enabling logistics providers to respond effectively to uncertainty, this research aims to reduce operational costs, improve resource utilization, and deliver practical "win-win" solutions that enhance both operational efficiency and customer service in AHD systems.

Presentation 2
***Chiara Merolla*: Decision-Oriented Planning for Autonomous Vehicles at Unsignalized Intersections**
Decision making at urban intersections remains one of the most challenging tasks for autonomous driving. Autonomous vehicles must interpret the behavior of surrounding road users and operate under uncertainty while balancing safety, compliance with traffic regulations, and traffic efficiency.
This PhD research focuses on the design of decision making and speed planning strategies for negotiating unsignalized intersections. The proposed approaches combine optimization-based and rule-based methods to explicitly incorporate traffic regulations into the planning process while accounting for interactions with other road users. The objective is to develop strategies that generalize across different intersection layouts and traffic conditions without relying on scenario-specific assumptions.
The proposed algorithms are validated through experiments on a full-scale autonomous vehicle operating on public roads open to traffic, demonstrating their applicability in real-world driving.

Presentation 3
***Matteo Pierini*: Advanced Vehicle Dynamics Control for High-Performance Autonomous Vehicles**
High-performance autonomous vehicles operating at high speeds and near the limits of handling represent one of the most challenging applications of autonomous driving technologies. In these conditions, vehicle control systems must cope with highly nonlinear and strongly coupled lateral and longitudinal dynamics, while guaranteeing robustness and real-time feasibility.
This PhD research focuses on the development of advanced control algorithms for autonomous racing vehicles, addressing problems ranging from trajectory tracking to vehicle dynamics control.
Optimization-based and model-based control techniques are investigated to account for complex vehicle dynamics, tire-road interactions, load transfer effects, and aerodynamic phenomena relevant at high speeds. Particular attention is devoted to the practical deployment of the developed algorithms, addressing computational efficiency, ease of tuning, and robustness across different operating conditions and vehicle platforms.
The proposed methods are extensively validated through both high-fidelity simulations and experimental testing on full-scale autonomous racing vehicles, demonstrating their effectiveness in challenging autonomous driving scenarios at the limits of handling.

Pitch
Diego Segoni, Federico Bordini, Luca Brembilla, Giacomo Farrinella, Giacomo Piombini, Andrea Bertozzi.

The event will open with a networking reception.

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