

**Cycle de Conférences Laboratoire MIPS  
2015-2016**

**4 décembre 2015 à 14h00  
Amphithéâtre Schittly – ENSISA-Lumière**

**AUTONOMOUS DRIVING.  
PATH PLANNING AND TRAJECTORY DECISION  
USING MODEL BASED OPTIMIZATION APPROACH**

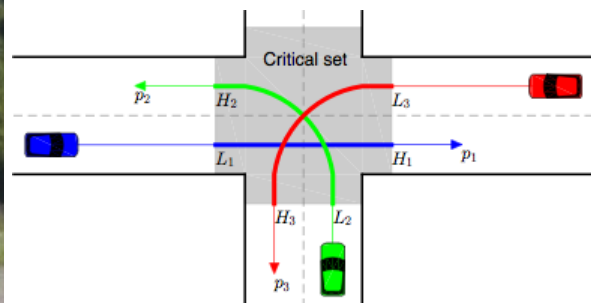
**Prof. Jonas Sjöberg**  
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Jonas Sjöberg is Professor of Mechatronics and Head of the Mechatronic research group. Dr. Sjöberg's research involves mechatronics, and mechatronic related fields, such as signal processing and control. Within these fields, he focuses on model based methods, simulations, system identification, and optimization for design and product development of mechatronic systems. Applications are, for example, Automotive Active Safety and Hybrid Electric Vehicles. Dr. Sjöberg also leads and supervises research and education at the undergraduate and graduate levels.

The talks start with an overview of some of our running and recent projects concerning automotive active safety and autonomous driving. The approach of the research and how it is verified in test driving is illustrated.

The second half of the talk is more technical and concerns the problem of optimally controlling autonomous vehicles to safely cross an intersection. The challenge is to state the problem so that it can be solved in real time. The approach is to solve an optimal control sub problem for all permutations of crossing sequences. For a chosen crossing sequence, we show that the sub problem of optimal longitudinal vehicle control, subject to collision avoidance constraints, can be formulated as a convex program.

The proposed method transforms the problem from the original time domain to a space domain, and introduces a change of optimization variables by replacing vehicles' speed with its inverse. In this way, the optimization problem becomes much easier to solve in real time.



**Références :**

<http://www.chalmers.se/en/staff/Pages/jonas-sjoberg.aspx>