

Report on Research Project under the IDEA League Student Grant

Please fill out this report and email it to your IDEA League Student Grant contact person, both in PDF (including the signatures) and Word (excluding the signatures).

Personal Information			
Full Name		Max van Rest	
Field of study		Civil Engineering	
Degree pursued		Master degree	Current year of studies 6
Home university		Delft University of Technology	
Sponsoring professor at home university	Name	Victor L. Knoop	
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Information about the research stay					
Host university		Eidgenössische Technische Hochschule Zürich			
Research topic		A decentralized traffic control strategy for various levels of vehicle technology in an urban network			
Dates of research stay		From	1/2/2017	To	9/7/17
Sponsoring professor at home university	Name	Monica Menendez			
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Summary of research project (200 words max.)
<p>The automation of vehicles has become a trending subject over the last years. What the effects of different levels of vehicle technology will be on traffic and how to control this mixed traffic are interesting questions. In this paper, a traffic control strategy is proposed to control urban traffic with different levels of technology in a decentralized way: every intersection is controlled separately by its traffic controller that also sets the speeds of the approaching automated vehicles. The proposed control strategy consists of two parts: The control of the traffic signals and the trajectory control of the automated vehicles. The proposed signal control is based on the original backpressure strategy and is adapted to the partly connected environment. The trajectory control is designed focusing on maximizing the speed on which vehicles cross the intersection and minimizing the number of vehicle stops. A simulation of an urban network corridor is set up to test the proposed control system. The first results indicate that especially for high traffic demands the proposed control system results in a lower average travel delay than when a green wave control approach is implemented. Another large benefit is the flexibility regarding the network size and symmetry.</p>

Experience Report

(Please tell us about your personal experience at the host university and give us an evaluation of the benefits of the research stay for the course of your studies)

At the ETH Zürich, I have been able to benefit from the knowledge and experience of different professionals in my field of research. The research group of dr. Monica Menendez consists of PhD and master students who were not only willing to give me the right advices when needed, but who also had a lot of experience with the subjects discussed in my thesis. While dr. Monica Menendez coordinated my research and was willing to answer all my questions, PhD student Kaidi Yang offered me supervision and help on daily bases. Kaidi Yang published papers about controlling traffic with different levels of vehicle technologies and has a lot of experience with the simulation software and programming language I used for this research. Therefore, Kaidi Yang was an excellent supervisor.

Next to the above named benefits, it was an interesting experience to study at another highly ranked technical university in such a high developed and very organized country as Switzerland is. Thanks to this experience, I am able to reflect better on the quality of education and student life in Delft, which I always have seen as 'the standard'. Of course, both universities (and countries) have their own strengths and weaknesses, and I am thankful that partly because of the IDEA League grant I had the opportunity to get the best of both worlds.

Picture

(Please provide a picture of you at the host university)



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