

## Report on Research Project under the IDEA League Student Grant

Personal Information			
Full Name		Seewer, Antoine	
Field of study		Mechanical Engineering	
Degree pursued		Robotics, Systems and Control MSc	Current year of studies   2
Home university		ETH Zurich	
Sponsoring professor at home university	Name	Prof. Dr. Roland Siegwart	
	Email	rsiegwart@ethz.ch	

Information about the research stay			
Host university		Technische Universiteit Delft	
Research topic		Collision Avoidance for Autonomous Boats in Crowded Canals using Model Predictive Control	
Dates of research stay		From	02.11.2016 To 17.05.2017
Sponsoring professor at home university	Name	Dr. Javier Alonso-Mora	
	Email	j.alonsomora@tudelft.nl	

Summary of research project (200 words max.)
<p>The present Master's thesis proposes a novel approach to collision avoidance for Autonomous Surface Vessels (ASVs) in crowded environment based on Model Predictive Control (MPC). Using a dynamical model of the vessel, control inputs are computed according to a receding horizon strategy that maintains the boat in free space via collision avoidance constraints. The motion of dynamic obstacles is predicted within the optimizer assuming constant velocity over the horizon and uncertainties on their future positions are compensated by enlarging them progressively. Two different local planners are presented. The first one simply minimizes the distance to the next waypoint, whereas the second method, based on Model Predictive Contouring Control (MPCC), has for objective to maximize the progress on the path. Both methods are validated in simulation and their performance and computational complexity is compared.</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)*

TU Delft is a renowned technical university with lots of interesting projects. I must however say that I was quite disappointed by their international office. I barely received any information from them about the campus/student life and they even sent me to the wrong place to get my Dutch citizen number (needed to open a bank account, to have a train subscription, etc.). A simple standardized email with that information would have eased the integration process... Nevertheless, once aware of their existence, there is quite a lot to do (sport, culture, international student groups, etc.). As often the case during short stays abroad, most of my interactions were with other exchange students. The general atmosphere of my research group was really pleasant and we organized from time to time country-themed dinners and small excursions. To sum it up, it was a nice and enriching experience.

## Picture

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



The report should be signed by both professors involved. The signatures will be deleted when the template is published on the IDEA League webpage.

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*Student*

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*Sending professor*

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*Host professor*

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