

## Road Categorization for Automated Vehicles with a Focus on Road Sections and Crossings

Relevance to the Automotive Industry:	Automated and autonomous operations is becoming increasingly important for all means automotive vehicles. There are several prototype vehicles on the roads, though currently there are no such vehicles that are commercially available. A major challenge in this regard is the lack of methods to overcome the enormous test efforts required for such vehicles to validate their safety for final approval.	
Research Location:	Technische Universität Darmstadt Institute for Automotive Engineering (FDZ)	
Homepage (Engl.):	<a href="http://www.fzd.tu-darmstadt.de">http://www.fzd.tu-darmstadt.de</a>	
Faculty Mentor:	Prof. Dr.rer.nat. Hermann Winner	
Faculty Mentor Email:	<a href="mailto:winner@fzd.tu-darmstadt.de">winner@fzd.tu-darmstadt.de</a>	
Graduate Mentors:	Moritz Lippert, M.Sc.	
Graduate Mentor Emails:	<a href="mailto:lippert@fzd.tu-darmstadt.de">lippert@fzd.tu-darmstadt.de</a>	
Project Description:	<p>The Technische Universität Darmstadt Institute of Automotive Engineering (FZD) is collaborating with six other German universities and with six industrial partners to investigate and develop disruptive modular vehicle concepts. The objective is to design and build four fully automated and driverless prototype vehicles within four years. This includes designing a safety validation concept that reduces the testing effort required. One solution being investigated is to classify road sections and crossings within different requirement categories. This would compartmentalize the test scenarios, thus reducing the exponential growth of test cases, and enable systematic stepwise testing with much less overall effort.</p> <p>The objective of this NSF REU project is to have two NSF REU students build on the prior work by FZD to develop a method to categorize a road network, by classifying road sections and crossings, respectively, of the proving grounds for the overall project.</p> <p><b>PHASE A</b> (2 weeks): Investigate existing methods for categorizing (A) road sections and (B) road crossings.</p> <p><b>PHASE B</b> (2 weeks): Identify the relevant attributes for categorizing (A) road sections and (B) road crossings.</p> <p><b>PHASE C</b> (2 weeks): Design and implement extensions to the existing FZD method for categorizing (A) road sections and (B) road crossings.</p> <p><b>PHASE D</b> (2 weeks): Apply the extended method to the existing proving grounds.</p> <p><b>PHASE E</b> (3 weeks): Finally, the NSF REU student will document the research performed, prepare a written report, and deliver an end-of-summer presentation on the research performed.</p>	
Target publications:	<ul style="list-style-type: none"> <li>• WKM-Symposium 2020</li> </ul>	
Necessary Skills/ Knowledge:	<ul style="list-style-type: none"> <li>• Experience with abstract tasks and problem-solving</li> </ul>	
Desirable Skills/ Knowledge:	<ul style="list-style-type: none"> <li>• Experience with, or knowledge of, safety validation of automated vehicles</li> </ul>	
Additional Online Resource(s):		

NSF REU students must have completed at least two semesters of engineering studies prior to the proposed summer research, and they must have at least one semester remaining before they can earn their BS in Engineering.