



Security Language for Autonomous Driving Systems Testing

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Type: Master's Thesis

Context

SCENIC [2], OpenScenario (ASAM) [1], and many others [3] are languages for safety testing of Autonomous Driving Systems (ADS) which comprise a common syntax for safety test case scenarios. These languages enable the modeling and automated generation of safety scenarios within diverse ADS simulation platforms. The adoption of a common language for safety testing has helped to establish standardization of ADS testing and development of test libraries to assist with safety validation in resource-constrained test programs. Cybersecurity testing of ADS systems has no such language. For an ADS program to validate the cybersecurity of a vehicle, a tester must custom create an attack for each threat model, there is no structured language to guide the modeling and automated generation of cybersecurity test cases, no test scenario libraries to draw knowledge from. The aim of this thesis is to confront this problem, building upon the knowledge from safety languages, to define a domain-specific language for cybersecurity testing of ADS.

Tasks

The detailed timeline, various tasks, and milestones will be deployed in agreement with the student.

Requirements

- **High motivation** for learning new things
- **Very good** programming skills: Python
- **Good** experience with docker orchestration
- Experience with CARLA or a similar simulator is a **plus**
- An understanding of security (in general) and automotive security is a **plus**

Are you Interested?

please send your full application (CV, current transcript of records) to (mohammad.hamad@tum.de).

References

- [1] ASAM. Openscenario. <https://www.asam.net/standards/detail/openscenario/>, 2021.
- [2] D. J. Fremont, T. Dreossi, S. Ghosh, X. Yue, A. L. Sangiovanni-Vincentelli, and S. A. Seshia. Scenic: a language for scenario specification and scene generation. In *Proceedings of the 40th ACM SIGPLAN Conference on Programming Language Design and Implementation*, pages 63–78, 2019.
- [3] J. Ma, X. Che, Y. Li, and E. M.-K. Lai. Traffic scenarios for automated vehicle testing: A review of description languages and systems. *Machines*, 9(12), 2021.