Thesis (MA/BA)

Deterministic Execution in a Service-Oriented Software Architecture for the Automotive Domain

The technical architectures in the automotive industry are currently undergoing significant changes. With the advent of electromobility and automated driving, the hardware and software architectures employed in vehicles are also evolving. In this project, you will have the opportunity to extend a software framework developed at our department. The framework is designed for the development of distributed modular functions that can be executed on various control units within the automobile.

The software architecture to be extended is utilized in the UNICARagil vehicles (www.unicaragil.de).

The aim of this thesis is to expand the existing software framework in order to enable deterministic and reproducible execution of the system. Deterministic execution refers to the property of a system where given the same inputs and conditions, the system will always produce the same outputs and behavior. It ensures consistency and predictability in the execution of services within a service-oriented architecture. In the context of automotive systems, deterministic execution becomes crucial for diagnosing issues, ensuring reliability, and facilitating effective testing and development processes.

Your tasks in this thesis will include:

- Analyzing the existing software framework and its functionalities
- Investigating existing approaches to achieve deterministic execution
- Designing and implementing the extension for deterministic execution of distributed services
- Integrating the developed methods into the existing framework
- Conducting comprehensive tests to validate the enhanced functionalities

Requirements:

- Proficiency in software development and distributed systems, experience with programming languages such as C++
- Interest in the automotive industry and embedded software development

Contact

Please read our Instructions for Applications.

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