Master Thesis: Security Test Scenario Framework for Automotive ECUs

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Company Description

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Introduction

Are you passionate about cybersecurity and the automotive industry? This master's thesis project focuses on developing a security test case framework for electronic control units (ECUs), incorporating the latest industry standards like ISO21434 and ISO/SAE PAS8477. You will work with various testing teams and experts to explore and analyze current methods and frameworks, aiming to enhance vehicle security. This research offers a valuable opportunity to contribute to innovative solutions in automotive cybersecurity.

Description

This master's thesis aims to develop a comprehensive security test case framework for electronic control units (ECUs) in the automotive industry. The framework is designed for use by various stakeholders, including system testing teams, security testing teams, penetration testers, and future auditors.

The primary objective is to review and synthesize existing testing methods and frameworks within the automotive sector. The candidate will engage with different testing teams to understand their methodologies, focusing on relevant standards and formats such as ASAM ATX/OTX, Gherkin Cucumber, and the keyword-based Robot Framework. An essential aspect of the thesis will be to address the forthcoming second edition of ISO21434, which incorporates the Road Vehicles - Cybersecurity Verification and Validation ISO/SAE PAS8477, marking a significant milestone for security testing in the automotive industry.

A scalable approach across different projects and customer requirements is crucial to enable efficient testing, facilitate knowledge exchange, and ensure traceability in managing future incidents.

Collaboration with multiple working groups, such as the Validation and Verification Center of Competence and various testing teams, will support the candidate throughout the research process.

This master's thesis offers an opportunity to develop innovative security testing approaches for automotive ECUs, contributing significantly to enhancing vehicle security and addressing the evolving challenges in the automotive industry.

Qualification

- Personality:
    - motivated, responsible,
    - self-confident, flexible, able to moderate.
    - able to work in a team and with good communication skills.
- Working style:
    - independent, self-reliant, structured, analytical, and confident in dealing with other business units.
- Experience and Know-How
    - knowledge in security engineering & testing
    - ideally experience with json, yaml and/or Python
- Language: very good communication and language skills in English
- Education: current studies in the field of computer science, engineering, or comparable studies

References

ASAM e.V. (2018, September 25). *ASAM ATX*. Retrieved 07 16, 2024, from https://www.asam.net/standards/detail/atx/

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Robot Framework Foundation. (n.d.). *Robot Framework User Guide Version 7.0.1*. Retrieved 07 16, 2024, from https://robotframework.org/robotframework/latest/RobotFrameworkUserGuide.html

smartbear. (n.d.). *Cucumber*. Retrieved 07 16, 2024, from https://cucumber.io/