

CRII: SaTC: Automated Security Analysis of Software-based Control in Emerging Smart Transportation Under Sensor Attacks



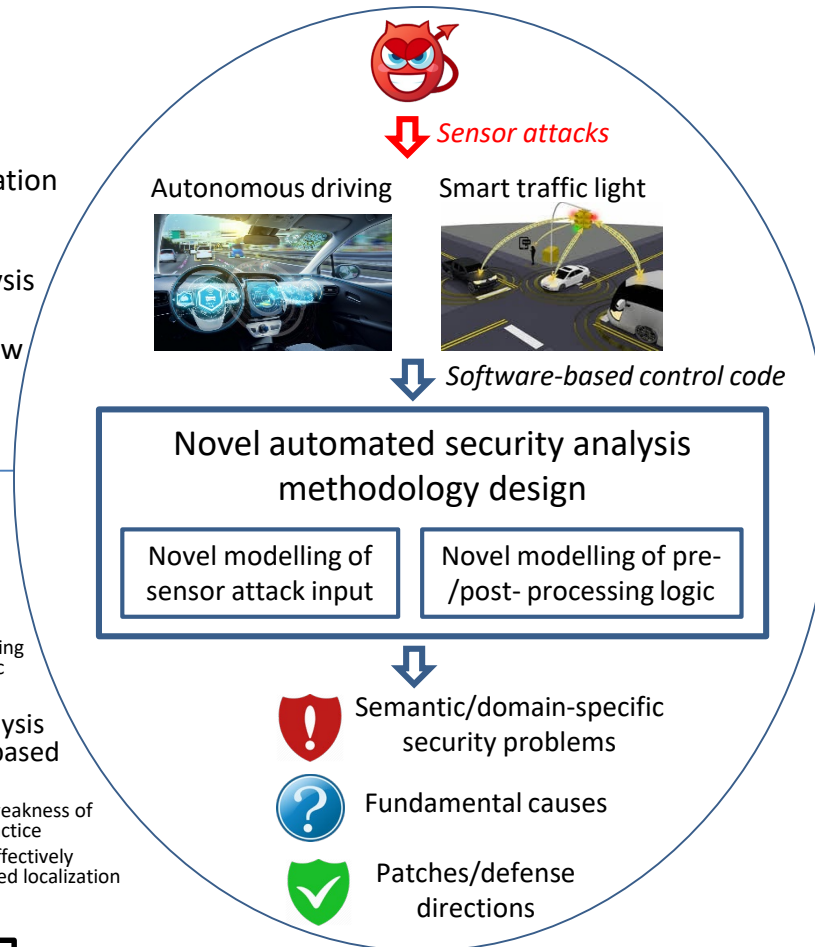
Challenge:

Lack of systematic approach to analyze the security of software-based control in smart transportation systems under sensor attacks

- Lack of sensor attack input modelling for security analysis automation
- Lack of solution for data-flow centric decision process in smart transportation systems

Solution:

- Perform the first security analysis of LiDAR-based perception in autonomous driving (AD)
 - Novel modeling of LiDAR spoofing attack, and pre-processing logic
 - To appear in ACM CCS'19
- Perform the first security analysis of multi-sensor fusion (MSF) based localization in AD
 - Discover and understand the weakness of state-of-the-art methods in practice
 - Design a new attack that can effectively break state-of-the-art MSF-based localization



Scientific Impact:

- Initiate the first research efforts for the security of smart transportation software-based control, which is highly security/safety critical
- Discover new semantic/domain-specific security problems in these systems, understand root causes (e.g., design trade-offs), and leverage the insights to identify defense directions
- Design novel security analysis methodology for systematic domain-specific vulnerability discovery

Broader Impact:

- As transportation is one of the most basic urban functions, the successful completion of this project has a direct impact on the mobility and safety of people's everyday life
- The discovered new security problems, root causes, and potential defenses can facilitate secure and robust software design in smart transportation systems
- The developed novel security analysis methods can be incorporated into the development and testing stages of smart transportation systems to proactively address security problems
- The knowledge and results from this project have been incorporated into both the undergraduate and graduate level security courses in UCI
- Have recruited undergraduate and graduate students, especially those in underrepresented groups, in this project

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