Evidence Briefing: A Rapid Review on Advanced Software-in-the-Loop Methods for Automotive Software Verification

Larissa Pestana, lcp2@cin.ufpe.br
Breno Miranda, bamf@cin.ufpe.br

JUSTIFICATION

The article "A Rapid Review on Advanced Software-in-the-Loop Methods for Automotive Software Verification" was motivated by the increasing complexity of embedded systems in the automotive industry, which has rendered traditional software verification methods, such as the V-cycle, ineffective. These rigid approaches result in late error detection, increased costs, and significant rework. The article explores advanced Software-in-the-Loop (SiL) techniques to create simulations that more accurately represent real vehicle systems. The aim is to enhance software verification and validation from the early stages of development, reduce reliance on real hardware, and promote early error detection.

KEY FINDINGS

- **Software Verification Approaches:** Static Code Analyzer, Formal Methods, Simulation-Guided
- **Innovations in SiL:** Prerequisite Assessment, Automated Testing, Credibility and Realism
- **Synchronization Methods:** Relative Time Synchronization, Formal Analysis
- **Adaptation for Electric and Autonomous Vehicles:** Electric Drives, Autonomous Vehicles:

CONCLUSION

The continuous evolution of SiL is propagated through the tools discussed in this research. Although SiL has its limitations, especially in simulating inputs and timing adjustments, research such as those covered in this rapid review demonstrates the potential for more realistic and comprehensive tests. For electric and autonomous vehicles, SiL must adapt to the specific needs of these technologies. Improvements in verification practices from the earliest stages are crucial to dealing with the dynamic and integrative demands of modern automotive systems.

RESEARCH FINDINGS STREAM