High-Confidence Formal Verification of Real Cyber-Physical Systems: from Models to Machine Code

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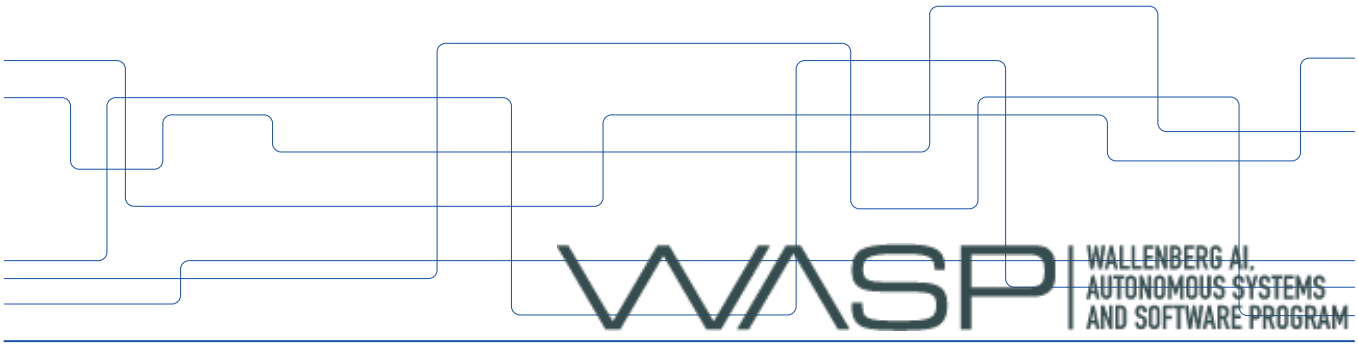


Application Areas

Automotive

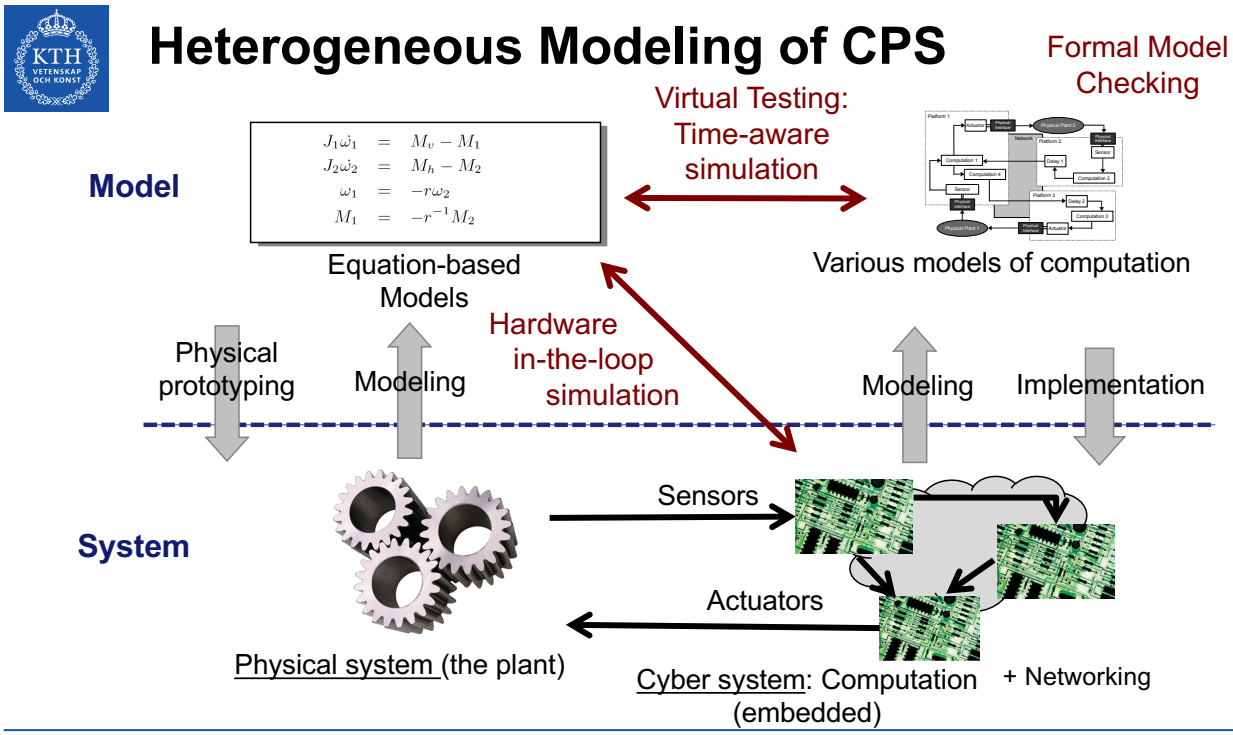
Aircraft

Cyber-Physical Systems (CPS)

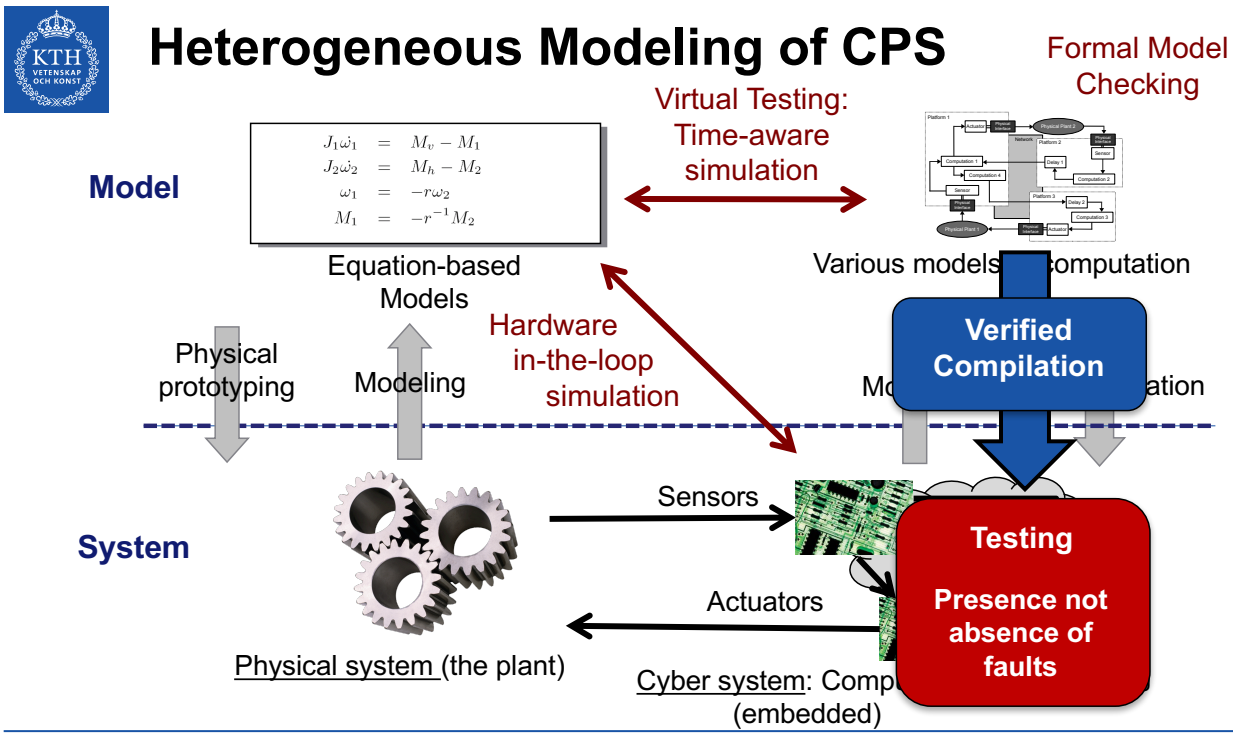
Satellites

Container Automation

Heterogeneous Modeling of CPS



Heterogeneous Modeling of CPS



Research Challenges

Model Checking
- UPPAAL
- Verified LTL model checker (Esparza, 2013)
- Verified Timed automata in Isabelle (Wimmer, 2018)

Verified Compilers
- CompCert (Leroy, 2009)
- CakeML (Kiam Tan et al., 2016)
- Véluz (Bourke et al, 2017)

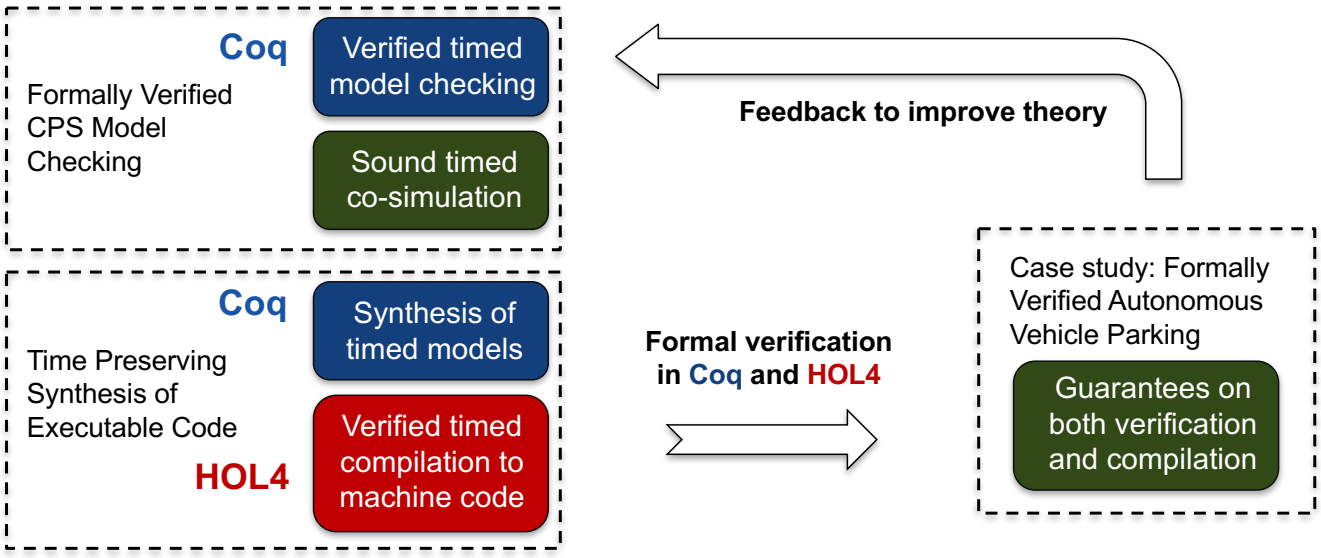
Challenge 2:
Formally verify the verifier and transfer proof

Challenge 1:
Both functional and temporal constraints

The overall research goal of this project is to

*develop a new theoretical foundation of **formally verified** cyber-physical domain-specific model compilation, **from high-level real system models down to machine code**, satisfying both **functional and temporal constraints.***

Project Overview



Team

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Modeling languages, CPS,
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Expedition Vision