ADMORPH: Towards Adaptively Morphing Embedded Systems

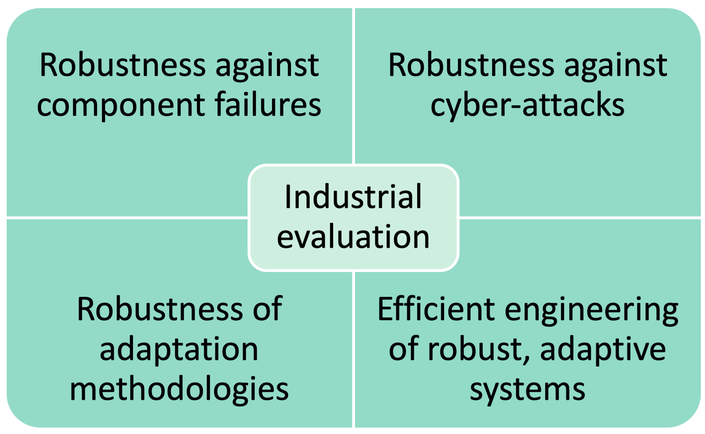
http://www.admorph.eu

Mission and Objectives

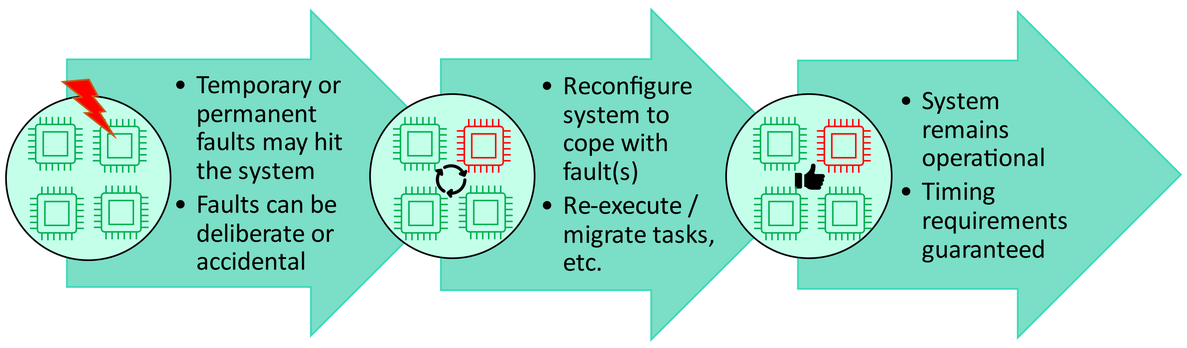
How can we efficiently and effectively develop and deploy embedded computer systems that utilize adaptivity to achieve fault and intrusion tolerance in mission- and safety-critical Cyber Physical Systems (of Systems) – CPS(oS)?

To realize such robust, adaptively morphing systems, we address:

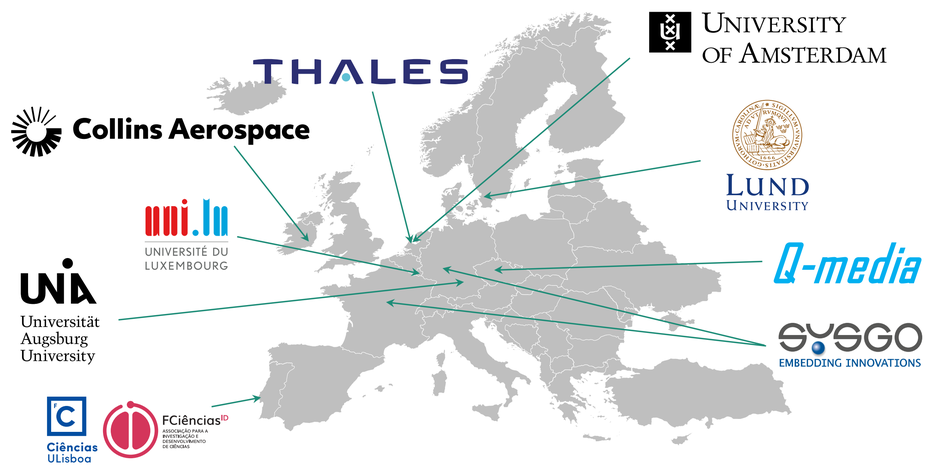
- formal specifications of adaptive systems;
- adaptivity methods like strategies for maintaining safe and secure control of CPS(oS);
- analysis techniques for adaptive systems to, e.g., perform timing verification of adaptive systems;
- run-time systems for adaptive systems that realize the actual run-time system reconfigurations to achieve fault and intrusion tolerance.



Vision



Consortium



Use Cases

Autonomous Aerospace Systems

Will demonstrate adaptability as a key enabler for autonomy in the context of a System of Systems involving autonomous aircrafts and Air Traffic Control (ATC)

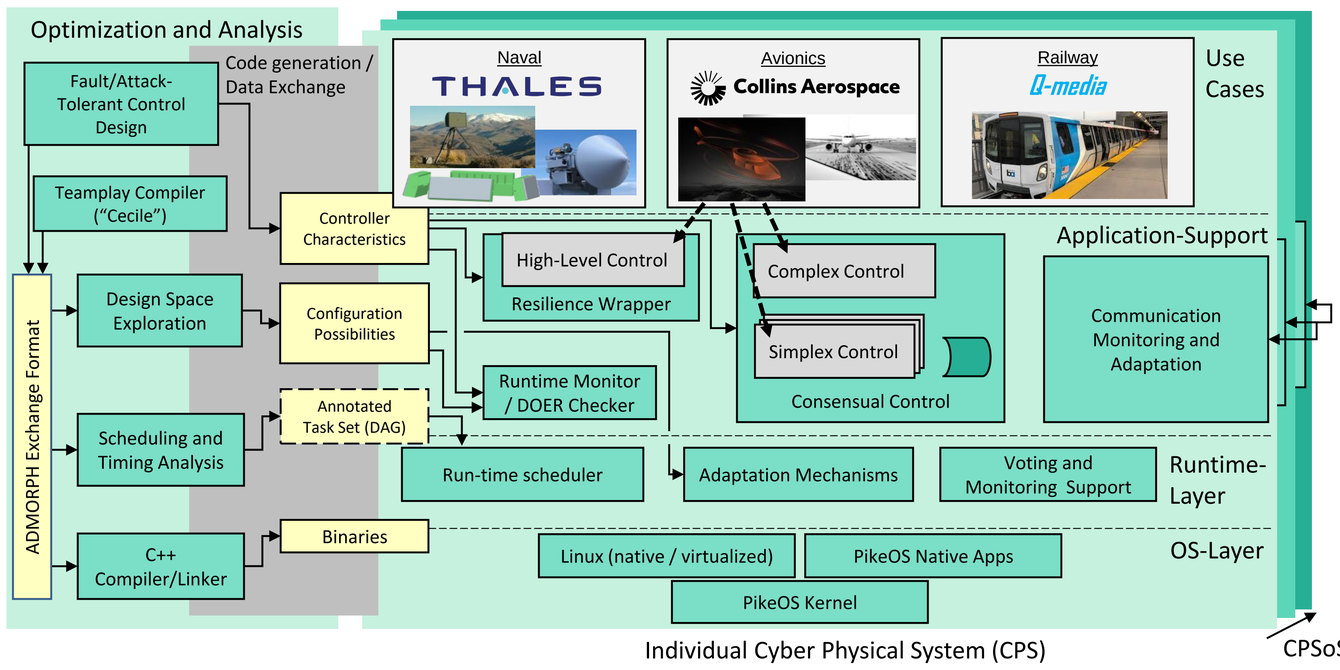
Radar Surveillance Systems

Will demonstrate the ability to achieve fault tolerance as needed for reliable and robust real-time data processing in radar surveillence systems

Subway Transportation Systems

Will demonstrate the suitability of ADMORPH methods for supporting real-time and transparent reconfiguration of a Train Supervision Surveillance System

ADMORPH System Architecture and Technologies



- Design Space Exploration for H/W and adaptivity selection
- Multi-Model MoC to formally model adaptive real-time embedded systems
- Coordination language, compiler and middleware for adaptive systems
- Adaptive Byzantine Fault-tolerance and Rejuvenation Analysis tools for adaptive systems, including degraded modes
- Analysis tools for fault-resilient control systems
- Runtime environments for Fault-detection, Resilient control and Task Re-execution
- Software Update Framework without Loss of Service

Project data and further information

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- Start Date: 1st January 2020
- End Date: 30th June 2023
- Coordinator: Univ. of Amsterdam

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