Technology Transfer Process

From Space to Earth

Technological Synergies from Aerospace to Automotive

- Mechatronics
- Redundant hardware and systems
- Redundant and safe functions
- Cameras & artificial vision
- Positioning systems

OBJECTIVES:

- Novel on-the-fly control and verification concepts
- Ground-breaking methods for unifying control and verification to quickly react to changing environments
- Seamless integration of modeling and conformance testing
- A unique tool chain that makes it possible to integrate modeling, control design, formal verification, and automatic code generation
- Prototypical realizations of the novel methods in automated vehicles, human-robot collaborative manufacturing
- Wind turbines and smart grids, which will clearly demonstrate the benefits of formal methods

A new development process that reduces development time and costs for critical cyber-physical systems to strengthen European companies which design or produce cyber-physical systems.

UnCoVerCPS provides methods for a faster and more efficient development process of safety- or operation-critical cyber-physical systems in (partially) unknown environments.

Cyberphysical systems are very hard to control and verify because of the mix of discrete dynamics (originating from computing elements) and continuous dynamics (originating from physical elements).

We present completely new methods for de-verticalization of the development processes by a generic and holistic approach towards reliable cyber-physical systems development with formal guarantees.

In order to guarantee that specifications are met in unknown environments and in unanticipated situations, we synthesize and verify controllers on-the-fly during system execution. This requires to unify control and verification approaches, which were previously considered separately by developers. For instance, each action of an automated car (e.g. lane change) is verified before execution, guaranteeing safety of the passengers.

We will develop completely new methods, which are integrated in tools for modeling, control design, verification, and code generation that will leverage the development towards reliable and at the same time open cyberphysical systems. Our approach leverages future certification needs of open and critical cyber-physical systems.

UnCoVerCPS Consortium:

- Technische Universität München (TUM) – Coordinator, Germany
- Université Joseph Fourier, Grenoble 1 (UJF), France
- Universität Kassel (UKS), Germany
- Politecnico di Milano (PoliMi), Italy
- GE Global Research Europe, Germany
- Robert Bosch GmbH, Germany
- Esterel Technologies, France
- Deutsches Zentrum für Luft- und Raumfahrt, Germany
- Tecnalia Research & Innovation, Spain
- R.U.Robots Limited, United Kingdom

More information about the project is available online. Please visit http://cps-vo.org/group/UnCoVerCPS

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