

DATI, AI E ROBOTICA @POLITO

RICERCA, TRASFERIMENTO TECNOLOGICO E SUPPORTO ALLE AZIENDE SUI TEMI FONDAMENTALI DEI BIG DATA, INTELLIGENZA ARTIFICIALE, ROBOTICA E RIVOLUZIONE DIGITALE



CPSwarm - Design of autonomous multi-robot systems embedding AI

Authors: E. Ferrera, C. Pastrone, G. Prato, D. Conzon

CPSwarm



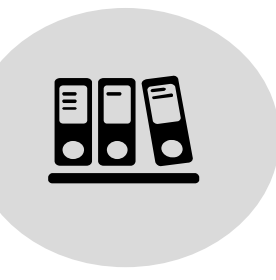
Vision & Objectives

CPSwarm aims to advance large scale CPS engineering by reducing development time and costs, with a particular focus on autonomous robotic vehicles and drones, freight vehicles and smart logistics.



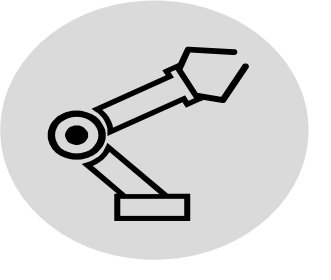
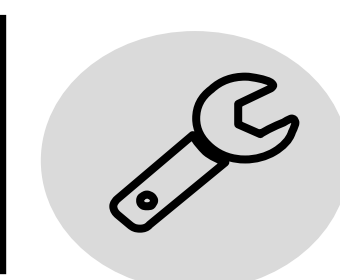
Drastically improve support for designing complex, autonomous CPSs

Provide a self-contained, extensible library of reusable models for CPSs



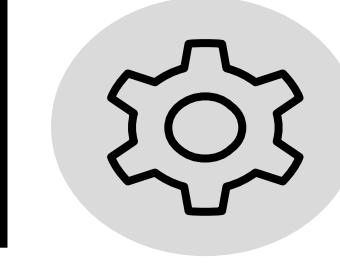
Establish reference patterns and tools for the integration of CPS artefacts

Define a complete library of swarm and evolutionary algorithms for CPS design



Address real industrial needs in CPS design

Reduce the complexity of CPS development workflows



CPSwarm workbench

The CPSwarm Workbench provides a set of tools to support engineering of CPS swarms. A user-friendly GUI allows the user to access all the Workbench functionalities and tools.

The CPSwarm Workbench supports the following features:

Swarm modelling – it allows modelling several swarm aspects using an extended UML/SysML formalism.

Simulation & optimization – it allows to visualize and verify the swarm behavior on external simulation tools and also to optimize it.

Code generation – it allows to translate design-level model behavior to executable code.

Swarm deployment – it allows to transfer the source code and configuration files to the swarm devices.

Monitor & command – it allows to configure the swarm and to monitor its behavior during operation.

Contacts

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WWW.CPSWARM.EU



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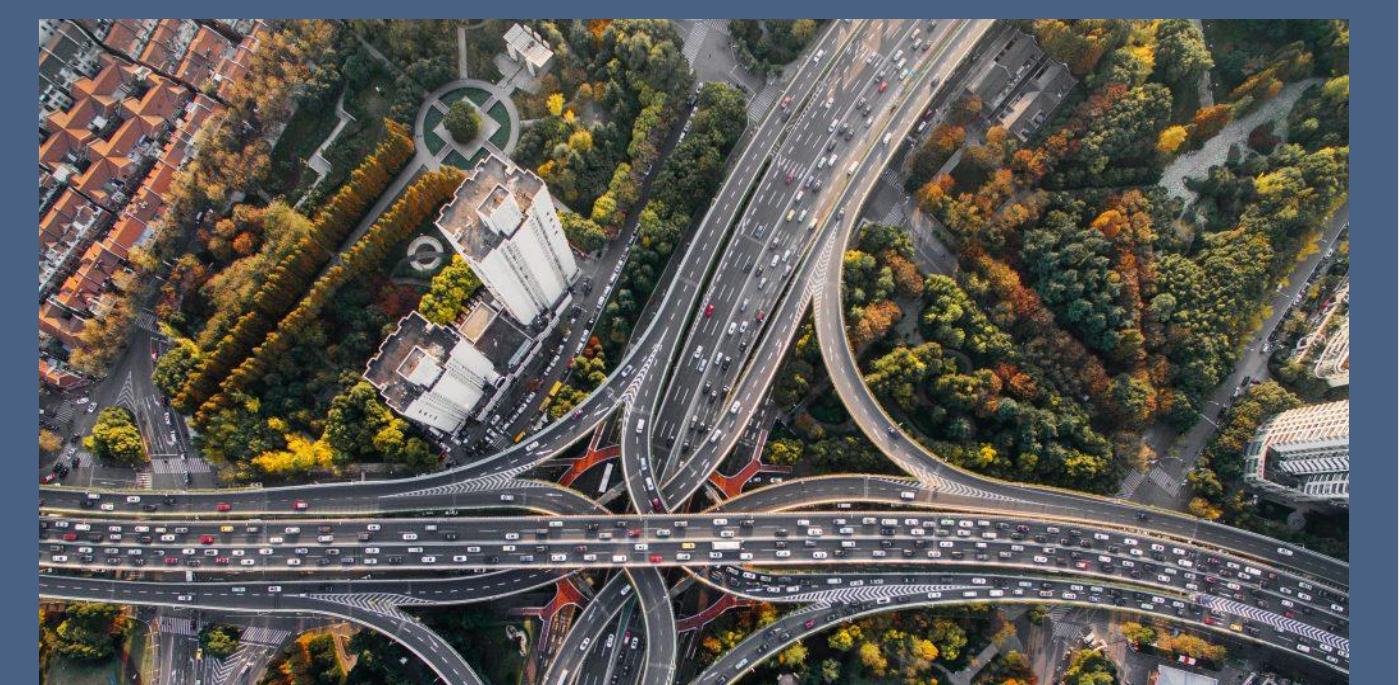
[@CPSWARM EU](https://www.youtube.com/channel/UC...)

Scenarios



Search And Rescue

Autonomous driving support intended for freight vehicles like trucks or vans connected via kind of an electronic drawbar ("Platoon").



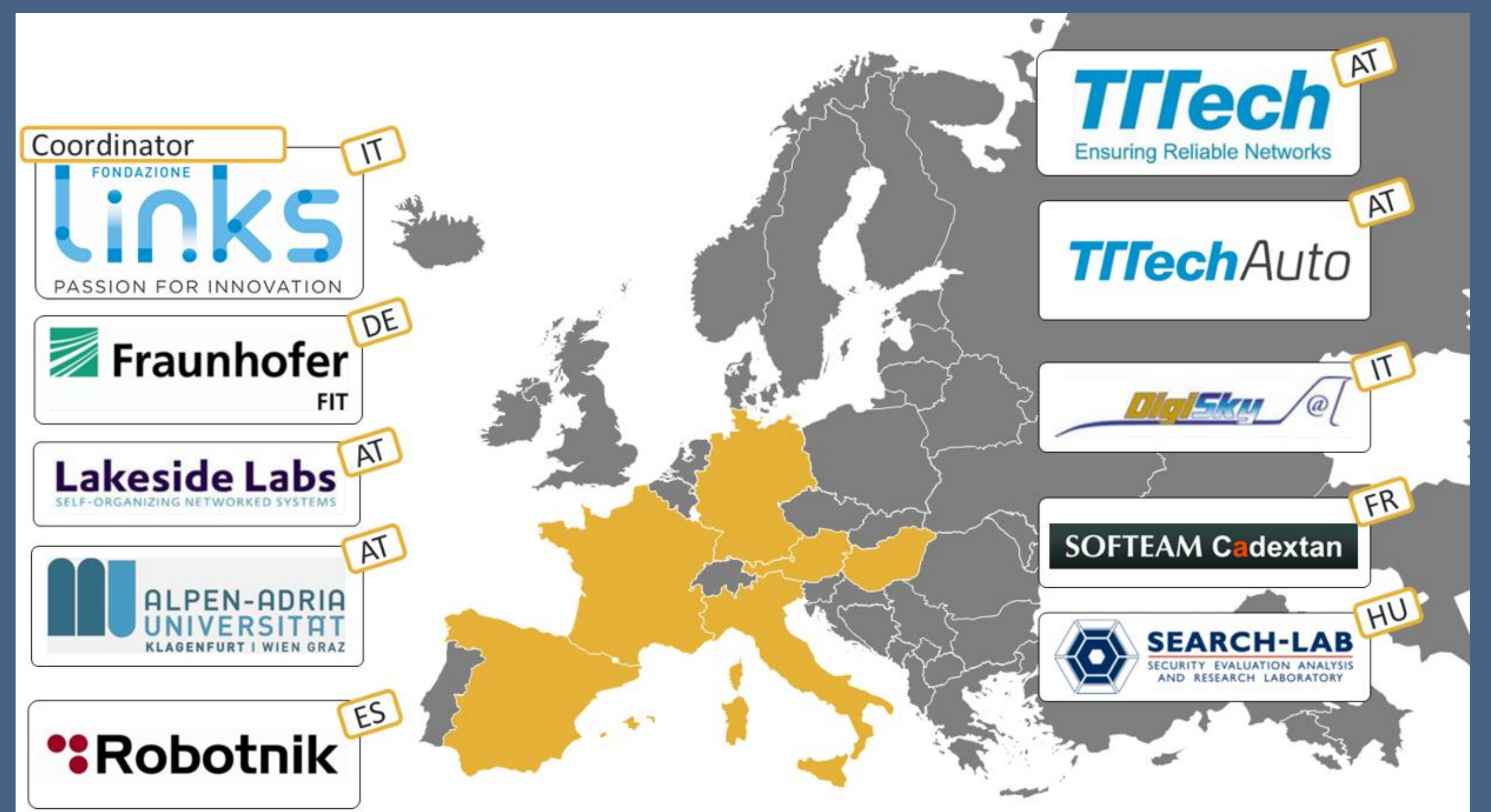
Automotive CPS



Swarm Logistics

Robots and rovers that collaboratively assist humans in a **logistics domain**.

Partners



Relevant Publications

- Modeling Swarm Intelligence Algorithms for CPS Swarms.** Workshop on Challenges and new Approaches for Dependable and Cyber-Physical Systems Engineering – co-located with Ada-Europe 2019. Warsaw. Poland. June 2019
- Scalable Distributed Simulation for Evolutionary Optimization of Swarms of Cyber-Physical Systems** International Journal On Advances in Systems and Measurements. IARA. July 2019.
- The CPSwarm technology for designing swarms of cyber physical system.** Software Technologies: Applications and Foundations . Eindhoven. Netherlands. July 2019.