HiPeRT Lab

High-Performance Real-Time Lab

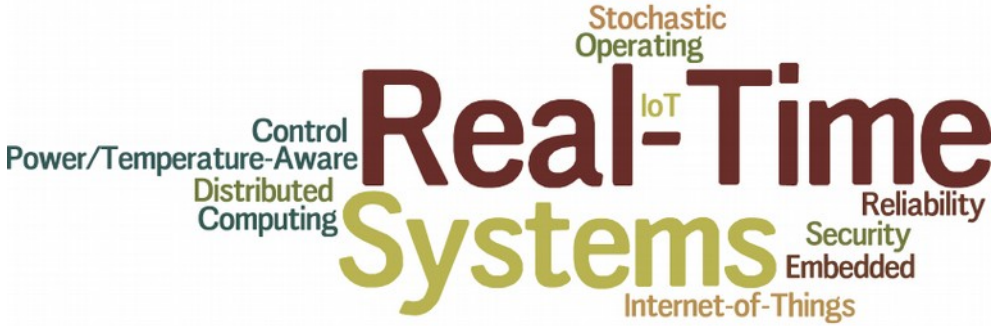
In a nutshell

- ✓ Since 2014 @ UniMoRe
- ✓ 4 profs, 7 post-docs, 4 PhDs, 2 admin staff, *n* undergrads
- ✓ http://hipert.unimore.it

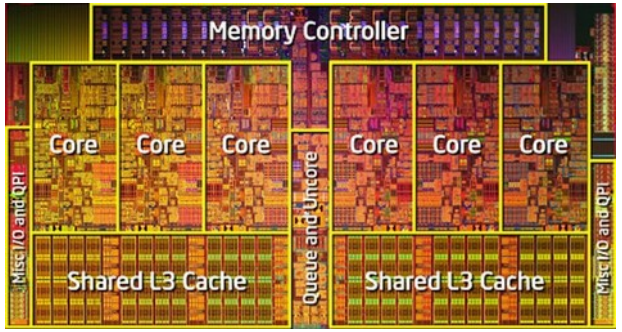
Funded by

- ✓ EU projects (H2020)
- ✓ E-R regional projects
- ✓ Industrial contractors

IMECH



Software Architectures for Embedded Systems and FPGA



What do we do?

Industry 4.0

Autonomous driving & ADAS

Neural networks
Artificial intelligence

Current EU projects

HERCULES: High-Performance Real-time Architectures for Low-Power Embedded Systems

- ✓ Coordinators
- ✓ Automotive & avionics
- ✓ Jan 2016 – Dec 2018

HERCULES http://hercules2020.eu

Prystine: Programmable Systems for Intelligence in Automobiles

- ✓ Advanced driving assistance systems, smart connected cities
- ✓ Coordinating WP5 – System integration
- ✓ May 2018 – April 2021

PRYSTINE http://www.prystine.eu

I-MECH: Intelligent Motion Control Platform for Smart MECHatronic Systems

- ✓ Industry 4.0
- ✓ Coordinating BB11 – Operating System and Hypervisor
- ✓ June 2017 – December 2020

I-MECH https://www.i-mech.eu

Current regional projects and industrial partners

OPEN-NEXT

- ✓ POS-FESR (ER region)
- ✓ Industry 4.0
- ✓ April 2017 – March 2020

http://www.t3lab.it/progetti/open-next/

COOPERATION with leading companies

- ✓ Packaging
- ✓ Semantic intelligence
- ✓ Document processing & analyis
- ✓ Computing platform manufacturers
- ✓ Automotive
- ✓ Defense
- ✓ …

HERCULES

= **High-Performance Real-time Architectures for Low-Power Embedded Systems**

The first industrial-grade framework for future real-time embedded systems

"An order-of-magnitude improvement of energy efficiency and cost"

AIRBUS

MAGNETI MARELLI

More about it tomorrow in the Scheduling and Real-Time session

HERCULES

http://hercules2020.eu

ETH Zürich

MAGNETI MARELLI

EVIDENCE®
EMBEDDING TECHNOLOGY

UNIVERSITAS STUDIORUM MUTINENSIS ET REGIENSIS 1175

UNIMORE
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA

CZECH TECHNICAL UNIVERSITY IN PRAGUE

pitom
think over movement

http://hercules2020.eu

AIRBUS

Intelligent Motion Control Platform for Smart Mechatronic Systems

- ✓ Industry 4.0 requires smart, safe and reliable production complexes
  - Focus also on size, motion speed, precision, adaptability, self-diagnostic, connectivity, new cognitive features, etc..
- ✓ I-MECH will deliver augmented intelligence for wide range of cyber-physical systems having actively controlled moving elements
- ✓ Industry-driven, high degree of tech transfer

Our role

- ✓ Virtualization on x86 platforms with Xen
- ✓ Coordination for the hypervisor/os building block

Programmable Systems for Intelligence in Automobiles

- Autonomous driving enable a new generation of sensors and computing platform
- Master the Grand Societal Challenges of safe, clean, and efficient mobility
- Fail-operational behavior is essential in the sense

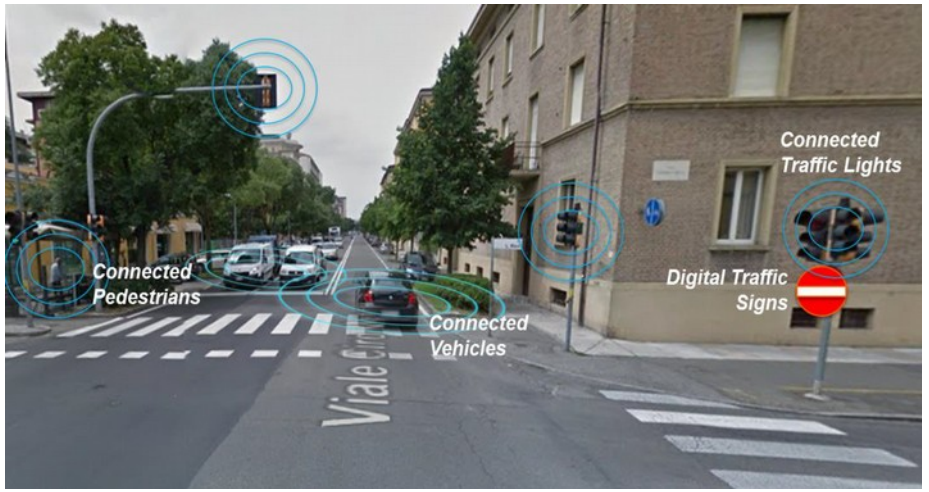
Prystine will deliver FUSION

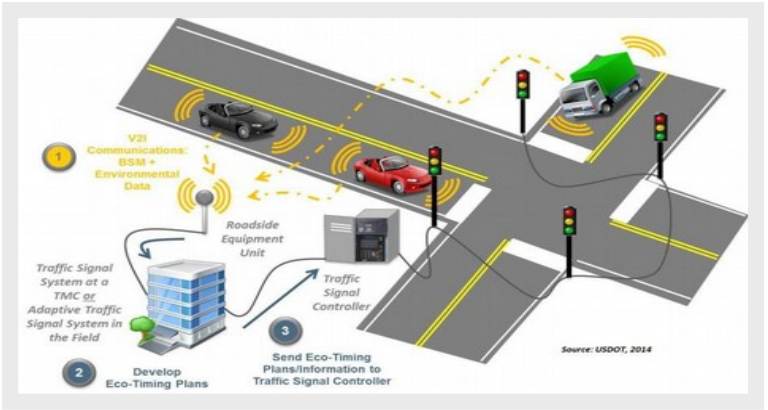
- Fail-operational Urban Surround perceptION (FUSION)
- Based on robust Radar and LiDAR fusion and control
- Enable safe automated driving

The Modena automotive smart area

The goal: a urban environment for *city awareness*, which integrates multiple (IoT) information channels to improve the quality of citizenship in terms of sustainability, services and safety.

- Testbed for research on smart cities, connected cities, autonomous driving…
- Both academical and industrial





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http://hipert.unimore.it

IMECH

Backup

OPEN-NEXT

Open-source real-time software structures for next generation industrial embedded platforms

- ✓ Programming frameworks and methodologies
- ✓ Operating system support
- ✓ Tools for software development and real-time analysis

...for next-generation industrial (4.0) systems on multi-/many cores

OPEN-NEXT

- Key industrial partners

http://www.t3lab.it/progetti/open-next/

- Research centers
  - TTLab, INFN
  - CRIT, Innovation centre