IWES 2021
6th Italian Workshop on Embedded Systems
Sapienza University of Rome
9-10 December 2021

Current embedded systems research activities at the **Department of Electrical Engineering and Information Technology** (DIETI) of the **University of Naples Federico II**

PRESENTER: ALESSANDRA DE BENEDICTIS

The Research Group

❑DIETI counts more than 150 academics among full time professors and researchers, and more than 70 active PhD students

❑The **Security & Embedded Research** group currently includes:

- 1 full professor + 1 professor emeritus
- 3 associate professors
- 1 tenured professor (RTD-B)
- 8 PhD students + 1 post-doc

Proff. Nicola Mazzocca, Antonino Mazzeo
Valentina Casola, Valeria Vittorini,
Alessandro Cilardo, Alessandra De Benedictis
Ing. Salvatore Barone, Erasmo Lamontagna,
Alessandra Somma, Franca Rocco di Torrepadula,
Francesco Vitale, Vincenzo Maisto, Stefano Mercogliano,
Alberto Moriconi, Riccardo Carbone

Main research themes

Smart Cyber-Physical Systems (CPSs) architectures, technologies and services

High Performance Computing (HPC) architectures, techniques and programming tools

Digital system security

Main research activities and projects (1/3)

❑ **High Performance Computing (HPC) architectures, techniques and programming tools**

- Energy-efficient and low-latency open-source processor architectures

- Heterogeneous computing architectures and HW-SW Co-Design approaches

- Hardware accelerators development methodologies

- Quantum Technology and HPC integration opportunities

H2020-FETHPC-2017 ***RECIPE***: *REliable power and time-ConstraInts-aware Predictive management of heterogeneous Exascale systems*, (ID: 801137, duration: 2018–2021)
Main contact: prof. Alessandro Cilardo

Main research activities and projects (2/3)

❑ **Smart Cyber-Physical Systems (CPSs) architectures, technologies and services**

- ▪ CPSs and digital twins: design methodologies, enabling technologies and services (e.g., RUL prediction, monitoring, predictive maintenance)

- ▪ Applications of CPSs and Artificial Intelligence (e.g., smart mobility and railway applications)

- ▪ System modeling and formal verification methods and techniques (e.g., anomaly-detection)

EU Horizon 2020 - Shift2Rail Joint Undertaking **RAILS** - *Roadmaps for A.I. integration in the raiL Sector,* (ID: RAILS 881782, duration: 2019-2023)
Main Contact: prof. Valeria Vittorini

Main research activities and projects (3/3)

❑**Digital systems security**

▪ Design and development methodologies for secure and safe systems (cloud, IoT and Edge systems)

▪ Hardware-based security mechanisms and protocols for IoT/Edge systems

▪ Security assessment and testing methodologies

▪ Cyber resilience

(**closed**) EU Horizon 2020 ***MUSA*** - *Multi-cloud Secure Application (H2020–ICT–2014–1–RIA). 2015-2017.* Contact: prof. Valentina Casola and Alessandra De Benedictis

Industrial collaborations

❑The research group has several partnerships ongoing with private companies and organizations in the area of design, security and dependability of embedded systems:

- ▪ RFI, Hitachi Railway Systems, ST Microelectronics, Micron, Gematica, IVM,Bit4ID…

❑Recent activities have addressed/address:

- ▪ System security assessment and security hardening
- ▪ Zero infrastructure
- ▪ Services for mobility
- ▪ Smart asset monitoring
- ▪ ….

Thank you!