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SAFETY AND RELIABILITY IN CRITICAL SYSTEMS

PhD student: Davide Piumatti

Supervisor: Matteo Sonza Reorda

OUTLINE:

- About me
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- CAD research mission
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- My research mission
- PEIC (Power Electronics Innovation Center)
- References

ABOUT ME

- I'm Dr. Davide Piumatti
- Graduated to electronic engineer in 2012 at Politecnico di Torino
- Graduated to computers science engineer in 2015 at Politecnico di Torino
- Thesis in Safety and reliability for critical systems: "Development and evaluation of testing programs for automotive microcontrollers"
- Research Fellow in 2015 - 2017 at DAUIN department of Politecnico di Torino : "Techniques for the design of highly reliable processor systems"
- Now, Ph.D. at DAUIN department of Politecnico di Torino: "Reliability and efficiency in electronic power systems"

DAUIN

- The department of Automation and Computer Engineering (DAUIN) is a major one within Politecnico
  - Professors and researchers: about 70
  - Staff: about 20
  - One of the most active in terms of
    - Research activities
    - Cooperation with companies
    - Teaching activities: more than 5,000 students
  - Strong expertise in electronic system design

DAUIN

- Special interest on embedded systems
  - Codesign
  - Design validation
  - Real-time Operating Systems
  - Low-power
  - Test
  - Fault tolerance

THE CAD GROUP

- Major group within DAUIN
- 9 permanent people (professors and researchers)
- About 12 young researchers (post-doc, PhD students, visitors)
- Long expertise in relationships with industry, university, research centers worldwide
- Involvement in several European projects, for both research and cooperation
- International reputation: average Scholar h-index > 20

- www.cad.polito.it

CAD GROUP RESEARCH MISSION

- To support (through techniques, tools, and services) the designer of electronic circuits and systems, with special emphasis on:
  - Testing
  - Fault tolerance
  - Validation
  - Embedded and real-time systems
  - Model-based design
  - Reconfigurable computing
  - Wireless Sensor Networks

CAD GROUP INDUSTRIAL PARTNERS

CAD GROUP ACADEMIC PARTNERS

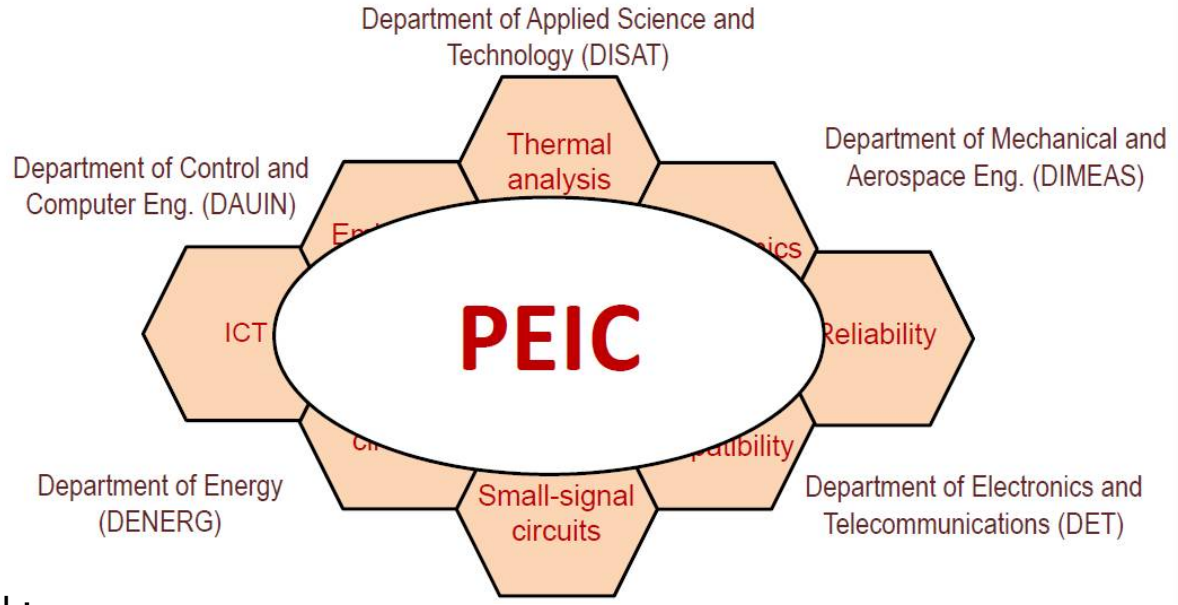
- LIRMM, Montpellier, France
- INPG, Grenoble, France
- University of Bremen, Bremen, Germany
- University of Freiburg, Freiburg, Germany
- Delft Technical University, Delft, The Netherlands
- University of Lund, Lund, Sweeden
- Universidad Carlos III, Madrid, Spain
- Universidad de Sevilla, Seville, Spain
- Tallinn University of Technology, Tallinn, Estonia
- University of Cyprus, Nicosia, Cyprus
- University of Athens, Athens, Greece
- Purdue University, USA
- UFRGS, Porto Alegre, Brazil
- PUCRS, Porto Alegre, Brazil
- Universidad Pedagogica y Technologica de Colombia
- Universidad de la Republica, Montevideo, Uruguay
- ...

MY RESEARCH MISSION

- Topics of my Ph.D.
  - New technique for the self-test in field for the automotive microcontrollers
  - New technique for the self-test in field for the automotive Electronic Control Units
  - New technique for faults tolerance in safe critical systems
  - New technique for testing the analog and power electronics (PEIC project)
    - End manufactory test
    - On-line in filed test
    - Reliability
    - Monitoring
    - Prognostics
    - Diagnostic

PEIC POWER ELECTRONICS INNOVATION CENTER

A multidisciplinary area, whose individual fields are covered inside Politecnico di Torino



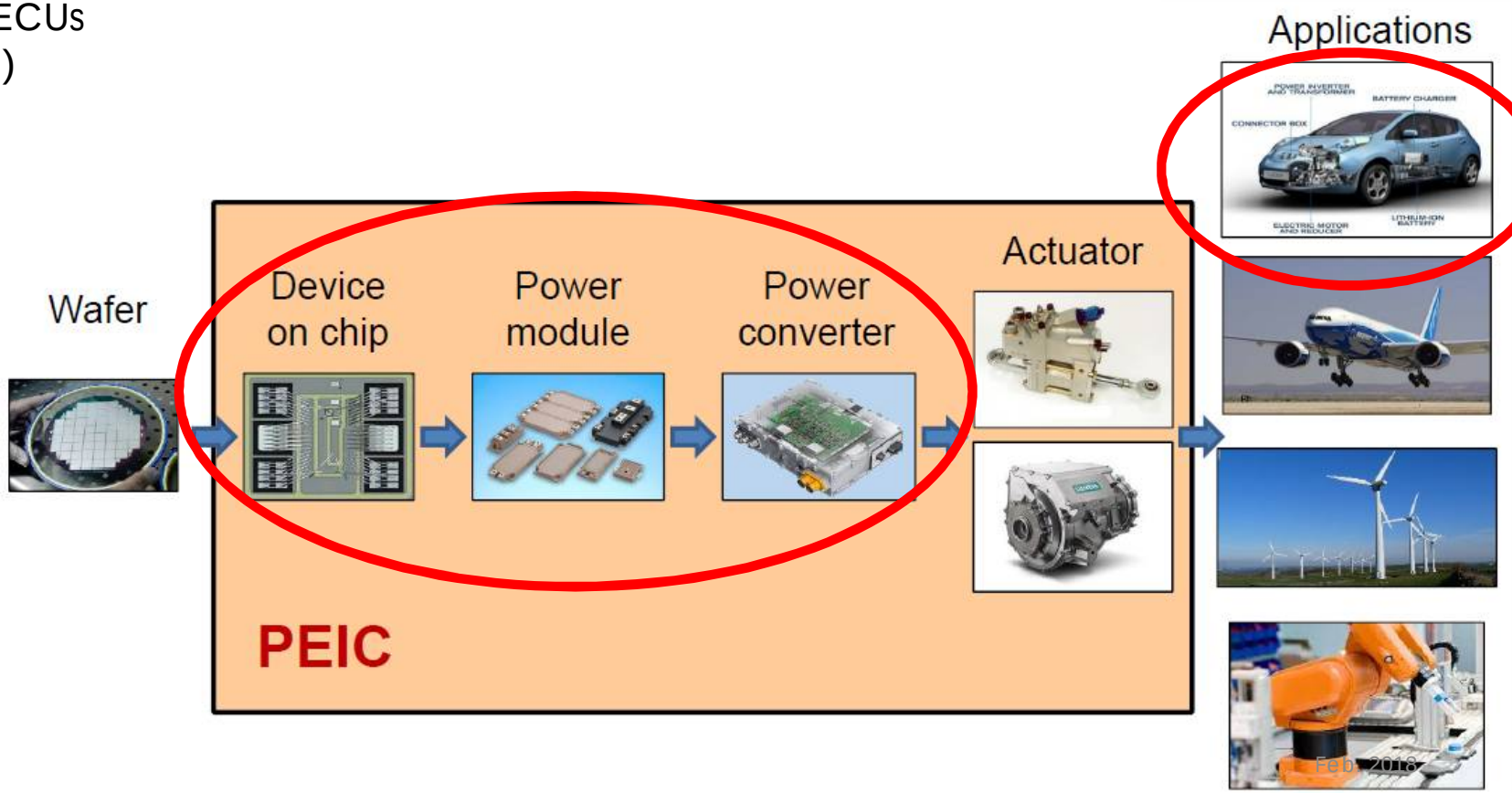
GOAL:

- Improve energy efficiency (battery life)
- Reduce fuel consumption (hybrid or electric car)
- Diagnostics / Testing of ECUs (analog and digital electronics)

Applications

PEIC POWER ELECTRONICS INNOVATION CENTER

- Functional test of new ECUs
- Testing (fault coverage)
  - µC
  - Analog electronic
  - Power electronic
  - Board
  - System



SOME SCIENTIFIC PUBLICATIONS

- OVERVIEW ABOUT TEST AND RELIABILITY IN INDUSTRIAL CASE IS AVAILABLE ON SCIENTIFIC PAPER:

Robustness in Automotive Electronics: an industrial overview of major concerns

Ulrich Backhausen 1, Oscar Ballan 2, Paolo Bernardi 3, Sergio De Luca 4, Julie Henzler 1, Thomas Kern 1, Davide Piumatti 3, Thomas Rabenalt 1, Krishnapriya Chakiat Ramamoorthy 1, Ernesto Sanchez 3, Alessandro Sansonetti 4, Rudolf Ullmann 1, Federico Venini 2&3 , Robert Wiesner 1
1INFINEON (IFX) DE; 2 XILINX US; 3 Politecnico di Torino ITA; 4 STMicroelectronics ITA

2017 IEEE 23rd International Symposium on On-Line Testing and Robust System Design (IOLTS), Thessaloniki, 2017, pp. 157-162. doi: 10.1109/IOLTS.2017.8046234

- http://ieeexplore.ieee.org/document/8046234/

- ALL SCIENTIFIC PUBLICATION AVAILABLE ON:
  - https://iris.polito.it/cris/rp/rp22316
  - https://scholar.google.it

REFERENCES

POLITECNICO DI TORINO
WEB: www.polito.it

CAD GROUP
WEB: www.cad.polito.it

Dr. DAVIDE PIUMATTI
LINKEDIN: https://it.linkedin.com/in/davide-piumatti-a90339131
E-MAIL: davide.piumatti@polito.it

ASSOCIAZIONE EX ALLIEVI DEL POLITECNICO DI TORINO
WEB: www.alumni.polito.it
E-MAIL: segreteria.alumni@polito.it