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DC-RES

DOCTORAL COLLEGE - RESILIENT EMBEDDED SYSTEMS

Entrusting computers with autonomous driving, the control of a big chemical production plant, or similar safety critical real-world applications, requires a high degree of resilience on all levels, from application and operating system to processor architecture and implementation. Significant research is required to accomplish this, even more so for novel computing paradigms that are on the horizon, like machine learning or neuronal computing. It is the very mission of the Doctoral college „Resilient Embedded System“ to provide efficient and scientifically sound solutions in this area of high technical and societal importance. For the first time in Austria, a classical university, namely TU Wien, and a University of Applied Science, namely FH Technikum Wien, have joined forces towards an excellent PhD education, with the aim to combine scientific research and industrial needs. In total, 20 PhD students from all over the world will, supervised by highly qualified professors from both institutions, provide their research results in this challenging field.

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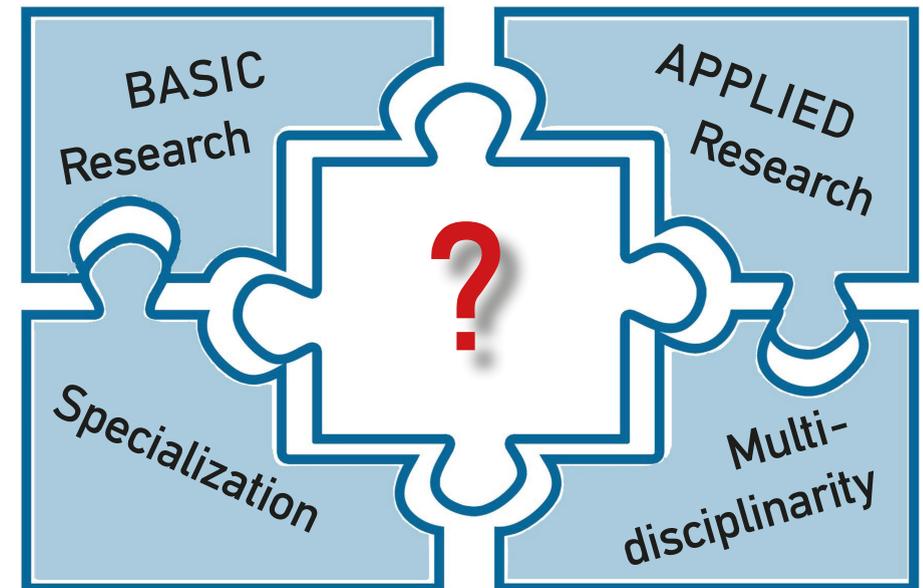
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Doctoral College

Resilient Embedded Systems

THE JOURNEY OF RESEARCH IN COMPUTING



December 12th, 2018

Gußhausstraße 27-29, lecture room EI 10, 1040 Wien

KEYNOTE-TALK

„Re-Engineering Computing with Neuro-Inspired Learning: Devices, Circuits and Systems”

ABSTRACT

Advances in machine learning, notably deep learning, have led to computers matching or surpassing human performance in several cognitive tasks including vision, speech and natural language processing. However, implementation of such neural algorithms in conventional „von-Neumann” architectures are several orders of magnitude more area and power expensive than the biological brain. Hence, we need fundamentally new approaches to sustain exponential growth in performance at high energy-efficiency beyond the end of the CMOS roadmap in the era of 'data deluge' and emergent data-centric applications. Exploring the new paradigm of computing necessitates a multi-disciplinary approach: exploration of new learning algorithms inspired from neuroscientific principles, developing network architectures best suited for such algorithms, new hardware techniques to achieve orders of improvement in energy consumption, and nanoscale devices that can closely mimic the neuronal and synaptic operations of the brain leading to a better match between the hardware substrate and the model of computation.

PROF. KAUSHIK ROY



BIOGRAPHY

Kaushik Roy is the Edward G. Tiedemann, Jr., Distinguished Professor of Electrical and Computer Engineering at Purdue University. He received his PhD from University of Illinois at Urbana-Champaign in 1990 and joined the Semiconductor Process and Design Center of Texas Instruments, Dallas, where he worked for three years on FPGA architecture development and low-power circuit design. His current research focuses on cognitive algorithms, circuits and architecture for energy-efficient cognitive computing, computing models, and neuro-morphic devices. Kaushik has supervised 75 PhD dissertations and his students are well placed in universities and industry. He is the co-author of two books on Low Power CMOS VLSI Design (John Wiley & McGraw Hill).

In recognition of his scientific merits he holds numerous prizes and awards.

<https://engineering.purdue.edu/C-BRIC/biographies/kaushik-roy>

PROGRAM

17:00 s.t. **OPENING**

Prof. Sabine Seidler, Rector TU Wien

**INTRODUCTION OF THE DOCTORAL COLLEGE:
„RESILIENT EMBEDDED SYSTEMS” (DC-RES)**

Prof. Andreas Steininger

Director Vienna PhD School of Informatics, Chair DC-RES

FH-Prof. Christian Kollmitzer

Vice Rector FH Technikum Wien, Faculty Electronic Engineering

KEYNOTE-TALK & DISCUSSION

„Re-Engineering Computing with Neuro-Inspired Learning“

Prof. Kaushik Roy, Purdue University

PANEL DISCUSSION moderated by Prof. JOSEF BROUKAL

„The Journey of Research in Computing:

Basic versus Applied Research - Specialization versus Multidisciplinaryity“

Mag. Jochen Borenich, MBA (COO, Kapsch BusinessCom)

FH-Prof. Christian Kollmitzer (Vice Rector FH Technikum Wien)

Prof. Kaushik Roy (Purdue University, Indiana, USA)

Prof. Hannes Werthner (Dean of the Faculty of Informatics, TU Wien)

19:00 Networking over wine & bread