Tentative Workshop Schedule for AxC23

Time	Event	Duration	Description
9:00am	Welcome by Chairs	10 mins	
9:10am	Keynote	30/40 min Keynote + 20/10 questions	**Approximate Computing for Machine Learning and Beyond** Prof. Nima TaheriNejad, Heidelberg University, Germany Abstract: We start this talk with a categorization of various approximate computing solutions before looking into the literature of approximate computing in machine learning. In particular, we review those which use an adaptive approach to their approximation. Next, we present some of our own recent works in the field of approximate computing. In doing so, we go beyond machine learning and into two different realms: one is approximate in-memory computing, and the other one is democratization of approximate computing by enable software engineers and programmers to benefit from hardware approximation benefits. These two windows into the future of approximate computing conclude this talk.
10:00am	Regular Session #1 Cross-Layer and AI-based Approximation	10 mins + 5 QA	1. **Cross-Layer Approximations for System-Level Optimizations: Challenges and Opportunities** Jorge Castro-Godínez, Muhammad Abdullah Hanif and Muhammad Shafique 2. **Design Space Exploration of Approximate Computing Techniques with a Reinforcement Learning Approach** **Sepide Saeedi**, Alessandro Savino and Stefano Di Carlo
10:30am	Coffee break		
11:00am	Panel	90 mins	**Past, Present and Future of Approximate Computing: Achieved Milestones and Open Challenges** Abstract: the scope of the panel is to bring together experts in AxC to draw pictures of what AxC accomplished so far and what are promising directions. If you want to work in this field attend the panel and ask the experts!!
12:30pm	Lunch		
2:00pm	Invited Talk #1	20/25 mins + 20/15 QA	**Approximate Computing Methods towards Resource-Efficient and Dependable Deep Learning for Industrial Applications** Cecilia de la Parra, Bosch

			Abstract: The use of Artificial Intelligence (AI) is ubiquitous across domains: from automotive to manufacturing and consumer electronics, between others. While algorithmic performance keeps improving over time, computational and memory requirements of AI applications are also increasing at an almost exponential rate, making their embedded deployment increasingly challenging. At the same time, dependable AI is crucial in industrial and commercial applications, and therefore it is necessary to address dependability without further compromising resource efficiency of AI hardware accelerators. In this talk, we discuss how cross-layer approximate computing can tackle these challenges and pave the way towards energy-efficient and dependable AI for industrial applications.
2:45pm	Regular Session #2 Approximation in the Field	10 mins + 5 QA	1. **Exploit Approximation to Support Fault Resiliency in MPI-based Applications** **Roberto Rocco** and Gianluca Palermo 2. **Stochastic Computing as a Defence Against Adversarial Attacks** **Florian Neugebauer**, Vivek Vekariya, Ilia Polian and John Hayes 3. **Guardband Optimization for the Preconditioned Conjugate Gradient Method** Natalia Lylina, Stefan Holst, Hanieh Jafarzadeh, **Alexandra Kourfali** and Hans-Joachim Wunderlich 4. **Multi-Metric SMT-Based Evaluation of Worst-Case-Error for Approximate Circuits** Morteza Rezaalipour, Lorenzo Ferretti, Ilaria Scarabottolo, George Constantinides and Laura Pozzi 5. **Low Power Streaming of Sensor Data Using Gray Code-Based Approximate Communication** **Somayeh Sadeghi Kohan**, Sybille Hellebrand and Hans-Joachim Wunderlich
4:00pm	Coffee Break		
4:30pm	Invited talk #2	20/25 mins + 20/15 QA	**Is it possible to reduce memory footprint without affecting reliability? An overview on DNNs exploiting approximate computing techniques.** Annachiara Ruospo, Politecnico di Torino Abstract: Today, neural networks have gained significant importance and have made noteworthy contributions across diverse fields, owing to their

			exceptional computational and learning capabilities. However, the adoption of newer versions of Deep Neural Networks (DNNs) in resource-constrained systems faces a crucial limitation related to memory requirements for storing static parameters like synaptic weights. To address this challenge, a recent trend has emerged, focusing on reducing the memory footprint of DNNs using reduced bit-width data types. By relaxing the necessity for fully precise or deterministic operations, Approximate Computing (AxC) techniques have proven effective in reducing memory demands by leveraging reduced bit-width fixed-point arithmetic or low-precision floating-point implementations. While this approach presents a sound solution for mitigating increasing memory requirements, it also introduces potential compromises to the reliability of the network. This presentation offers a comprehensive overview of the state-of-the-art techniques currently employed to address challenges related to memory requirements in DNNs and DNN-based systems. It also highlights the consequences these techniques have on the reliability of the models.
5:15pm	Regular Session #3 Circuit Level Approximation	10 mins + 5 QA	**1. Generic Accuracy Configurable Matrix Multiplication-Addition Accelerator using HLS** Luis G. Leon-Vega and Jorge Castro-Godínez **2. A Parametrizable Template for Approximate Logic Synthesis** Morteza Rezaalipour, Marco Biasion, Ilaria Scarabottolo, George Constantinides and Laura Pozzi 3. **Input-aware accuracy characterization for approximate circuits** Ali Piri, Salvatore Pappalardo, Salvatore Barone, Mario Barbareschi, **Bastien Deveautour**, Marcello Traiola, Ian O'Connor and Alberto Bosio 4. **AxASRE: A Novel Approach to Approximate Adder Synthesis Results Estimation** Pedro T. L. Pereira, Guilherme Paim, Paulo Flores, Eduardo Costa and Sergio Bampi
6:30pm	Closing Session		