

# SCONA 2020 Technical Program

## Workshop on Stochastic Computing for Neuromorphic Architectures

Friday, March 13, 2020, ALPEXPO Grenoble

### 9:00-9:15: Workshop introduction

Iliia Polian<sup>1</sup>, John P. Hayes<sup>2</sup>, Weikang Qian<sup>3</sup>, <sup>1</sup>University of Stuttgart, <sup>2</sup>University of Michigan, Ann Arbor, <sup>3</sup>Shanghai Jiao Tong University

### 9:15-10:00 Keynote

#### Stochastic Computing for Machine Learning towards an Intelligent Edge

Warren J. Gross, McGill University, Canada

### 10:00-10:30 Coffee break

### 10:30-12:00 Session 1: Stochastic Approaches for Artificial Intelligence

#### PASCA: PARallel Stochastic Computing based Neural Network Accelerators

Runsheng Wang, Peking University, China

#### Tsetlin Machine: A New Paradigm for Pervasive AI

Adrian Wheeldon<sup>1</sup>, Rishad Shafik<sup>1</sup>, Alex Yakovlev<sup>1</sup>, Jonathan Edwards<sup>1</sup>, Ibrahim Haddadi<sup>1</sup>, Ole-Christoffer Granmo<sup>2</sup>, <sup>1</sup>Newcastle University, UK, <sup>2</sup>University of Agder, Norway.

#### Stochastic Neural Networks: Limits and Opportunities

Florian Neugebauer, University of Stuttgart, Germany

### 12:00-13:00 Lunch

### 13:00-14:30 Session 2: Emerging Architectures for Stochastic Computing

#### Introduction to Dynamic Stochastic Computing

Siting Liu, Jie Han, University of Alberta, Canada

#### From Unary to Low-Discrepancy: Deterministic Bit-streams Revolutionize Stochastic Computing

Hassan Najafi, University of Louisiana in Lafayette, USA

#### On the Simulation of Software-Driven Stochastic Computing for Emerging Applications

Sercan Aygun<sup>1,2</sup>, Ece Olcay Gunes<sup>2</sup>, <sup>1</sup>Yildiz Technical University, Turkey, <sup>2</sup>Istanbul Technical University, Turkey

### 14:30-15:00 Coffee break

### 15:00-16:30 Session 3: Nanotechnology for Stochastic Computing

#### Stochastic magnetic devices for cognitive computing

Kaushik Roy, Purdue University, USA

#### Stochastic learning in CMOS integrated HfO<sub>2</sub> based memristive arrays

F. Zahari<sup>1</sup>, M. K. Mahadevaiah<sup>2</sup>, E. Perez<sup>2</sup>, E. Perez-Bosch Quesada<sup>2</sup>, H. Kohlstedt<sup>1</sup>, Ch. Wenger<sup>2,3</sup>, M. Ziegler<sup>4</sup>, <sup>1</sup>Kiel University, Germany, <sup>2</sup>IHP, Germany, <sup>3</sup>Brandenburg Medical School Theodor Fontane, Germany <sup>4</sup>TU Ilmenau, Germany

#### Unary Computing Meets ReRAM Crossbar: A Novel Solution for Reliable ReRAM-based Neuromorphic Computing

Weikang Qian, Shanghai Jiao Tong University, Shanghai, China

### Workshop Wrap-Up