

Title: "Practical Approximate Channel Decoders"

Speaker: Dr. Alexios Balatsoukas-Stimming

Time & Location: Friday, March 8 at 2 p.m. NJIT, ECE202

Abstract:

During the so-called happy scaling era of integrated circuits, the increasing transistor count per unit area and the increasing energy-efficiency were able to offset the ever-increasing complexity of communications and digital signal processing algorithms. Unfortunately, the gains from circuit technology scaling have slowed down significantly in the last few years. One of the promising techniques that have been proposed to overcome this hurdle is approximate computing, where the reliability constraints of integrated circuits are relaxed significantly. In this presentation, I will first explain how and under which conditions well-known methods, such as density evolution, can be adapted in order to analyze LDPC and polar decoders that operate with approximate memory. For polar codes in particular, I will also describe efficient techniques that can be used to mitigate the effect of memory faults. Finally, I will explain why most approximate decoders that have been proposed in the literature so far (including our own) are impractical, and I will describe some low-complexity methods that can be used to partially overcome this obstacle.

Bio

Dr. Alexios Balatsoukas-Stimming received the Diploma and MSc degrees in Electronics and Computer Engineering from the Technical University of Crete, Chania, Greece, in 2010 and 2012, respectively, and a PhD in Computer and Communications Sciences from the Ecole polytechnique federale de Lausanne (EPFL), Switzerland, in 2016. He spent one year at the European Laboratory for Particle Physics (CERN) as a Marie Sklodowska-Curie postdoctoral fellow and he is currently a postdoctoral researcher in the Telecommunications Circuits Laboratory at EPFL. His research interests include VLSI circuits for communications, error correction coding theory and practice, as well applications of approximate computing and machine learning to signal processing for communications.