

Welcome to the SPS Seasonal School on Signal Processing and Communication Systems for 5G. The jointly, internationally, organized by IEEE Vizag Bay Section Communications Society & SPS Joint Chapter, Vizag, India, IEEE Long Island Section SPS Chapter, New York, USA, and IEEE Finland SP/CAS Chapter, Finland presents the following Technical Lecture:

GPU Acceleration for 5G Signal Processing and Machine Learning

Wednesday September 15th 2021 at 8AM-12PM Pacific

Abstract:

As the rollout of 5G progresses and research for 6G begins, the key themes of softwarization, virtualization, open systems and artificial intelligence form foundational principles for communication systems of the future. The application of AI/ML to wireless communications an extremely active research area with many 10's to 100's of papers published weekly reporting new results on the application of AI/ML to the physical layer (L1), MAC layer (L2) and at the network optimization level.

To realize the Industry's vision of an AI/ML powered wireless future, a full stack solution supporting a software defined radio (SDR) approach for the vRAN, together with optimized silicon for AI, coupled with application development frameworks for AI/ML development is essential. NVIDIA GPU technology and associated CUDA programming model, together with arch suite of AI/ML SDKs (Software Development Kits) provides these capabilities.

In this talk we present The *Aerial* software-defined GPU-based cloud native 5G NR RAN platform. Aerial implements not only 5G NR the baseband signal processing, but using GPU virtualization supports additional concurrently operating workloads, such as AI/ML inference, training and data analytics on this one hyper-converged system. We provide an overview of the L1 signal processing pipeline and describe efficient mechanisms for data movement between the GPU and NIC-based fronthaul interface using a GPU-enabled Data Plane Development Kit (DPDK). A brief survey of some of the promising deep learning approaches for L1 and L2 enhancements is presented.

Distinguished Lecturer:



Dr Chris Dick joined NVIDIA in 2020 where he is a wireless architect and the technical lead for the application of Artificial Intelligence and Machine Learning to 5G and 6G wireless. From 1998 to 2020 he was a Fellow and the DSP Chief Architect at Xilinx.

In his 30 years working in signal processing and communications he has delivered silicon and software products for 3G, 4G and 5G baseband DSP and Docs is 3.1 cable access. He has performed research and delivered products for digital front-end (DFE) technology for cellular systems with a particular emphasis on digital pre-distortion for power amplifier linearization. Chris has also worked extensively on silicon architecture and compilers for machine learning.

Prior to moving to Silicon Valley in 1998 he was a tenured academic in Melbourne Australia for 13 years. He has over 200 publications, 70 patents and is an adjunct Professor at Santa Clara University where he has taught courses on real-time signal processing and machine learning for 18 years. In 2018 he was awarded the IEEE Communications Society Award for Advances in Communication for research in the area of full-duplex wireless communication.

Logistics:

When: The 15th of September 2021 @ 8am—12pm PST

Where: Virtual Meeting

Registration Fees: Free for all registered participants

Registration: <https://attend.ieee.org/sps-ss/>

Technical Lecture Coordinators:

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