

The FAU-SIAM student chapter invites you to a talk by

## Sirani Perera, Ph.D.

Assistant Professor in Mathematics at Embry-Riddle  
Aeronautical University (ERAU)



### A fast algorithm for beam digitization

Friday April 9th, 2021, 4:00pm EST

Open to all

Live on [Zoom](#) (Meeting ID: 829 1824 9336, passcode: Spring2021)

### Abstract

Digital beamformers are popular due to the extensive usage in digital signal processing, including applications in radar, cellular networks, microwave imaging, and radio astronomy. When digital beamformers are considered, characteristics of the analog to digital converters e.g., dynamic range and instantaneous bandwidth, and the number of complex operations performed are of paramount importance in array processing receivers with applications in wireless communications. Moreover, for 5G wireless communications, the wireless system performance is primarily determined by the signal to noise ratio which is assumed to be due to the presence of additive white Gaussian noise from a variety of sources. In this talk, we will observe a hybrid of discrete transform matrices and its sparse factorization to reduce the arithmetic complexity of the brute-force matrix-vector calculation. Next, the language of signal flow graphs will be utilized to connect the algebraic operations associated with the proposed algorithm to realize the system as an integrated circuit. Finally, the proposed fast algorithm will be utilized to reduce the analog to digital converter channels and power consumption. This is joint work with Arjuna Madanayake (FIU) and Levi Lingsch (ERAU).

### About the speaker

Sirani M. Perera received a Ph.D. in Mathematics from the University of Connecticut in 2012. She was the first Sri Lankan to attend the Center for Mathematical Sciences at the University of Cambridge, UK with a full Shell Centenary Scholarship and obtained Part III Tripos in Mathematics in 2006. Since 2015, she is working as an assistant professor in Mathematics at Embry-Riddle Aeronautical University (ERAU), USA in the field of Numerical Linear Algebra and Scientific Computing. Her research interests include structured matrices, matrices with displacement structure, fast Fourier transforms, fast and stable algorithms, complexity and performance of algorithms, machine learning algorithms, signal processing, array processing, and image processing. Within the last five years at ERAU, she has 16 published and in review papers and 6 media publications. Dr. Perera has guided 16 undergraduate students and 2 graduate students. She is the inventor of the pending US patent entitled Reduced Multiplicative Complexity Discrete Cosine Transform (DCT) Circuitry, and a co-inventor of the recently submitted disclosure entitled Complexity Reduction of Wideband True Time-Delay Multi-beam Beamforming.

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