Title: Learning to Beamform in Integrated Sensing and Communication Systems

Speaker: Dr. Sundeep Prabhakar Chepuri (Indian Institute of Science Bangalore).

Abstract: Integrated sensing and communications (ISAC) are envisioned to be an integral part of future wireless systems. In this talk, we will discuss model-drivel neural model to design transmit precoders for ISAC systems to jointly optimize a certain sensing and communications quality of service (QoS). In particular, we pose the problem of learning transmit precoders from uplink pilots and echoes as a function estimation problem and we model and parameterise this function using a neural model. To learn the neural network parameters, we develop a loss function based on the first-order optimality conditions to incorporate the sensing and communications QoS. Through numerical simulations, we demonstrate that the proposed method outperforms traditional optimization-based methods in presence of channel estimation errors while incurring lesser computational complexity and generalizing well across different channel conditions that were not shown during training.

Bio: Sundeep Prabhakar Chepuri received his M.Sc. degree (cum laude) in electrical engineering and Ph.D. degree (cum laude) from the Delft University of Technology, The Netherlands, in July 2011 and January 2016, respectively. He was a Postdoctoral researcher at the Delft University of Technology, The Netherlands. He has held positions at Robert Bosch, India, during 2007- 2009, and Holst Centre/imec-nl, The Netherlands, during 2010-2011. Currently, he is an Assistant Professor at the Department of ECE at the Indian Institute of Science (IISc) in Bengaluru, India.

Dr. Chepuri was a recipient the Pratiksha Trust Young Investigator award. His papers have received best paper awards at the ICASSP in 2015, ASILOMAR 2019, and EUSIPCO 2023, He was an Associate Editor of the EURASIP Journal on Advances in Signal Processing. Currently, he is an elected member of the EURASIP Technical Area Committee (TAC) on Signal Processing for Multisensor Systems, IEEE SPS Sensor Array and Multichannel Technical Committee (SAM-TC), IEEE SPS Signal Processing Theory and Methods Technical Committee (SPTM-TC), and an Associate Editor of IEEE Signal Processing Letters and IEEE Transactions on Signal and Information Processing over Networks. His general research interest lies in the field of mathematical signal processing, statistical

inference, and machine learning applied to network sciences and wireless communications.