Center for Signal and Information Processing (CSIP)
Presents:

Volumetric Radar Imaging of Moving Objects

Friday, February 23rd - 3:00 pm
Centergy One 5126 (CSIP Library)

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Bio: Skanda Prasad is a fourth year PhD student working with Prof Christopher Barnes with a research focus in Synthetic Aperture Radars and Radar Imaging based on diffractive wave field inversion. Before coming to Georgia Tech, he was working in the industry, first as a telecommunication software engineer at Alcatel-Lucent, and later, as a DSP Hardware Engineer at Applied Micro.

Abstract:

Traditional techniques in Radar Imaging, and specifically, Synthetic Aperture Radars (SAR) require the use of perfectly linear or circular motion paths. Deviations from them need to be carefully compensated through numerous techniques, which increase the complexity of these algorithms. Most of these techniques are also limited to providing only two-dimensional imagery. Three-dimensional SAR imaging usually requires multiple passes, such as Interferometric SAR or multipass Circular SAR.

The talk will offer an overview of SAR technology and its various techniques, offering a brief history of the development and taxonomy of SAR algorithms. We will also look at a more intuitive way of approaching Radar Imaging in the wavenumber (k) space, through Ewald Sphere visualization of scatterer profiles in k-space. The Ewald Sphere, combined with angle isomorphism between scatterer view angles and the corresponding sample in k-space allows us to develop a Stolt transformation based imaging algorithm. This algorithm, which uses a novel Huygens-Fresnel processing method, gives us the ability to perform two and three-dimensional aperture synthesis to create volumetric images of objects moving in highly non-linear paths from a single pass. The algorithm also supports coherent multi-band fusion, as well as spatial sub-aperture fusion of data from sparse sensor swarms.