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SPACE SITUATIONAL AWARENESS UTILIZING COMMENSAL BASED RADAR AND SOFTWARE-DEFINED-RADIO

Abstract

Traditional approaches to Space Situational Awareness for the detection and tracking of space debris and space objects have required significant infrastructure and large budgets. Through the implementation of commensal (passive) based radar techniques and software-defined-radio, these hurdles can be overcome.

While software-defined-radio has been around for many years, the barrier to entry has been reduced thanks to the recent proliferation of low cost devices with support for quadrature sampling. This has resulted in an immense resurgence of interest and development in the field with solutions ranging from the tracking of aircraft and ships to the reception of space based communications such as the Yutu lunar rover. Software tools, for example GNU Radio, have removed the need for task driven hardware specific solutions and allowed for a single software-defined-radio device to support multiple protocols and modulation schemes as well as facilitate parallel analysis of a wide portion of the spectrum.

This presentation will focus on the identification and characterization of objects in space using software-defined-radio devices. Commensal based radar techniques and weak-signal-propagation are utilized for detecting and tracking the objects; the data from multiple ground based receivers is then correlated to enhance the accuracy and image the detected objects.