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Author: Mr. Uri Greisman Ran
Elbit Systems Aerospace Division, Israel

TASK-BASED IMAGING – A NOVEL PARADIGM CHALLENGING THE TRADITIONAL PUSH BROOM CONCEPT

Abstract

This session is based on Elbit System's novel Magic Mirror Satellite, implementing a novel paradigm of task-based imaging by a highly accurate control system of a 360 gimballed fast scanning mirror. Typically, Remote Sensing satellites are using push broom method to take images of the required area below their trajectory. Using the rotation wheels, these satellites can change their attitude and point their line of sight diagonally, hence to take images of objects that are somewhat on the side of the NADIR swath. Yet, it is commonly accepted that most of the imaged area is not required for viable applications. A gimballed 360 fast scanning mirror can direct the reflected / emitted energy from the observed objects to the satellite remote sensing system, hence enabling the satellite to prioritize areas of interest and avoid imaging areas that are not required. Moreover, as the gimballed mirror can be directed at very quickly to any direction, it can support immediate tasking concept, which will enable to provide an image of a certain area within a short time frame. This feature is especially valued for rapid imaging and continuous surveillance of an area of interest. Some of the operational values of task based imaging includes: 1. Agile scanning of various polygons, and faster time to image results 2. Significantly lower amount of collected data, processing and downstream communication- all results in a efficiency improvements and ability to support the mission by a smaller satellite, providing lower value/cost ratio 3. Significantly improved imaging characteristics, due to longer integration time that enable collection of more photons, and mosaic scanning which enable to support much better IFOV for a given optical aperture. This session will introduce some of the requirements for a gimballed mirror, technical challenges and potential for new services and values which could materialize from its implementation in a single satellite or a satellites constellation.