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5 Cognitive Optics and Advanced Technology Demonstration
Sarah T. Crites, University of Hawai'i at Manoa (United States)
Richard T. Howard, NASA Marshall Space Flight Center (United States)

Introduction

This conference, with this fifth successful consecutive offering in the operational concepts, principles and methodologies on sensors and systems for space applications, reflects a consensus of those participating from all over the globe. This international collaboration explores a range of science and technology destined for space or operating through space to enable robust and resilient space systems and operations in contested environments. Our varied interests include processing, exploitation, decision support for attributions, communications, tactical planning from space payloads, and pervasive technologies supporting responsive space with cognitive optics, connectivity and agile satellite radios.

The plenary presentation initiated technical discussions on the focus area of on/off-board Time Division Multiple Access (TDMA) scheduling to robustly disseminate schedules to remotely piloted aircraft for compact low-cost Low-Earth-Orbiting satellite communications without satellite radio beacons and knowledge of satellite locations. Assisted by the conference chair (Dr. Khanh Pham), Dr. Tien Nguyen, Chief engineer and Engineering Fellow from Raytheon/Space and Airborne Systems provided an overview of existing RF beacon techniques used for TDMA scheduling and stimulated technical inputs from the conference attendees by describing initial thoughts on the beaconless TDMA scheduling approaches. Future technologies anticipated herein will help increase the Air Force capabilities while operating in denied, limited or anti-access environments.

To date there have been nearly 200 papers published in these proceedings. Since its initiation in 2008, the title has been modified from Modeling, Simulation and Verification of Space-based Systems III to reflect the broadening of the scope of the conference to include the state of the art not only from modeling, simulation and support test verification related to space-based sensors and systems but also tracking, telemetry and control for space situational awareness. The enhanced scope also includes theoretical and application oriented connectivity and dissemination for cognitive space RF communications. As the title indicates these proceedings are spread across the three key facets of the developments in the field, namely space payload technologies for dual military-civil operations; tracking, telemetry, and control for space situational awareness; and connectivity and dissemination for cognitive satellite radios. As has been the practice, and driven by the command, control, and communications (C3) autonomy technology developer community and the spacecraft mission community, presentations have been grouped this year into nine sessions, adaptively categorized to represent the changing interests of our participants:

- Pervasive Technologies Supporting Responsive Space
- Space Payload Technologies for Dual Military-Civil Operations
- Sensor Contamination Detection, Abatement, and Effects
- Cognitive Optics and Advanced Technology Demonstration
- Tracking, Telemetry, and Control for Space Situational Awareness
- Plenary Presentation
- Connectivity and Dissemination for Cognitive Space Communications
- Processing, Exploitation, and Decision Support for Attributions and Tactical Planning

Each year, representatives from our program committee consisting of conference participants from academia, government, and commercial sectors involved in space, exchange ideas and promote the discussion of salient research, applications and recent developments in a number of space sensor technology areas and C3 autonomy in space. Toward this end, we plan to continue this series and look forward to your readership of these proceedings and participation with the program committee to continue to rejuvenate the growth of this conference and broaden its appeal within the space community in coming years. Further details regarding the call for papers and schedule for next year will be made available in due course at SPIE (www.spie.org).

We are pleased to acknowledge the authors for choosing this conference for publication of their extraordinary technical achievements. We also would like to take this opportunity to thank the members of our program committee and the session chairs for their tireless support to make this conference another success despite of continued budget cuts, government travel restrictions, and DoD sequestration. Thanks are also due to SPIE staff for their invaluable help in making this all possible.

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