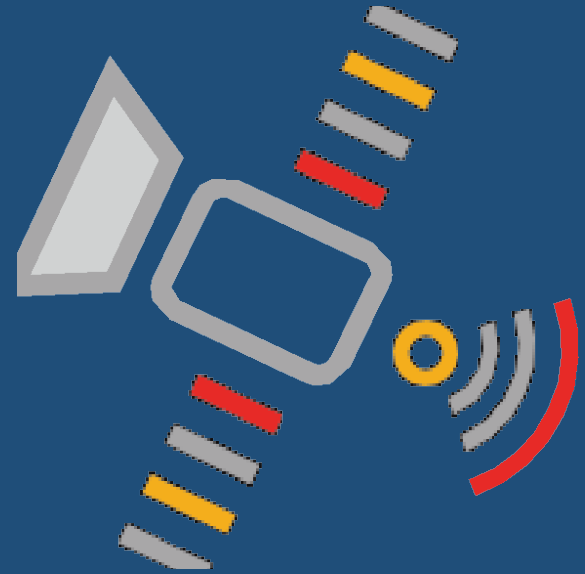


IEEE Synthetic Aperture Standards Committee: Radar Study Group

January 26, 2023



Kumar Vijay Mishra

United States DEVCOM Army Research Laboratory

Raghu G. Raj

United States Naval Research Laboratory

RSG: Current Members

Chair: Dr. Kumar Vijay Mishra (ARL)

Co-chair: Dr. Raghu G. Raj (NRL)

Secretary: Dr. Shobha Sundar Ram (IIIT-D)

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*No longer active or have not joined any sub-group

IEEE Standards

- ◆ An IEEE standard is a document established by consensus that provides rules, guidelines, or best practices for salient technical aspects of SAR. It is a basis for comparison and a reference point against which other approaches, designs or algorithms can be evaluated.
- ◆ After publication, a well-written standard establishes uniform engineering or technical criteria, methods, processes, and practices.

Synthetic Aperture Standard Committee

- ◆ There is a recognition that across a variety of disciplines common theoretical, mathematical, and algorithmic techniques are employed:
 - ★ Synthetic Aperture Radar
 - ★ Synthetic Aperture Sonar
 - ★ Synthetic Aperture Channel Sounding
 - ★ Fourier Ptycography
 - ★ Event Horizon Telescope
 - ★ Medical Imaging

- ◆ The goal of the SASC is to establish IEEE Standards for each of these application areas while taking into account the common threads underlying these:
 - ★ Data acquisition
 - ★ Processing
 - ★ Analysis and interpretation

Motivation for SAR Standards

- ◆ SAR is increasing being used in space-based and automotive radar applications. Having a uniform set of standards can enable system interoperability
- ◆ Standards can establish best practices and rules-of-thumb for implementing SAR algorithms in a broad range of applications
- ◆ Our interpretation of “SAR” is very broad; encompasses:
 - ✦ Standard SAR
 - ✦ Inverse SAR (ISAR)
 - ✦ Interferometric SAR/ISAR
 - ✦ Polarimetric SAR/ISAR
 - ✦ Multichannel Radar
 - ✦ Multistatic Radar
 - ✦ MIMO Radar
 - ✦ Distributed radars
- ◆ Aspects for standardization:
 - ✦ Standard processing structures and algorithms (both hardware and software implementations)
 - ✦ Testing and benchmarking mechanisms
 - ✦ Waveforms
 - ✦ Operation across frequency bands
 - ✦ Synchronization of radars (for Multistatic operation)
 - ✦ Antenna spacing
 - ✦ Sampling
 - ✦ SAR/ISAR image quality assessment
 - ✦ SAR/ISAR image interpretation
 - ✦ SAR/ISAR image fusion (across aspects, frequency bands)

Sub-groups for IEEE SASC RSG

- ◆ We recommend forming different sub-groups that will be in charge of standardizing different aspects of the IEEE SAR SA standard. Following are some suggested sub-groups:
 - ★ **Fundamental SAR processing sub-group**
 - **Lead: Raghu G. Raj and Dr. Kumar Vijay Mishra**
 - Participants: All members of Radar SA
 - ★ **Autofocusing and Calibration sub-group**
 - **Lead: Ozan Doğan**
 - Participants: Ozan Doğan, Peter Vouras, Stefano Tebaldini, Michael Inggs, Jeff Arndt, Armin Doerry, Sudantha Perera, Raghu G. Raj, Kumar Vijay Mishra
 - ★ **Multichannel SAR sub-group**
 - **Lead: Chris Barnes**
 - Participants: Robert Jansen, Ralph Fiedler, James Gilb, Ozan Doğan, Peter Vouras, Stefano Tebaldini, Chris Barnes, Armin Doerry, Raghu G. Raj, Kumar Vijay Mishra
 - ★ **Multistatic SAR sub-group: Distributed MIMO radars**
 - **Lead: Michael Inggs and Chad Knight**
 - Participants: Manikandan Sabarimalai, James Gilb, Ozan Doğan, Peter Vouras, Stefano Tebaldini, Michael Inggs, Armin Doerry, Raghu G. Raj, Kumar Vijay Mishra
 - ★ **Maritime SAR sub-group**
 - **Lead: Ralph Fiedler**
 - Participants: Robert Jansen, James Gilb, Ozan Doğan, Peter Vouras, Michael Inggs, Armin Doerry, Raghu G. Raj, Kumar Vijay Mishra
 - ★ **SAR image quality and image interpretation sub-group**
 - **Lead: TBD?**
 - Participants: Ralph Fiedler, Robert Jansen, Patrick Beren, Stephen Palm, Manikandan, Ozan Doğan, Peter Vouras, Bradley Evans, Stefano Tebaldini, Dennis Tweten, Michael Inggs, Corina Naforntita, Jeff Arndt, Faruk Uysal, Armin Doerry, Wade Schwartzkopf, Raghu G. Raj, Kumar Vijay Mishra
 - ★ **Interferometric and 3D Imaging SAR sub-group**
 - **Lead: Raghu G. Raj and Kumar Vijay Mishra**
 - Participants: Chad Knight, Bradley Evans, Stefano Tebaldini, Raghu G. Raj, K. Vijay Mishra, Peter Vouras
 - ★ **Polarimetry Sub-group**
 - **Lead: Yanting Wang**
 - Participants: Yanting Wang, Stefano Tebaldini, Shobha Sundar Ram, Raghu G. Raj, Kumar Vijay Mishra, Peter Vouras
 - ★ **Exploitation Sub-group**
 - **Lead: Shobha Sundar Ram and Bradley Evans**
 - Participants: Shobha Sundar Ram, Bradley Evans, Ralph Fiedler, Raghu G. Raj, Kumar Vijay Mishra
 - ★ **Industry Focus#1: Automotive SAR sub-group**
 - **Lead: Stefano Tebaldini**
 - Participants: André Bourdoux, Peter Vouras, Stefano Tebaldini, Shobha Sundar Ram, Corina Naforntita, Faruk Uysal, Chris Barnes, Raghu G. Raj, Kumar Vijay Mishra
 - ★ **Industry Focus#2: Space-based SAR sub-group**
 - **Lead: Daniel Kamaoun**
 - Participants: Chad Knight, Daniel Kamaoun, Ozan Doğan, Peter Vouras, Bradley Evans, Stefano Tebaldini, Jeff Arndt, Raghu G. Raj, Kumar Vijay Mishra
- ◆ Participants are suggested to choose at least 2 sub-groups (basic SAR subgroup included) to contribute

IEEE SPS SASC Radar PAR Study Group (SPS/SASC/RADARSG)

Meeting Minutes

26 January 2023 1:00-3:00pm ET (UTC-5) via Teleconference

Recorded by Aly Artusio-Giimpse

1. Called to Order at 1:06 p.m. ET
2. Introductions and [Employer/Affiliation Declarations](#) made
3. Motion #1: Approval of [Agenda](#)
 - a. Mover: Bradley Evans, UNM
 - b. Seconder: Brian Sequeira, JHUAPL
 - c. Discussion: none
 - d. Results: Unanimously approved
4. Motion #2: Approval of [Previous Meeting Minutes](#)
 - a. Mover: Bradley Evans, UNM
 - b. Seconder: Ralph Fiedler, NRL
 - c. Discussion: none
 - d. Results: Unanimously approved
5. Presentations or Discussions
 - a. [Introduction of Sub-groups](#) (Dr. Raghu G. Raj)
 - b. [Fundamental SAR Processing Sub-group](#) (Dr. K. Vijay Mishra and Dr. Raghu G. Raj)
 - c. [SAR Autofocusing and Calibration Sub-group](#) (Dr. Ozan Dogan)
 - d. [Maritime SAR Sub-group](#) (Dr. Ralph Fiedler)
 - e. [Multistatic \(Distributed MIMO\) SAR Sub-group](#) (Dr. Michael Inggs)
 - f. [Polarimetry Sub-group](#) (Dr. Yanting Wang)
 - g. Motion #3: Extend meeting by 15 minutes
 1. Mover: Bradley Evans, UNM
 2. Seconder: Peter Vouras, US DOD
 3. Discussion: none
 4. Results: Unanimously approved
 - h. [SAR Exploitation Sub-group](#) (Bradley Evans)
 - i. (Postponed to next meeting) [Automotive SAR Sub-group](#) (Dr. Stefano Tebaldini)
 - j. [Interferometric & 3D Imaging SAR Sub-group](#) (Dr. Raghu G. Raj and Dr. K. Vijay Mishra)
 - k. Motion #4: Extend meeting by another 15 minutes (adjourn at 3:30 p.m. ET)
 1. Mover: Bradley Evans, UNM
 2. Seconder: Peter Vouras, US DOD
 3. Discussion: none
 4. Results: Unanimously approved
 1. Velocity SAR, Velocity-Induced SAR, and ScanSAR will be topics included in the Fundamental SAR Processing sub-group
6. Old Business
 - a. (Postponed to next meeting) Assignment of Leads for "Space-based SAR" and "SAR IQ and image interpretation" sub-groups
7. New Business
 - a. [ICASSP 2023 Workshop on Synthetic Apertures: Call for Papers](#)
8. Future Meetings
 - a. Will propose next meeting date via email.
9. Adjourned at 3:20 p.m. ET