IEEE Aerospace Electronic Systems
VP Technical Operations

Michael Braasch

2022 AESS Fall Board of Governors Meeting

21-22 October 2022

Edinburgh, Scotland, UK

IEEE

Technical Operations Committee

- Michael Braasch
- Dale Blair
- Steve Butler
- Roberto Sabatini
- George Schmidt

Main Activities

- Technical Operations is responsible for oversight of the Technical Panels for the AESS Board of Governors.
  - Currently we have six panels
    - Avionics Systems
    - Cyber Security
    - Glue Technologies for Space Systems
    - Gyro and Accelerometer (GAP)
    - Navigation Systems
    - Radar Systems

- VP Tech Ops met with Awards Chair (Apr 2022) to discuss technical panel participation in AESS awards nominations
- Tech Ops committee met with the Chairs of the Technical Panels on 01Jun2022
- VP Tech Ops reached out to Panel chairs in September 2022 requesting nominations for AESS awards
- Joe Dauncey (V&P chair) has noted low engagement on the part of some of the panels; requests the Supertopic be championed by AESS leadership

Motion(s)

- None
- V&P committee may need funds depending upon specific initiatives
- Regional workshops may need seed funds

Reports from the Panels

IEEE Aerospace Electronic Systems
Avionics Systems Panel Report

Roberto Sabatini
Chair, Avionics Systems Panel

2022 AESS Fall Board of Governors Meeting
21-22 October 2022
Edinburgh, Scotland, UK

About the Avionics Systems Panel

The Avionics Systems Panel (ASP) is composed of IEEE Associate or higher level members who are representatives of industry, government laboratories, educational institutions and professional societies, and who are active in the domain of Avionics. Its main objectives are:

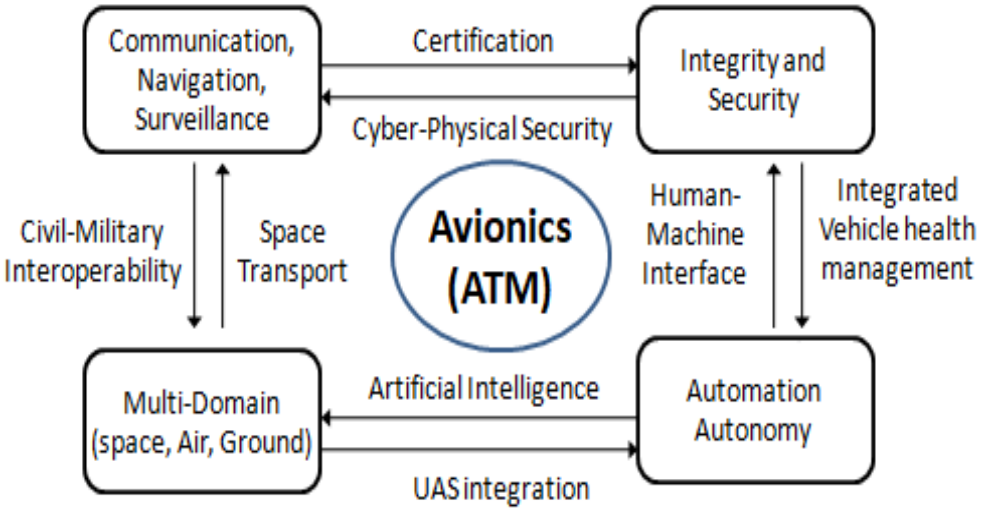
- Promote and support collaborative research initiatives in the domain of Avionics
- Develop and disseminate high-quality IEEE publications in the domain of Avionics
- Promote and support educational activities in the domain of Avionics
- Sustain and oversee the programs of the IEEE/AIAA Digital Avionics Systems Conference (DASC) and the Integrated CNS Conference; and contribute to other conferences and dissemination initiatives
- Manage the nomination and selection of candidates for IEEE Awards in the domain of Avionics
- Encourage submission of nominations for IEEE Fellows and Senior Members in the domain of Avionics
- Recommend and support new IEEE avionics standards or revisions of existing standards

2022 Activities

- The ASP held monthly meetings (with participants from the US, EU, UK and Asia) addressing the following topics:
  - **Research and Innovation (R&I).** Participation to NASA UTM and AAM activities; connections/collaborations with NextGen in the US and SESAR in the EU; other national and international Avionics/ATM/UAS programs; Collaboration with JARUS, ICAO and IFATCA (UAS/UTM)
  - **Publications.** Editorial Committees and Reviewer contributions to the Transactions on Aerospace and Electronic Systems and AESS Systems Magazine; Special Issues on Avionics, UTM/UAM and Space Systems; joint journal publication initiatives (e.g., Avionics Systems for Trusted Autonomy, Multi-Domain Traffic Management, Avionics Education)
  - **Conferences.** IEEE/AIAA Digital Avionics Systems Conference (DASC); IEEE/AIAA Integrated Communications, Navigation and Surveillance Systems (ICNS) Conference; IEEE/AIAA/PHM Aerospace Conference; other conferences
  - **Education Activities.** AESS Distinguished Lecturers/VDL Program updates; Webinars, Tutorials and Short Course initiatives
  - **Avionics Standards.** UAS/autonomy, AI, V2X Communications, Cyber Security, etc.
- A decision was made to held joint meetings with the Cyber Security Panel on a bi-monthly basis. The first two meetings have taken place in the reporting period.

Research and Innovation

1) **Communication, Navigation and Surveillance for Air Traffic Management (CNS/ATM):**
   - Evolution of the certification framework for integrated CNS +Avionics
   - Civil and military airspace integration and CNS+A systems interoperability;
2) **Avionics Systems Integration and Security:**
   - Fault-tolerant avionics design and Integrated Vehicle Health Management (IVHM) systems;
   - Cyber-physical security of avionics and CNS/ATM systems;
3) **Multi-Domain Avionics/Traffic Management (MDA/MDTM):**
   - UAS integration in all classes of airspace and UTM;
   - Avionics for space transport, Space Traffic Management (STM) and intelligent satellite systems;
4) **Automation and Autonomy:**
   - Development of Avionics Human-Machine Interfaces and Interactions (HMI^2); and
   - Artificial Intelligence (AI)/Machine Learning (ML) in avionics systems design and operations (including the challenges of certification and the role of explainable AI).



Research and Innovation

- The ASP is collaborating with ICAO, IFATCA, EASA, EUROCAE and SESAR initiatives to promote avionics research/innovation, education and the evolution of certification standards for UAS Traffic Management and Advanced Air Mobility
- ASP members contributed to weekly meetings of the JARUS (Joint Authorities for Rulemaking on Unmanned Systems) Working Group 7 – Automation Concept of Operations, with contributions focusing on:
  - Flight Rules for Autonomous Operations
  - ATM and UTM Automation
  - Infrastructure, Aerodromes and Ground Equipment
  - Considerations for Technology Maturity
  - Automation and Trusted Autonomy Use Cases
  - Multiple Simultaneous Operations

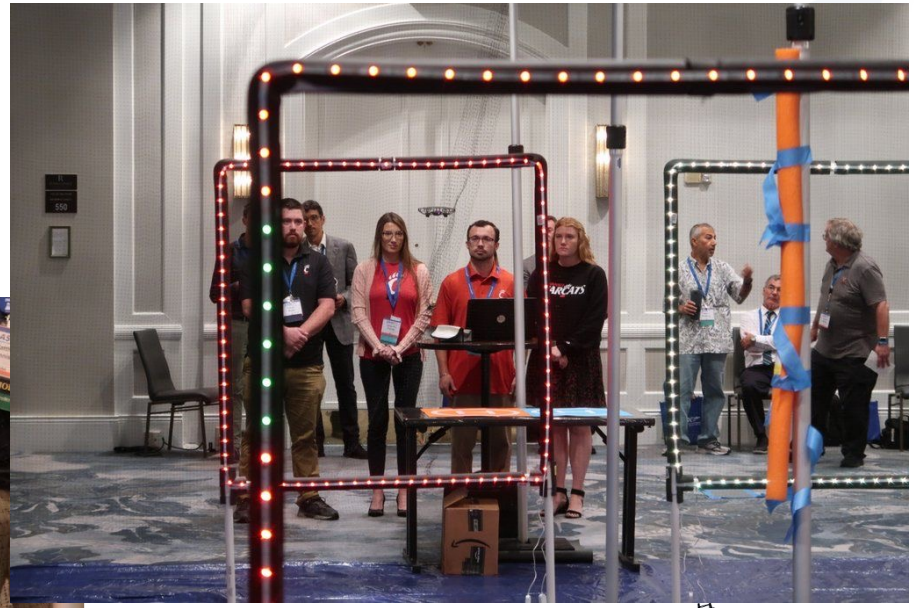
Research and Innovation

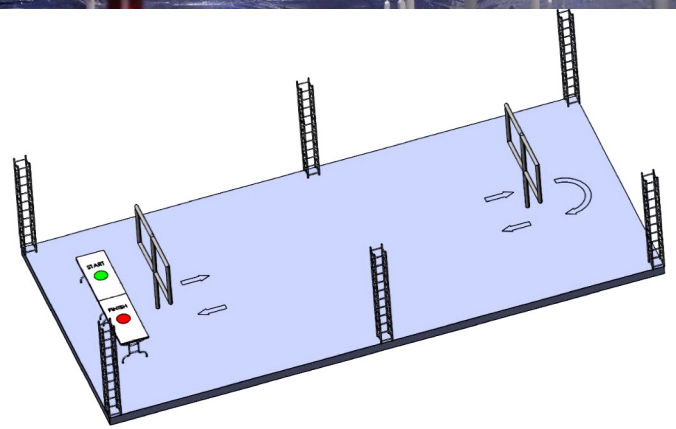
- The ASP developed a collaboration with the European Union (EU) Global Action on Space, an initiative of the European Commission that aims to promote international partnerships with the EU Space Program.
- Following the fruitful discussions held in April 2022, a workshop was held in September 2022 addressing the following topics:
  - Galileo and EGNOS (EGNSS) services and associated space business opportunities
  - Copernicus services and associated space business opportunities
  - Point-to-point commercial space transport (i.e., vehicle, spaceport and infrastructure technologies)
  - Multi-domain traffic management (space domain awareness and multi-domain traffic management)
  - Distributed space systems and AI for space (intelligent satellite systems and control segment evolutions)

Conferences

- The ASP actively contributed to the organization, management and execution of the 41st IEEE/AIAA Digital Avionics Systems Conference, held in Portsmouth, VA, in Sept 2022
- ASP members assisted with local arrangements/planning, gave various tutorials (Avionics, Spaceflight and Autonomous Systems) and served in various Track Chair or Session Chair roles
- DASC 2021 hosted a very successful UAS Students' Research Competition organized by the ASP in collaboration with NASA. Various Universities and STEM High Schools have participated
- The ASP developed and delivered a free-of-charge tutorial at DASC 2022, focusing on the panel ongoing R&I activities: ***"Application and Certification Concerns for Artificial Intelligence and Machine Learning Techniques in Safety Critical Avionics Systems."***
- ASP members also had a leadership role in the organization of IEEE/AIAA ICNS 2022 and led the Avionics and Sensor Fusion Sessions of the IEEE/AIAA/PHM AeroConf 2022

DASC 2022 – Students UAS Competition





DASC 2022 – ASP Tutorial

Application and Certification Concerns for Artificial Intelligence and Machine Learning Techniques in Safety Critical Avionics Systems

Publication Activities

- The ASP contributed significantly to the AESS editorial activities in the area of Avionics Systems. These activities include:
  - Series Editor, IEEE-WILEY Series – Progress in Aeronautics and Astronautics Systems, Roberto Sabatini
  - Senior Editor (Avionics), IEEE Transactions on Aerospace and Electronic Systems, Giancarmine Fasano
  - Associate Editor, IEEE Transactions on Aerospace and Electronic Systems, Roberto Sabatini
  - Associate Editor, IEEE Aerospace and Electronic Systems Magazine, Erik Blasch
  - Associate Editor, IEEE Aerospace and Electronic Systems Magazine, Roberto Sabatini
  - ASP members are also reviewers for TAES and the AESS magazine
- The ASP is currently leading two AESS “Systems” Special Issues:
  - UAS Traffic Management and Urban Air Mobility, focusing on low-level ATM and U-Space
  - Space Domain Systems, focusing on Space Domain Awareness

Education Activities

- Various ASP members serve as Distinguished Lecturers (DL) and actively contributed to the Virtual DL (VDL) Webinar Series:
  - Roberto Sabatini – Cyber-Physical and Autonomous Systems
  - Erik Blasch – Mulisensor Systems and Data Fusion
  - Kathleen Kramer – GNSS and Sensor Fusion
- Following the successful engagement within ICAO, NASA/AAM and JARUS, and by recommendation of the FAA's NextGen Chief Scientist, the ASP will deliver a lecture entitled: ***"Digital Avionics and Space Systems for Trusted Autonomy"*** as part of the FAA TechTalk Speaker Series in November 2022.

Avionics Standards

- ASP members are contributing to the advancement of ICAO, RTCA, EUROCAE/SAE and AEEC avionics standards.

• Established by the 1944 treaty at Chicago Convention • Operates as a United nations constituency • Caters to prime objectives of global interoperability, uniformity & equitable service of aircraft over all UN countries • Defines system functional and interoperability requirements	• Specifies services, system & avionics concept of operations, safety and performance requirements • Specifies methods for requirements verification • FAA uses RTCA standards for US airworthiness certification • EASA/Europe uses EUROCAE standards for the same purpose • Other countries mostly follows either RTCA or EUROCAE standards	• Established by aircraft operators to specify avionics form, fit and functions supporting airline operations • Primary goal is for avionics vendors and aircraft manufacturer to have uniform equipment standards for line replacement

Avionics Standards

Recent ASP contributions have focussed on AI/ML certification (SAE G-34/EUROCAE WG-114), which was also the topic of DASC 2022 ASP tutorial:

- **SAE G-34/EUROCAE WG-114, Artificial intelligence in Aviation** - Reviews current aerospace software, hardware, and system development standards used in the certification/approval process of safety-critical airborne and ground-based systems, and assesses whether these standards are compatible with a typical Artificial Intelligence (AI) and Machine Learning (ML) development approach.
- Published Standard: AIR6988 / ER-022 Artificial Intelligence in Aeronautical Systems: Statement of Concerns (2021).
- Works In Progress:
  - AS6983 / ED-xxx Process Standard for Development and Certification / Approval of Aeronautical Safety-Related Products Implementing AI;
  - AIR6987 / ER-xxx Artificial Intelligence in Aeronautical Systems: Taxonomy;
  - AIR6994 / ER-xxx Artificial Intelligence in Aeronautical Systems: Use Cases Considerations.

Avionics Standards

- A core premise of AI (ML) is the ability of learning, where the system learns and adapts its behavior to achieve the optimum, desired outcome
- The AI system responses for a given set of excitations in a given environment are not necessarily the same (i.e., deterministic, unique and predictive)
  - In AI System response, there is always a delta error from the target response
  - An AI System learns from every encounter to reduce & optimize the error delta
- For aviation systems, the regulator expectation is that for every scenario (i.e., a set of excitations in a given environment), the expected system response MUST be the same
  - The safety-of-life risks and liabilities associated with an uncertain outcome is too large for aviation
- An approach for AI standards and certification could be to provide an acceptable error tolerance for each expected system response
  - Need to have high confidence (10^{-6} to 10^{-9}) or lower probability that response will be outside the tolerance)
  - Standards MUST also define a fail-safe option, to mitigate unexpected AI system behavior

Avionics Standards

- ASP members are also contributing to the **Joint Authorities for Rulemaking in Unmanned Systems (JARUS) – Automation WG**
  - The Automation WG has been tasked with defining a framework for assessing the different notions of autonomy and developing a framework for evaluating automation in proposed UAS operations.
  - The framework includes definitions, assumptions, levels of automation, methods of assessing and describing operations, and considerations for broad incorporation in aviation standards.
  - The roles of the manufacturer, operator, pilot, service providers, and regulators are also assessed for each level of automation.
- The ASP contributions have been in the area of **Trusted Autonomy**. As autonomy increases, the human needs to build trust in the machine and the machine needs to build trust in the human. The deployment of trusted autonomous systems results from the optimized balance of human and machine tasks (i.e., human-autonomy teaming) with a focus on integrity metrics defined to support safe and efficient airspace operations.

IEEE Aerospace Electronic Systems
Cyber Security Technical Panel

Kathleen Kramer

Chair, Cyber Security

2022 AESS Fall Board of Governors Meeting

About the Cyber Security Technical Operations Panel

The AESS Cyber Security panel supports cyber security technical activities, including conference activities and events, publications, and educational activities that promote developments, awareness and understanding of cyber security applications and issues in complex systems for space, air, ocean, or ground environments, and particularly those that apply to aviation and aerospace. These technical areas include:

- Cyber security for aircraft and avionics
- Secure navigation and GPS threats
- Cyber security for aviation and other transportation systems
- Information security for complex systems
- Identification and modeling of cyber-related vulnerabilities

2022 Cyber Panel Activities

Panel Meetings

- Established regular panel meetings, using Avionics Systems Panel's monthly timeslot, alternative months, beginning in April 2022, and jointly worked with Avionics Panel on major tutorial

Vision and Perspectives

Panelist Joe Dauncey chaired the AESS Tech Ops VP Committee on Vision and Perspectives

Distinguished Lectures

- DLs with related topics, and several lectures on new tutorial topic, including for IEEE Day in Turkey.

Conference Activities

- IEEE Education Week – Future Directions on LEO SatS (Security Issues)
- 2022 Digital Avionics Systems Conference (September 2022 - Portsmouth)
  - Track on Cyber Security and Systems (Kramer is chair of track) with Fasano and Sabatini other chairs or contributing
  - ***Pre-Conference Tutorial offered jointly Avionics Systems Panel was very successful and appreciated by greater DASC/community***
- 2022 IEEE International Carnahan Conference on Security Technology (September 2022 - Třebíč, Czech Republic)
  - Tech Ops Panel Meeting at conference

IEEE Aerospace Electronic Systems
Glue Technologies for Space Systems Technical Panel

Claudio Sacchi

Chair, Glue Tech

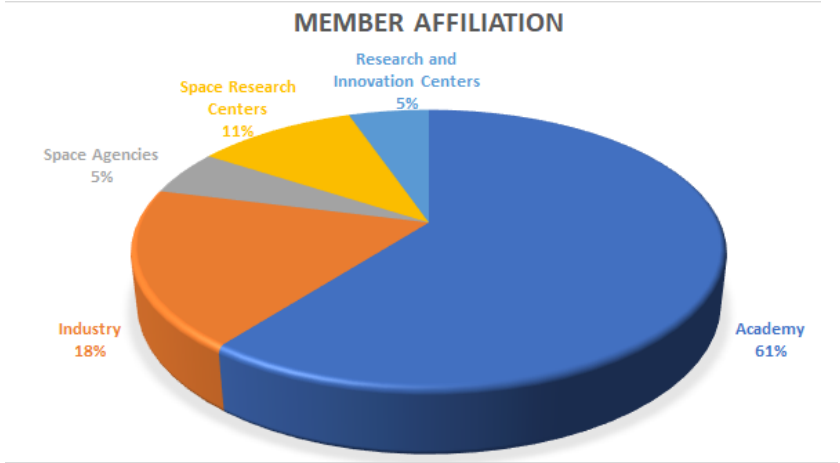
2022 AESS Fall Board of Governors Meeting

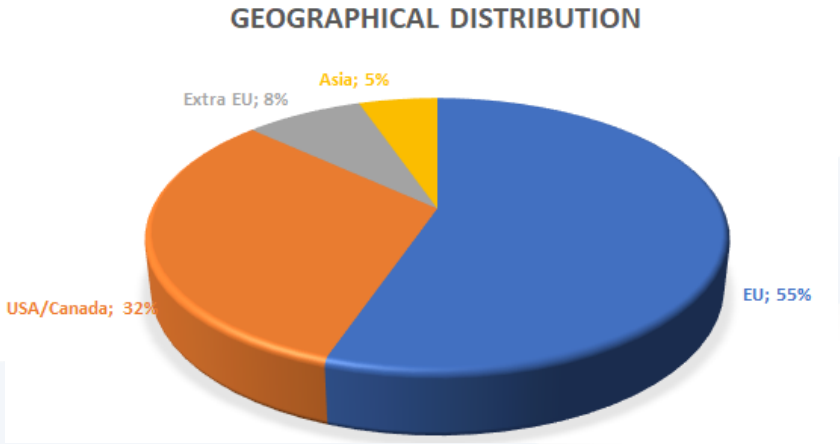
Goals of the GlueTech Panel

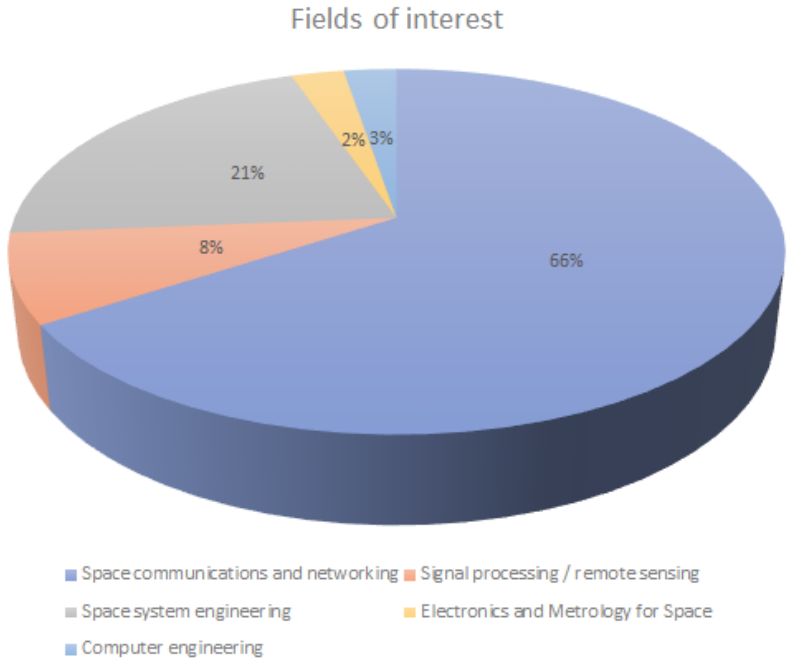
- Promote the coordination of the technical activities related to the technologies that constitute the necessary common platform for innovative Space Systems;
- Promote and support publications concerning the panel topics;
- Organize panels and special sessions in featured-topic conferences;
- Promote educational activities;
- Encourage the submission of nominations for IEEE Fellows and Senior Members in the fields of interest of the panel;
- Manage the nomination and selection of candidates for IEEE Awards in the fields of interest of the panel;
- Creation of communities and forums cooperating in the development of panel technical activities.

Glue Tech Membership

Member affiliation, geographical distribution and research interests







Members number: **38**

Accomplishments & Activities – Editorial Initiatives

- The **special section** of IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS entitled: *"Information and Communication Technologies (ICT) for a New Space Vision"* (guest editors: Claudio Sacchi, Fabrizio Granelli, Mario Marchese, Kar-Ming Cheung and Michael Noble) has been published in vol. 58, n. 5, October 2022 issue.

11 full papers published, with 5 guest editors, 7 authors and an unprecised number of peer reviewers affiliated to the «Glue Tech» panel involved in the Section!

IEEE TRANSACTIONS ON AEROSPACE AND ELECTRONIC SYSTEMS

OCTOBER 2022 VOLUME 58 NUMBER 5 IEARAX (ISSN 0018-9251)

GUEST EDITORIAL

SPECIAL SECTION ON INFORMATION AND COMMUNIATION TECHNOLOGIES (ICT) FOR A NEW SPACE VISION

Accomplishments & Activities – Editorial Initiatives

- The edited book: **“A Roadmap to Future Space Connectivity”** is on the way!

- The Book editors are Claudio Sacchi (panel chair), Fabrizio Granelli (panel founder member), Riccardo Bassoli (panel secretary), Frank H.P. Fitzek, Marina Ruggieri (panel founder member).

- **13 edited contributions** are expected to be published in the book. An (internal) deadline for collecting the contributions have been fixed on October 31, 2022. The expected date of delivery of the edited book material to Springer is December 23, 2022.

Accomplishments & Activities – Conferences

- **The Special Session 4.03 of IEEE Aerospace Conference 2023**, dealing with the «Glue Tech» topics and chaired by the Panel Chair Claudio Sacchi received 7 abstract submissions (deadline for full paper submission: October 14, 2022).

- Organization of a special session at the **2022 IEEE 9th International Workshop on Metrology for AeroSpace (MetroAeroSpace)**, Pisa, Italy, 27-29 June 2022.
  - Session title: *«Interplanetary Exploration: Mars and Moon»*
  - Session organizers: Claudio Sacchi and Cosimo Stallo.
  - 4 papers presented in the session.

- Organization of a tutorial at the **2022 IEEE 9th International Workshop on Metrology for AeroSpace (MetroAeroSpace)**, Pisa, Italy, 27-29 June 2022.
  - Tutorial title: *Technologies for «New Space» Systems*
  - Tutorial presenter: Claudio Sacchi

Accomplishments & Activities – Didactic Activities

- **PhD Summer Schools**
  - TWO PhD Summer Schools have been organized by panel members and dealing with panel topics in the Summer of 2022:

Dove e quando

Imperia Campus of Genoa University

from 25th July to 29th July 2022

Imperia (Italy), 25-29 July 2022, organizer: Mario Marchese (modality of fruition: mixed)

1-2, 5-6 September 2022, organizers: Claudio Sacchi, Mario Marchese, Fabrizio Granelli, Tommaso Rossi (modality of fruition: online)

Accomplishments & Activities – Didactic Activities

- **Seminars**
  - The panel chair Claudio Sacchi has been invited to hold a seminar focused on the panel topics for the graduate students of the ECE Department of the University of New Mexico of Albuquerque (NM):

ELECTRICAL & COMPUTER ENGINEERING

ECE 590 Graduate Seminar

All are Welcome!

Electrical & Computer Engineering Departmental Seminar:

Technologies for a "New Space"

Claudio Sacchi

University of Trento, DISI, Trento (Italy)

Friday, May 6, 2022, at 3 PM

Woodward Hall, Room 147

Guests: Contact Prof. Osiński <osinski@chtm.unm.edu> for a Zoom link

ABSTRACT

The old paradigms of satellite communications are becoming more and more obsolete. In the recent years, the emerging concept of "New Space" is changing the vision of Space as an ecosystem, where connectivity is an enabling "glue" technology servicing a lot of new applications. What shall we see in the "New Space"? We shall see, for sure, more software rather than hardware, more "network intelligence" rather than pure repetition of signals, tighter integration among terrestrial and Space segments (navigation, broadcasting, communications, IoT, etc.). Space communications will exploit advanced concepts of "quantum engineering". However, the "New Space" will be also sustainable. In this talk, an overview of the most innovative technologies standing at the basis of the "New Space" vision will be presented.

Technologies for a «New Space»

CLAUDIO SACCHI, UNIVERSITY OF TRENTO, DEPT. OF INFORMATION ENGINEERING AND COMPUTER SCIENCE (DISI), TRENTO (ITALY)

UNM Seminar Series, University of New Mexico, Albuquerque (NM), 6 May 2022

Accomplishments & Activities – Planned Activities

- **Annual panel paper to be submitted to IEEE AES Magazine**
  - Foreseen in February 2023.

- **New tutorials**
  - A tutorial has been proposed by Claudio Sacchi, Ernestina Cianca and Riccardo Bassoli at the IEEE ICC 2023 conference (Rome, Italy, 28 May-3 June 2023). Proposal title: «Toward a New Vision of Space Communications: Design Philosophy and Technologies" (under review).

- **Next panel meetings:**
  - Autumn 2022 panel meeting: November 18, 2022
  - Spring 2023 panel meeting: March 2023 during IEEE Aerospace Conference (date TBD).

IEEE Aerospace Electronic Systems
Gyro and Accelerometer Panel (GAP) Technical Panel

Randall Currey

Chair, GAP

2022 AESS Fall Board of Governors Meeting

Meetings

- The GAP held TBD meetings since March 2022

Dates	Location	Host	Attendance
March 7/8, 2022	Virtual	Webex	10
May 2/3, 2022	Virtual	Webex	11
July 11/12, 2022	Virtual	Webex	13
Sept 12/13, 2022	Virtual	Webex	

- Future GAP meetings

Dates	Location	Host
Nov 14/15, 2022	Albuquerque, NM	Sandia National Labs
Jan 23/24, 2023	Virtual	Webex

Accomplishments & Activities

- Revision of 1431, “Standard for Specifying and Testing Coriolis Vibratory Gyros”
  - The GAP continues to revise this standard
- Revision of 1559, “Standard for Inertial Systems Terminology”
  - First proof from editors has been reviewed
  - Comments provided to editors.
- Publication of 1780, “Standard for Specifying Inertial Measurement Units (IMUs)”
  - **Has been published**
- INS draft outline
  - Continued organizing results of brainstorming into an outline
- AESS articles
  - GAP 60th anniversary article
  - IEEE Std 1780 publication article

IEEE Aerospace Electronic Systems
Navigation Systems Technical Panel

Michael Braasch

Chair, NSP

2022 AESS Fall Board of Governors Meeting

Navigation Systems Panel

- Primary panel responsibility is support of the PLANS conference
- U.S. Institute of Navigation (financial sponsor of PLANS) moved the next offering from 2022 to 2023 due to issues related to the pandemic
- The NSP article in SYSTEMS, “State Estimation Methods in Navigation: Overview and Application” won the 2020 Harry Rowe Mimno Award
- Special Section in TAES on Machine Learning Methods for Positioning and Navigation; several manuscripts in the review cycle
- NSP organized a special session on navigation at this year’s FUSION conference
- Since Australia did not work out for the first offering of the IEEE Navigation Conference, alternatives are being considered

IEEE Aerospace Electronic Systems
Radar Systems Technical Panel

Nathan Goodman

Chair, RSP

2022 AESS Fall Board of Governors Meeting

IEEE

Radar Systems Panel

- Sustain and oversee the program of IEEE Radar Conference series
- Promote and support publications in the field of Radar
- Promote educational activities in the field of Radar
- Provide periodic revision of IEEE Standards pertaining to the domain of Radar
- Encourage the submission of nominations for IEEE Fellows and Senior Members in the field of Radar
- Manage the nomination and selection of candidates for IEEE Awards in the field of Radar

Accomplishments and Activities

- Spectrum-Related Activities
  - Hosting a joint COMSOC/AESS Special Session on Radar & Communications spectrum sharing at 2023 IEEE Radar Conference
  - Planning with RSP Publications Committee for a T-AES special section on spectrum sharing (may be delayed for a bit due to planned T-RS special section on similar topic)
  - RSP member V.K. Mishra co-editing a Special section on “Learning for Joint Radar-Comms” in J-STSP
  - Additional spectrum-related

- Annual Member Renewals & New Member Selection occurring in October

- The RSP regrets the passing of RSP member and long-time radar community friend & colleague: Dr. Graeme Smith
  - 2023 IEEE Radar Conference is considering ways to commemorate Graeme – possibly naming the 2023 student paper award first prize in Graeme’s honor

Accomplishments and Activities

- Publications:
  - New journal: Transactions on Radar Systems (T-RS) approved and expected to launch this month
    - T-AES is anticipated to receive >300 radar-related submissions this calendar year, so T-RS is needed and welcomed
    - Two special sections planned for first year of T-RS
  - But T-AES will continue to promote radar-related publications as well
    - T-AES special section on “Deep Learning for Radar Applications” had 18 submissions

- Standards
  - RSP Standards committee finalizing updates to IEEE Std. 686 on Radar Definitions
    - Finalized updates should be completed within a few months
  - RSP members continue to participate on the Synthetic Aperture Standards Committee, which is constituted under the Signal Processing Society

Accomplishments and Activities

- Future Conference Updates
  - 2023 IEEE Radar Conference: May 1-5, 2023 in San Antonio
    - General Chairs: Anthony Martone, Bill Melvin, and Kelly Sherbondy
  - RADAR 2023: Nov. 6-10, 2023 in Sydney, AUS
    - General Chairs: Luke Rosenberg and Joe Fabrizio
  - **2024 IEEE Radar Conference: May 6-10, 2024 in Denver
    - General Chairs: Justin Metcalf & Braham Himed
  - RADAR 2024: Rennes, France
    - General Chair: Myriam Nouvel
  - **2025 IEEE International Radar Conference: May 3-9, 2025 in Atlanta, GA (rescheduled with hotel in agreement to hold 2021 IEEE Radar Conference as virtual)
    - General Chairs: Bill Melvin and Nathan Goodman
    - Note: because this conference was a change from the 2021 IEEE Radar Conference (RadarConf) to the 2025 International Conference (RADAR), we have recently renamed and resigned the MOU
  - **2025 IEEE Radar Conference: Tentatively Sept. 13-18, 2025 in Krakow, POL
    - General Chairs: Mateusz Malanowski & Piotr Samczynski

**Recent selection or update

IEEE Aerospace Electronic Systems
Ad Hoc Visions and Perspectives Commitee

Joe Dauncey

Chair, V&P

2022 AESS Fall Board of Governors Meeting

Autonomy for Sustainability

IEEE AESS Supertopic Definition
February 2022

Development Activities

This deck can be provided to colleagues to spread the word

Options:

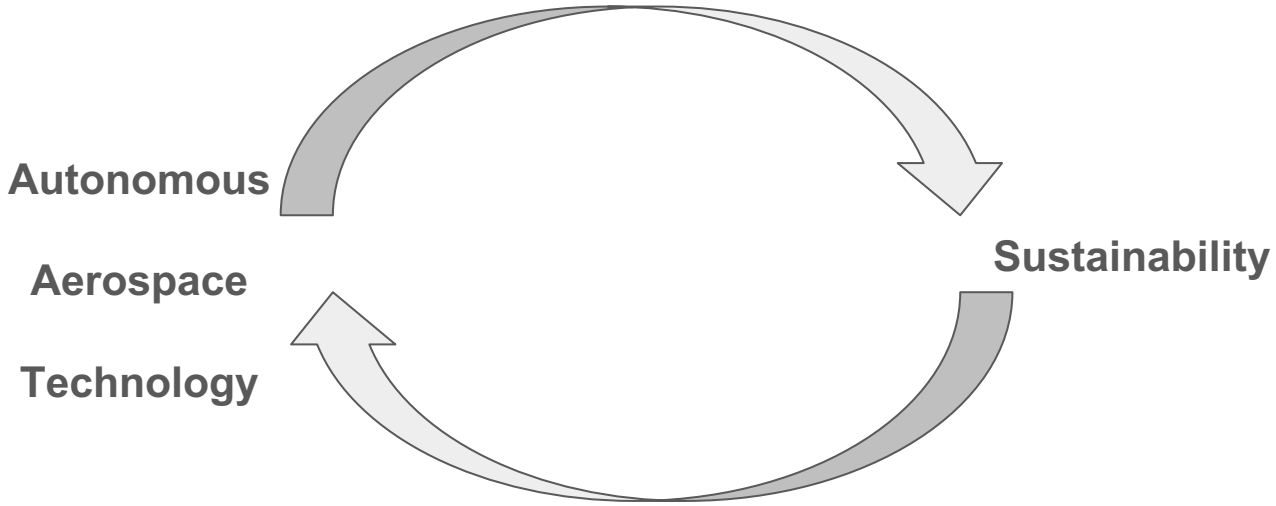
- Graphic enhancement of deck
- Animated version with voiceover
- Word Cloud
- Minecraft world (joking!)

Autonomy for Sustainability

Reflect current technological evolution while also giving a perspective aimed at global benefit (for humanity and Earth):

- Autonomy : Enables humanity to maximise their potential
- Sustainability : Ensures that what is done is in the interests of global society

Where autonomy is implemented by technology, sustainability gives it a moral/ethical context



Autonomy for Sustainability

Autonomous systems are becoming mainstream in many walks of life:

- Unmanned Aerial Vehicles, Self-driving cars, Robotic surgery, Electronic Home-assistants, Manufacturing and warehouse systems, Space Systems and Surveillance
- Humanity faces the challenge of increased interaction with autonomous systems in everyday life
- AESS covers many of the areas where these impact will be felt
- Autonomous systems also has the potential to be used for very nefarious efforts
- establishes a role for the AESS in steering autonomous technology for the betterment of society and the planet
- Autonomy enables empowerment of the human in their society/context
- Aligns with IEEE Vision - Technology for Humanity

Autonomy for **Sustainability**

Sustainability ensures that all the great things we have created as human beings remain great for future generations:

- The immediate crisis of climate change is a threat to sustainability
- Further, technology itself poses some threat if used for the wrong purposes
- Sustainability is key to engagement with younger generations
  - Keen to apply their ethical/moral beliefs to the problems that they are trying to address
  - Averse to application of their professional/technical disciplines in isolation to the perceived challenges in global society
- Sustainability challenges are becoming more clearly understood, and it is essential for all innovation to make consideration
- Autonomous systems are expected to affect global productivity, equality and inclusion, environmental outcomes, both in the short and long term
- Demonstrates the AESS role in exploring the broader societal impacts of technology

Supertopic Benefits

A topic on which all Panels can converge

Not only a technical topic:

- Tangible societal benefits
- Significant regulatory aspects that are needed to ensure trusted autonomy
- Regulatory and standards gaps
- Ethical aspects on the boundaries of autonomy and the role of humanity

Demonstrates AESS leadership by mapping societal problems to technological developments

Shows that technology/engineering does not exist in a silo

Challenges members on the application of their disciplines in their day-to-day working lives

Enables members (especially younger/emerging members?) to apply their disciplines in ways that support their beliefs (where those beliefs align to improved sustainability)

Ensures that panels and research agendas are scoped to consider the implications that are needed to make the work relevant to society

Enables opportunities for partnerships

Fundamentally, for the AESS, it keeps what has always been good and demonstrates why it is relevant today