

# 4th IAA CONFERENCE ON SPACE SITUATIONAL AWARENESS

# 2024

May 8-10, 2024

Daytona Beach, FL, USA

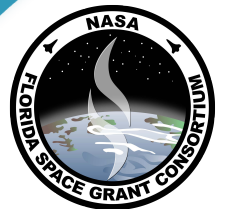
Embry Riddle Aeronautical  
University



sponsored by



arcsec



**EMBRY-RIDDLE**  
Aeronautical University

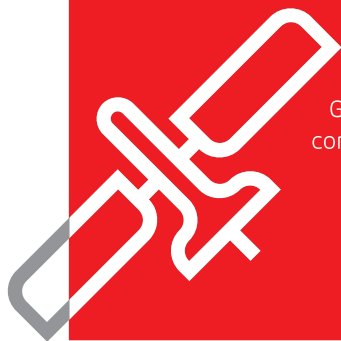


# Safety for the Space of Tomorrow

As a global leading force in Space Surveillance and Tracking (SST), Space Traffic Management (STM), and Space Domain Awareness (SDA), GMV stands at the forefront of space safety and sustainability. With over **100 specialized engineers** across **7 European countries and USA**, GMV offers unparalleled expertise and innovative COTS software solutions (**Ecosstm**) for comprehensive SST data processing. Additionally, GMV counts on a commercial operations centre (**Focusoc**) providing collision avoidance services 10+ satellite operators worldwide. Finally, GMV operates a proprietary network of Passive RF sensors (**Focusear**).

Our extensive track record with USSPACECOM's JCO, EU SST, EUSPA, ESA and several other national space agencies and MoDs underscore our role as a premier provider and integrator of SST ground segment infrastructure.

Elevate your space operations with GMV's unparalleled expertise and technologies. Connect with us at [gmv.com](http://gmv.com) or reach out directly via [sst@gmv.com](mailto:sst@gmv.com).



GMV products and contact information



[www.gmv.com/en-es/products/space/ecosstm](http://www.gmv.com/en-es/products/space/ecosstm)



| <b>Wednesday, May 8, 2024</b> |   |
|-------------------------------|---|
| 8:00am – 5:40pm               | Registration  |
| 8:00am – 9:00am               | Breakfast   |
| 9:00am – 9:30am               | Welcome from Chairs, IAA Delegates, and Embry Riddle Aeronautical University  |
| 9:30am – 10:30am              | <b>Keynote 1: The Imperative for a Multi-National Approach to SSA &amp; Space Sustainability (Roger McNamara, AIAA)</b>                               |
| 10:30am – 11:00am             | Coffee Break  |
| 11:00am – 12:40pm             | Morning Session – Identification, Estimation, and Tracking  |
| 12:40pm – 1:35pm              | Lunch   |
| 1:35pm – 3:40pm               | Afternoon Session I - Debris Removal  |
| 3:40pm – 4:00pm               | Coffee Break  |
| 4:00pm – 5:40pm               | Afternoon Session II – Spacecraft GNC   |
| <b>Thursday, May 9, 2024</b>  |   |
| 8:00am – 4:30pm               | Registration  |
| 8:00am – 9:00am               | Breakfast   |
| 9:00am – 10:00am              | <b>Keynote 2: From Orbit Determination to Characterization: AI/ML Methods in Space Situational Awareness (Roberto Furfaro, University of Arizona)</b> |
| 10:00am – 10:30am             | Coffee Break  |
| 10:30am – 12:35pm             | Morning Session – Policy and Risk Assessment  |
| 12:35pm – 2:00pm              | Lunch   |
| 2:00pm – 4:05pm               | Afternoon Session – Sensing and Forecasting   |
| 4:05pm – 4:30pm               | Coffee and Networking   |
| 4:30pm – 5:30pm               | Lab Tour  |
| 5:30pm – 7:00pm               | Awards Ceremony & Reception   |
| <b>Friday, May 10, 2024</b>   |   |
| 7:30am – 1:00pm               | Registration  |
| 7:30am – 8:30am               | Breakfast   |
| 8:30am – 9:30am               | <b>Keynote 3: Keeping Space Clear &amp; Knowing Where It Isn't (Troy Morris, KMI)</b>   |
| 9:30am – 10:00am              | Coffee Break  |
| 10:00am – 12:55pm             | Session – Identification and Tracking II  |
| 12:55pm – 1:00pm              | Farewell & Closing Ceremony   |

## ICSSA 2024 Extended Presentation Schedule

| Wednesday, May 8, 2024                            |               |  |  |  |
|---|---------------|--|--|--|
| <b>Morning Session</b>                            |               |  |  |  |
| <b>Session Chair – Troy Henderson</b>             |               |  |  |  |
| TOPIC   | TIME          | TITLE  | AUTHORS  | ORGANIZATION                                 |
| <b>Identification, Estimation, and Tracking I</b> | 11:00-11:25   | Improving Satellite Position and Velocity Calculation During Low Thrust Maneuvers Using Multi-Bistatic Radar and Unscented Kalman Filter             | Bhaskar Ahuja*, Luca Gentile, Marco Martorella   | The University of Trento                     |
|   | 11:25-11:50   | Watch out GEO Satellites, Here's a New ML-Method for Manoeuvre Detection and Intent Classification   | Temenuzhka Avramova, Pietro De Marchi, Daniel Oltrogge, Jeff Cornelius, David Vallado, Francesco Caronte, Nadir Casciola | AIKO Space                                   |
|   | 11:50 – 12:15 | Object Characterization and Attitude Determination Using Data Fusion   | K. McNally, A. de Andrés, C. Paulete, M. Torras, D. I. Tirado, A. Gallego, A. M. Antón                                   | GMV  |
|   | 12:15-12:40   | A Convex Optimization-Based Method for Efficient Reconstruction of Continuous Maneuvers  | Xingyu Zhou*, Dong Qiao, Xiangyu Li  | Beijing Institute of Technology              |
| <b>Afternoon Session I</b>                        |               |  |  |  |
| <b>Session Chair – Riccardo Bevilacqua</b>        |               |  |  |  |
| TOPIC   | TIME          | TITLE  | AUTHORS  | ORGANIZATION                                 |
|   | 13:35-14:00   | Starfish: An Orbital Debris Remover  | Katelyn Branaman, Daewon Kim   | Embry Riddle Aeronautical University         |
| <b>Debris Removal</b>                             | 14:00-14:25   | Orbital Debris Remediation via Collection Station  | Bao-Minh Hoang, Adam Kall  | Kall Morris Inc.                             |
|   | 14:25-14:50   | Space Debris Detection and Removal Using a Synchronized Network of Telescopes and ADR Equipment Through a Concerted Trace, Track and Tackle Sequence | Muhammad Akbar Hussain, Muhammad Mehdi Hussain, Muhammad Waqar Haider, Muhammad Ayaz Hussain                             | Southern Cross Outback Observatories Project |
|   | 14:50-15:15   | Active Debris Removal Using a Space Tug and a  | Liqiang Hou, Arun K. Misra, Zilong Zhuang  | McGill University                            |

\* Zoom Presentation

|                                       |               |  |   |                                      |
|---------------------------------------|---------------|--|---|--------------------------------------|
|                                       |               | Tether Considering Collision Probability   |   |                                      |
|                                       | 15:15 – 15:40 | Post Capture Attitude Control for Unknown Debris   | Nicolo Woodward, Riccardo Bevilacqua  | Embry Riddle Aeronautical University |
| <b>Afternoon Session II</b>           |               |  |   |                                      |
| <b>Session Chair – Troy Henderson</b> |               |  |   |                                      |
| <b>Spacecraft GNC</b>                 | 16:00 – 16:25 | A Novel Time-Optimal Algorithm for a Drag-Based Targeted Re-Entry  | Emanuela Gaglio and Riccardo Bevilacqua   | Scuola Superiore Meridionale         |
|                                       | 16:25 – 16:50 | Optimal Spacecraft Collision Avoidance Using Aerodynamic Drag  | Emanuela Gaglio, Constantin Traub, Fabrizio Turco, Jhonathan O. Murcia-Piñeros, Riccardo Bevilacqua and Stefanos Fasoulas | Scuola Superiore Meridionale         |
|                                       | 16:50 – 17:15 | Development and Implementation of a Novel Fault Tolerant Adaptive Controller for Spacecraft Attitude Control | Andres Perez, Hever Moncayo, Sebastian Leon   | Embry Riddle Aeronautical University |
|                                       | 17:15 – 17:40 | Generative Learning Model to Spacecraft Attitude Estimation in Proximity                                     | Gabriela Gavilanez, Hever Moncayo   | Embry Riddle Aeronautical University |
| <b>Thursday, May 9, 2024</b>          |               |  |   |                                      |
| <b>Morning Session</b>                |               |  |   |                                      |
| <b>Session Chair – Tarek Elgohary</b> |               |  |   |                                      |
| <b>TOPIC</b>                          | <b>TIME</b>   | <b>TITLE</b>   | <b>AUTHORS</b>  | <b>ORGANIZATION</b>                  |
| <b>Policy and Risk Assessment</b>     | 10:30-10:55   | Common Sense on Space Traffic Control (STC) Funding  | Stuart Eves   | SJE Space                            |
|                                       | 10:55-11:20   | Public Company Disclosures of Space-Related Risks  | Christopher Geiger, Cwynn Geiger  | Lockheed Martin                      |
|                                       | 11:20-11:45   | Japan's National Security Strategy and the Evolution of SSA/SDA Capabilities                                 | Kota Umeda, Kazuto Suzuki, Koichi Kikuchi, Ikuko Kuriyama   | Institute of Geoeconomics            |
|                                       | 11:45-12:10   | A Treatment of the All-Clear Problem for Solar Energetic Particle Events and Subsequent Decision Making      | Manolis K. Georgoulis   | JHU APL                              |

\* Zoom Presentation

|   |               |  |   |                                      |
|---|---------------|--|---|--------------------------------------|
|   | 12:10-12:35   | Conjunction Analysis Using TLE Predictions Enhanced by ML Approach   | Joseph N. Wilhelm, Hao Peng   | Embry Riddle Aeronautical University |
| <b>Afternoon Session</b><br><b>Session Chair – Arun Misra</b>   |               |  |   |                                      |
| <b>TOPIC</b>  | <b>TIME</b>   | <b>TITLE</b>   | <b>AUTHORS</b>  | <b>ORGANIZATION</b>                  |
| <b>Sensing and Forecasting</b>                                  | 14:00 – 14:25 | LiDAR Space Domain Awareness   | F. William Hersman, Michael Briggs, Jan Distelbrink, Jeff Ketel, Steve Ketel, Iulian C. Ruset | LiDAR Space                          |
|   | 14:25 – 14:50 | ASTAREON: Capabilities and Performances of MEDOC Radar Station for LEO Survey, Cataloguing and Servicing   | Florent Muller, Jocelyn Couetdic, Bruno Dugrosprez, Thomas Advani                             | ASTAREON                             |
|   | 14:50 – 15:15 | Evaluating Different Sensor Tasking Strategies for Object Catalog Build-Up   | Manuel Schubert, Christopher Kebschull, Johannes Gelhaus, Simona Silvestri                    | TU Braunschweig                      |
|   | 15:15 – 15:40 | Synthetic Covariance Production Using a New Digital Approach   | R.G. Gist, D.L Oltrogge, D., S. Alfano  | COMSPOC Corporation                  |
|   | 15:40 – 16:05 | Analysis of Aerodynamic Characteristics for the Vehicle in Transition Flow Region Based on a Novel Bridge Function                                 | Ruifeng Lv*, Hongwei Han, Qian Pan  | Beijing Institute of Technology      |
| <b>Friday, May 10, 2024</b>                                     |               |  |   |                                      |
| <b>Morning Session</b><br><b>Session Chair – Tarek Elgohary</b> |               |  |   |                                      |
| <b>TOPIC</b>  | <b>TIME</b>   | <b>TITLE</b>   | <b>AUTHORS</b>  | <b>ORGANIZATION</b>                  |
| <b>Identification, Estimation, and Tracking II</b>              | 10:00-10:25   | Enhancing Space Situational Awareness to Mitigate Risk: A Case Study in the Misidentification of Starlink Satellites as UAP in Commercial Aviation | Douglas J. Buettner, Richard E. Griffiths, Nick Snell, John Stillely                          | University of Utah                   |
|   | 10:25-10:50   | Analysis of Non-Linear Orbit Determination in the Cislunar Region Using the Linearized State Transition Matrix                                     | Seur Gi Jo, David Canales   | Embry Riddle Aeronautical University |

\* Zoom Presentation

|  |               |   |   |                                      |
|--|---------------|---|---|--------------------------------------|
|  | 10:50-11:15   | Dual Quaternion-Based Kalman-Bucy Filter for Optimal Relative Pose Estimation   | Ryan Kinzie, Pol Fontdegloria Balaguer, Riccardo Bevilacqua, Sergey Drakunov, Dongeun Seo, John W. Conklin, Peter J. Wass | Embry Riddle Aeronautical University |
|  | 11:15 – 11:40 | Lunar Particle Trajectory Estimation from Rocket Impingement  | Nicola-Isabella Ruiz, Daniel Lopez, Troy Henderson  | Embry Riddle Aeronautical University |
|  | 11:40 – 12:05 | Neural Network to Predict Hypervelocity Fragment Flyout from Satellite Explosion Breakup Events                                   | Katharine E. Larsen, Tahsinul Haque Tasif, Riccardo Bevilacqua  | Embry Riddle Aeronautical University |
|  | 12:05 – 12:30 | Detection and Tracking of RSO/NEO in Star Tracker Images with Centroiding Kalman Filter   | Laila Kazemi, Alexander Vandenberghe, Tjorven Delabie   | ARCSEC Space                         |
|  | 12:30 – 12:55 | Orbit Determination for a Non-Cooperative Target Considering Navigation Error of Observation Platform Based on Random Noise Model | Jiating Su*, Lixuan He, Jiayi Li, Xiucong Sun   | Beihang University                   |

\* Zoom Presentation