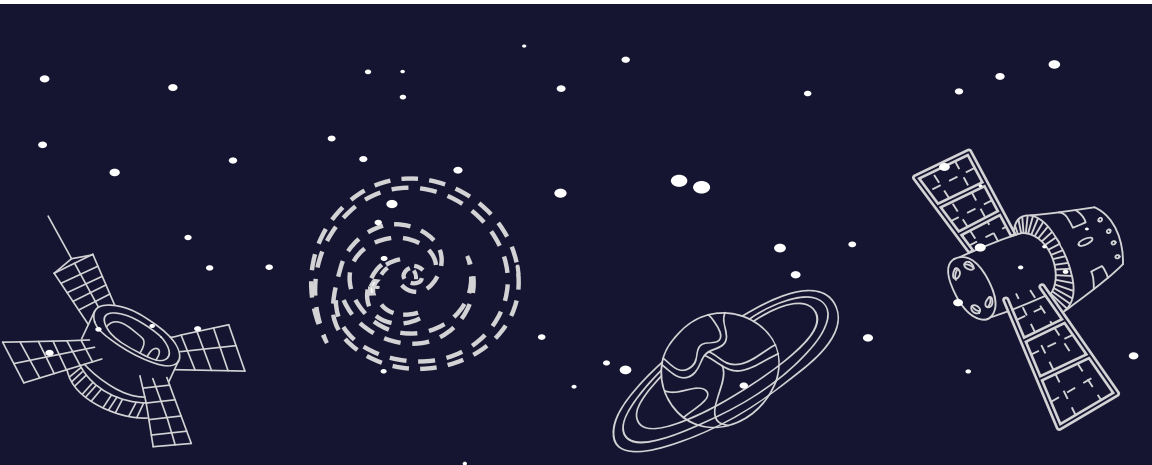
19th AMOS

Advanced Maui Optical and Space Surveillance Technologies Conference

2018 PROGRAM

September 11-14 | Maui, Hawai'i



Presented by

maui economic DEVELOPMENT BOARD

ALOHA & WELCOME

We are pleased that you are participating in the 19th AMOS Conference. Although we will be sitting in a darkened ballroom, intently listening to technical briefings throughout the week, we are, indeed, in a culturally rich and beautiful setting...

It is our pleasure to share with you a few of the things that make Maui unique. We have sprinkled elements throughout the week to remind us of our Hawaiian "Sense of Place."

Among them are the leis worn at the welcome reception, our traditional Native Hawaiian invocation opening the conference, and a private luau buffet and show on Wailea Beach.

If there is anything our Conference Team can do to make your week more productive and enjoyable, please let us know.

Warmest Aloha,
The AMOS Conference Team

FEATURED EXHIBITORS

a.i. solutions
AFRL | AFOSR
AGI
Applied Optimization
Astro Haven Enterprises
Astrosysteme Austria
Boeing
CACI
Celestron
Charles River Analytics
EOS Space Systems
ExoAnalytic Solutions
Finger Lakes Instrumentation
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PO'OKELA | striving for the best

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LAULIMA | working together

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ENHANCING YOUR CAREER IN SPACE

A JOINT INITIATIVE OF THE
AMOS CONFERENCE AND SGAC

The first annual EMER-GEN™ is a joint initiative of the AMOS Conference and SGAC. The program is designed especially for young professionals and students (35 and under) enthusiastic about careers in space.

With the help of advisors from industry, government, academia and NGOs, we created a two-day experience that offers **Mentoring** with renowned space specialists from the public sector (military and civil), private sector, and nongovernmental organizations; **Networking** with other young leaders; **Skill building** sessions to enhance your effectiveness in a global environment; and **Short courses** and primers from experts drawn from an array of fields related to space situational awareness.

A JOINT INITIATIVE OF THE AMOS CONFERENCE AND SGAC

AMOS

SPACE GENERATION ADVISORY COUNCIL

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SEP 11 Tuesday | Po'alua

8:00 AM - 12:00 PM | TECHNICAL SHORT COURSES (Separate registration fee required)

CONJUNCTION ASSESSMENT RISK ANALYSIS
Lokelani II Ballrooom

Presented by **Francois Laporte** and **Monique Moury**, CNES; **Matt Hejduk** and **Lauri Newman**, NASA/CARA

OPERATIONAL ANALYTICS: DEMYSTIFYING MACHINE LEARNING
Mauna Loa Ballrooom

Presented by **Joseph Coughlin**, L3 Applied Defense Solutions and **Rohit Mital**, Stinger Ghaffarian Technologies

SPACE DEBRIS RISK ASSESSMENT AND MITIGATION ANALYSIS - Verification of Compliance with Requirements on Space Debris Mitigation using ESA's DRAMA Software
Breakout Room 4615

Presented by **Tim Flohrer**, ESA/ESOC Space Debris Office and **Benjamin Bastida Virgili**, ESA/ESOC Space Debris Office

INTRODUCTION TO THEORY AND APPLICATION OF MULTI-OBJECTIVE OPTIMIZATION USING GENETIC ALGORITHM
Breakout Room 4617

Presented by **Triet Tran,** Cornerstone Consulting LLC

1:00 PM - 5:00 PM | TECHNICAL SHORT COURSES (Separate registration fee required)

STATISTICAL ORBIT DETERMINATION FOR SPACE SURVEILLANCE AND TRACKING
Lokelani II Ballrooom

Presented by **Moriba Jah**, University of Texas at Austin

OBSERVING AND CHARACTERIZING SPACE DEBRIS
Lokelani III Ballroom

Presented by **Thomas Schildknecht**, Astronomisches Institut Universität Bern

MACHINE LEARNING FOR SPACE SITUATIONAL AWARENESS
Mauna Loa Ballroom

Presented by **Kyle Pula**, CACI; **Richard Linares**, Massachusets Institute of Technology; and **Roberto Furfaro**, University of Arizona

6:00 PM - 7:30 PM | WELCOME RECEPTION • LUAU GARDENS

CO-SPONSORED BY BOEING

The conference kicks off with a welcome reception providing participants with a unique networking opportunity. Surrounded by tropical breezes participants and their guests will be greeted with a shell lei, a beverage and appetizers, all while listening to music by the U.S. Air Force Band of the Pacific. Conference badge required at entry.

SEP 11 Wednesday | Po'akolu

6:00 AM - 7:15 AM | BREAKFAST AT LEISURE • LUAU GARDENS

7:30 AM | CONFERENCE OPENING • AULANI BALLROOM

Leslie Wilkins, President & CEO, Maui Economic Development Board, Inc.
Reverend Kealahou Alika, Keawala'i Congregational Church

Opening Keynote Address

Major General Stephen N. Whiting
Commander, 14th Air Force, Air Force Space Command; and Deputy Joint Force Space Component Commander, U.S. Strategic Command

8:30 AM | SSA POLICY FORUM

Space Situational Awareness and Enhancing Security and Deterrence

Moderated by **Doug Loverro**, Former Deputy Assistant Secretary of Defense for Space Policy, U.S. Department of Defense

Regina Peldszus, Policy Office Space Situational Awareness, German Aerospace Center
Jana Robinson, Space Security Program Director, Prague Security Studies Institute
Scotty Van Sant, Deputy Branch Chief, Space Policy, U.S. Strategic Command

ASK A QUESTION | Go to http://sift.ly (Enter code: AMOS18)

9:30 AM - 10:00 AM | COFFEE BREAK SPONSORED BY numerica CORPORATION

9:30 AM - 6:00 PM | EXHIBIT HOURS

10:00 AM | ADAPTIVE OPTICS & IMAGING (15-MIN PRESENTATIONS)

Co-chaired by **Scott Hunt**, AFRL and **John Lambert** Cornerstone Defense

Complex Wavefronts from Image Plane Data | **Douglas Hope**, Hope Scientific Renaissance LLC

Leveraging Machine Learning for High-Resolution Restoration of Satellite Imagery | **Daniel Pimentel-Alarcon**, Georgia State University

Extending Daytime Adaptive Optics to Faint Objects | **Michael Hart**, HartSCI LLC

Satellite and Debris Characterisation through Adaptive Optics Corrected Imaging | **Michael Copeland**, Australian National University

First Results from the Adaptive Optics System for LCRD's Optical Ground Station One | **Lewis Roberts**, Jet Propulsion Laboratory, California Institute of Technology

Free-space Quantum Communication Link with Adaptive Optics | **Francis Bennet**, Australian National University

11:30 AM - 12:30 PM | LUNCH • LOKELANI BALLROOM

12:30 PM | SPACE-BASED ASSETS (20-MIN PRESENTATIONS)

Co-chaired by **Pat Patterson**, Space Dynamics Laboratory and **Jeff Sherk**, Metis Technology Solutions

Feasibility of Using Commercial Star Trackers for On-Orbit Resident Space Object Detection | **Samuel Clemens**, York University

Leveraging the Emerging CubeSat Reference Model for Space Situational Awareness | **David Gross**, University of Arizona

Imaging Payload Performance Considerations for On-orbit Servicing and Active Debris Removal | **Jim Shell**, Novarum Tech, LLC

~~A Small Satellite System for Space Surveillance (S5) | **Jason Westphal**, L3 Applied Defense Solutions~~ CXLD

Key Findings from the NEOSSat Space-Based SSA Microsatellite Mission | **Robert Scott**, Defence R&D Canada

2:10 PM - 2:30 PM | BREAK

2:30 PM | NON-RESOLVED OBJECT CHARACTERIZATION (15-MIN PRESENTATIONS)

Co-chaired by **Heather Cowardin**, JACOBS and **Marcus Holzinger**, University of Colorado Boulder

Satellite Characterization, Classification, and Operational Assessment Via the Exploitation of Remote Photoacoustic Signatures | **Justin Spurbeck**, The University of Texas at Austin

Vibrometry Challenges in Measuring Motion of Faraway Objects | **Steven Griffin**, The Boeing Company

Space Objects Classification via Light-Curve Measurements: Deep Convolutional Neural Networks and Model-based Transfer Learning | **Roberto Furfaro**, University of Arizona

Attitude Detection of Buccaneer RMM CubeSat through Experimental and Simulated Light Curves in Combination with Telemetry Data | **Melrose Brown**, UNSW Canberra

RAPTORS: Hyperspectral Survey of the GEO Belt | **Vishnu Reddy**, University of Arizona

Cyclic Complex Spin State Evolution of Defunct GEO Satellites | **Conor Benson**, University of Colorado Boulder

The Preliminary Results from Long-term Sparse Photometric Data | **Shengxian Yu**, Purple Mountain Observatory, Chinese Academy of Sciences

FireOPAL: Analysis of One Million High Time Resolution Optical Light Curves | **Greg Madsen**, Lockheed Martin

4:30 PM - 6:00 PM | POSTERS AND EXHIBIT SESSION CO-SPONSORED BY SAIC

SEP 13 Thursday | Po'aha

6:00 AM - 7:15 AM | BREAKFAST AT LEISURE • LUAU GARDENS

7:30 AM | GENERAL SESSION • AULANI BALLROOM

Keynote Address

Kevin O'Connell
Director of the Office of Space Commerce, U.S. Department of Commerce

8:00 AM | SSA POLICY FORUM

Space Traffic Management and Modernizing Oversight of Commercial Space Activities

Moderated by **Ralph Dinsley**, Northern Space and Security

Bhavya Lal, Research Staff Member, Science and Technology Policy Institute, Institute for Defense Analyses

Bryan Benedict, Senior Director, Innovation & Satellite Program, SES Government Solutions

Paul Graziani, Chief Executive Officer, Analytical Graphics Inc.

John Kay, Principal Scientist, Defence Technology Agency, New Zealand Defence Force

Charity Weeden, U.S. Managing Representative, Astroscale, Lquinox Consulting, LLC

ASK A QUESTION | Go to http://sift.ly (Enter code: AMOS18)

9:00 AM - 9:30 AM | COFFEE BREAK SPONSORED BY SOLERS

9:00 AM - 6:10 PM | EXHIBIT HOURS

9:30 AM | OPTICAL SYSTEMS & INSTRUMENTATION (15-MIN PRESENTATIONS)

Co-chaired by **Tamara Payne**, Applied Optimization Inc. and **Jim Shell**, Novarum Tech, LLC

FireOPAL: Toward a Low-Cost, Global, Coordinated Network of Optical Sensors for SSA | **Phil Bland**, Curtin University

OWL-NET : A Global Network of Robotic Telescopes for Satellites Observation | **Jang-Hyun Park**, Korea Astronomy and Space Science Institute

Non-Traditional Data Collection and Exploitation for Improved GEO SSA via a Global Network of Heterogeneous Sensors | **Jeff Aristoff**, Numerica Corporation

LEO Cubesats Tracking with a Network of Polish Optical SST Sensors | **Michael Zolnowski**, 6 Remote Observatories for Asteroids and Debris Searching

Aperture Efficiency and Wide Field-of-View Optical Systems | **Mark Ackermann**, Sandia National Labs

On-Orbit Smart Camera System to Observe Illuminated and Unilluminated Space Objects | **Steven Morad**, University of Arizona, SpaceTREx

11:00 AM | OPTICAL SYSTEMS & INSTRUMENTATION (CONTINUED)

CHES: A Rapid All-sky Survey System for SSA | **Chen Zhang**, Purple Mountain Observatory, Chinese Academy of Sciences

Development of a New Observatory at Learmonth Australia for Optical SSA | **Craig Smith**, EOS Space Systems

11:30 AM - 12:30 PM | LUNCH • LOKELANI BALLROOM

12:30 PM | OPTICAL SYSTEMS & INSTRUMENTATION (CONTINUED)

Scientific CMOS Camera for Observation of Dim Space Objects | **Michael Jacox**, Space Micro inc

High Sampling Rate Photometry of Spinning Satellites for Nano-Perturbation Detection | **Daniel Kucharski**, Space Environment Research Centre

Chimera: A High-speed Three-color Photometer for Satellite Characterization | **Eric Pearce**, University of Arizona Steward Observatory

Synthetic Tracking on a Small Telescope | **Michael Shao**, JPL

1:30 PM | FEATURED PRESENTATION

Pan-STARRS - The PS1 & PS2 Wide Area NEO Survey and Recent Results | **Ken Chambers**, University of Hawaii

1:50 PM | ASTRODYNAMICS (15-MIN PRESENTATIONS)

Co-chaired by **Islam Hussein**, L3 Applied Defense Solutions and **Vishnuu Mallik**, University of Texas at Austin

Autonomy Testbed Development for Satellite Debris Avoidance | **Bumsoo Kim**, Defence R&D Canada

Progress in a New Conjunction and Threat Warning Service for Space Situational Awareness | **James Bennett**, EOS Space Systems

Autonomous Correlation of Ground-Based Non-Resolved GEO RSO Tracks using Deep Neural Networks | **Ian McQuaid**, Air Force Institute of Technology

RSO Attitude Propagation with Recurrent Neural Networks | **Davide Amato**, University of Arizona

2:50 PM - 3:10 PM | BREAK

3:10 PM | ASTRODYNAMICS (CONTINUED)

Spaceborne Orbit Determination of Uncorrelated Tracks (UCT) Using a Stabilized-Gauss-Method, Linear Perturbation Theory and Angle-Only Measurements | **Mark Hinga**, USAF AFMC AFRL/RDST

Understanding the Effect of Perturbations on the Gaussianity of Various Coordinates for the Space Object Tracking Problem | **Weston Faber**, L3 Applied Defense Solutions

3:40 PM | ASTRODYNAMICS (CONTINUED)

Normality in State Uncertainties from Orbit Determination Results fitting Optical Measurements | **Sven Flegel**, Space Environment Research Centre

Improved Drag Coefficient Modeling with Spatial and Temporal Fourier Coefficient Expansions: Theory and Application | **Vishal Ray**, CU Boulder

Probabilistic Data Association Based on Intersection of Orbit Sets | **Laura Pirovano**, University of Surrey *(2018 AMOS Student Award Winner)*

Multi-Fidelity Methods for Orbit Determination | **Brandon Jones**, University of Texas at Austin

4:40 PM - 6:10 PM | POSTERS AND EXHIBIT SESSION CO-SPONSORED BY SPACENAV

8:00 PM - 10:00 PM | SATELLITE AND ASTRONOMY VIEWING • PACIFIC TERRACE ROOFTOP

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SEP 14 Friday | Po'alima

6:00 AM - 7:15 AM | BREAKFAST AT LEISURE • LUAU GARDENS

7:30 AM | GENERAL SESSION • AULANI BALLROOM

Keynote Address

Richard H. Buenneke
Senior Advisor, National Security Space Policy, U.S. Department of State

8:00 AM | SSA POLICY FORUM

SSA to Support Best Practices For Rendezvous and Proximity Operations

Moderated by **Victoria Samson**, Washington Office Director, Secure World Foundation

Jim Armor, Staff Vice President, Washington Operations, OrbitalATK

Lt Col Kevin Amsden, Commander, 3rd Space Experimentation Squadron, Air Force Space Command

Tom Kubancik, General Manager Commercial, Civilian, and International Space, L3 Applied Defense Solutions

Brian Weeden, Director of Program Planning, Secure World Foundation

ASK A QUESTION | Go to http://sift.ly (Enter code: AMOS18)

9:00 AM - 9:30 AM | COFFEE BREAK

9:00 AM - 2:40 PM | EXHIBIT HOURS

9:30 AM - 11:30 AM | SPACE EXPLORATION STUDENT SESSION • EXHIBITS ROOM

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The AMOS Conference welcomes 150 Maui middle school students and 25 STEM teachers to visit exhibit booths for hands-on STEM demonstrations.

9:30 AM | ORBITAL DEBRIS (20-MIN PRESENTATIONS)

Co-chaired by **James Frith**, NASA Orbital Debris Program Office and **Noelia Sánchez-Ortiz**, DEIMOS Space

Passive Debris Removal using Orbital Resonances | **Aaron J. Rosengren,** University of Arizona

Combining Observations for Re-entry Purposes | **Benjamin Bastida Virgili**, ESA/ESOC Space Debris Office

Simultaneous Multi-filter Photometric Characterization of Space Debris at the Swiss Optical Ground Station and Geodynamics Observatory Zimmerwald | **Emiliano Cordelli**, Astronomisches Institut Universität Bern

Debris Characterization, Albedo, and Plume Measurements from Laser Ablations of Satellite Materials in High-Vacuum and in Gaseous Ambients | **Gouri Radhakrishnan**, The Aerospace Corporation

Blast Point Determination for Space Object Fragmentation Events | **Weston Faber**, L3 Applied Defense Solutions

Methods of Processing Geosynchronous Breakups | **Zachary Slatton**, AFSPC/A3/6Z

11:30 AM - 12:30 PM | LUNCH • LOKELANI BALLROOM

12:30 PM | FEATURED PRESENTATION

The S&T Challenges of SSA Sensor Proliferation | **Col Eric Felt**, Air Force Research Laboratory and **Col Timothy Sejba**, Air Force Space & Missile Center

12:50 PM | SPACE SITUATIONAL AWARENESS (15-MIN PRESENTATIONS)

Co-chaired by **Gregory Cohen**, Western Sydney University and **Tim Flohrer**, ESA/ESOC Space Debris Office

Block-chain Application Within a Multi-Sensor Satellite Architecture | **Rohit Mital**, Stinger Ghaffarian Technologies

Optimization of Geosynchronous Space Situational Awareness Architectures using Parallel Computation | **Michael Felten**, U.S. Air Force

Weather Considerations for Ground-Based Optical SSA Site Selection | ~~**John McGraw**~~, **Pete Zimmer**, J.T. McGraw & Associates

A General Tool for Modeling Interactions of Light with Space Objects | **Olli Wilkman**, Finnish Geospatial Research Institute

1:50 PM | SPACE SITUATIONAL AWARENESS (CONTINUED)

5-eyes Collaborative SSA | **Andrew Ash**, Dstl

Maneuver Detection of Space Objects using Generative Adversarial Networks | **Steve Gehly**, UNSW Canberra

2:20 PM - 2:40 PM | BREAK

2:40 PM | SPACE SITUATIONAL AWARENESS (CONTINUED)

Modular Neural Network Tasking of Space Situational Awareness Systems | **Dan Regan**, Ball Aerospace

SSA Sensor Tasking: Comparison of Machine Learning with Classical Optimization Methods | **Carolin Frueh**, Purdue University

Performance of a Global Network of Laser-optical Tracking Stations for LEO Space Surveillance | **Jens Rodmann**, German Aerospace Center (DLR)

First Results from the Deployment of Expert Centres Supporting Optical and Laser Observations in a European Space Surveillance and Tracking System | **Tim Flohrer**, ESA/ESOC Space Debris Office

~~Global Sentinel Lessons for CSpO | **James Foster,** Lockheed Martin~~ CXLD

Governance of Space Situational Awareness - Revolution not Evolution | **Ralph Dinsley**, Reflecting Space NEW

Future of the Space Situational Awareness Enterprise - Global Trends | **Asha Balakrishnan**, Science and Technology Policy Institute

4:10 PM | CLOSING REMARKS & AWARDS CEREMONY

Stay tuned as we announce the winners of the inaugural 2018 AMOS Conference Best Paper Award and Student Award!

How was your AMOS Conference Experience?

Your input is invaluable as we begin to plan the 20th AMOS Conference. A Feedback Form is included in your welcome packet. If you prefer a digital version, visit https://www.surveymonkey.com/r/AMOS2018.

PLUS be in the running to win an iPad Mini 4. Winner will be announced at the Conference Closing on Friday afternoon (must be present to win). Paper forms can be turned in at the Hospitality Desk or collected at the Conference Closing. Digital forms must be submitted before 2:00 p.m. Friday to be eligible to win.

4:30 PM | CONFERENCE ADJOURNS

5:30 PM - 8:30 PM | CLOSING DINNER LUAU & SHOW • LUAU GARDENS

Dine, Dance and Discover Te Au Moana: The Ocean Tide A spectacular luau experience. Luau ticket required.

POSTER SESSIONS

Co-chaired by Rita Cognion, BAE Systems and Thomas Kelecy, L3 Applied Defense Solutions

WED | POSTER PRESENTERS

Advanced Atmospheric Mitigation Decision Aids for Space Imaging and Laser Communications | **Randall Alliss**, Northrop Grumman

Simultaneous Glint Spectral Signatures of Geosynchronous Satellites from Multiple Telescopes | **Francis Chun**, USAFA

Development of an In-orbit Measurement of a Ground Based Adaptive Optics Corrected Laser | **Francis Bennet**, Australian National University

Quantifying the Sensitivity of a Synthetic Light Curve Model, to the Model Inputs | **Laurence Blacketer**, University of Southampton

~~Machine Learning for Rapid Global Thermosphere Ionosphere Model Data Interrogation | **Melrose Brown**, UNSW Canberra~~ CXLD

Transformation between the Johnson-Cousins and Sloan Photometric Systems for SSA | **Tamara Payne**, Applied Optimization Inc.

Comparative Performance of a 3-Sided and 4-Sided Pyramid Wavefront Sensor | **Johanan Codona**, HartSCI, LLC

Data Topography for Pervasive, Proliferated SSA | **Phillip Cunio**, ExoAnalytic Solutions

Machine Learning-based Stability Assessment and Change Detection for Geosynchronous Satellites | **Phan Dao**, AFRL

~~Governance of Space Situational Awareness - Revolution not Evolution | **Ralph Dinsley**, Reflecting Space~~ MOVED TO SSA SESSION

Improving Techniques for Shack-Hartmann Wavefront Sensing: Dynamic-range and Frame Rate | **Takao Endo**, Mitsubishi Electric Corporation

The Gaia Catalogue Second Data Release and its Implications to Optical Observations of Man-made Earth Orbiting Objects | **James Frith**, NASA Orbital Debris Program Office

Space Object Tracking from the Robotic Optical Observatory at RMIT University | **Steve Gehly**, UNSW Canberra

Levarging Open Source Intelligence for Space Situational Awareness Analytics | **Thomas Gemmer**, Aptima, Inc.

Stable Narrow-line VECSEL Operation for Sodium Guide Star Generation | **Michael Hart**, HartSCI LLC

FireOPAL: Continental-scale Coordinated Observations of the OSIRIS-Rex Flyby | **Trent Jensen-Sturgeon**, Desert Fireball Network-Curtin University

~~Real-Time Maneuver Monitoring at GEO | **Maxwell Hillis**, ExoAnalytic Solutions~~ CXLD

Optical Characterization of Commonly Used Spacecraft Paints in a Simulated GEO Electron Environment | **Ryan Hoffman**, AFRL

Enhancing Cognitive Fusion for Space Situational Awareness | **Steven Ingram**, Lockheed Martin

SSA Decision Support System Development and Evaluation using Cognitive Systems Engineering | **Karen Feigh**, Georgia Institute of Technology

Increased Space Situation Awareness through Augmented Reality Enhanced Common Operating Pictures | **Michael Jenkins**, Charles River Analytics

Satellite Capture and Servicing Using Networks of Tethered Robots Supported by Ground Surveillance | **Himangshu Kalita**, University of Arizona/SpaceTREx

New Optical Sensors Cluster for Efficient Space Surveillance and Tracking | **Michael Zolnowski**, 6 Remote Observatories for Asteroids and Debris Searching

DVD-COOP for Optimal Design of Manoeuvre Path for Conjunctive Objects | **Deok-Soo Kim**, Hanyang University

~~Multi-static Passive Radar Space Object Detection Through Coherent Hyper-Agile Radio Frequency Integrated Circuit for Hypersonic and Hyper-Glide Vehicles | **Randel Castleberry**, Rim Technologies~~ CXLD

Optical Detection for Space Situational Awareness (ODESSA) | **Brian Kloppenborg**, Georgia Tech Research Institute

WENESSA, Wide Eye-Narrow Eye Space Situational Awareness | **Paul LeVan**, AFRL/RDST

Demonstration of Real-Time Quasi-Physical Atmosphere Density Estimation Approach for Space Traffic Management | **Richard Linares**, Massachusetts Institute of Technology

Equatorial Radar Array for Detection and Characterization of all Earth-Orbiting Objects | **Kathleen Minear**, Specialized Arrays Inc.

WED | POSTER PRESENTERS (CONTINUED)

Optimal Selection of Telescope Parameters for Space Situational Awareness Astrometry and Photometry | **Timothy Murphy**, L3 Applied Defense Solutions

Pomenis: A Small Portable Astrograph for Synoptic SSA | **Eric Pearce**, University of Arizona Steward Observatory

Passive RF Sensing in support of SSA | **Matt Prechtel**, Kratos RT Logic

Characterization of Spacecraft Materials using Reflectance spectroscopy | **Jacqueline Reyes**, The University of Texas at El Paso

Doppler Curves in Satellite Tracking and Characterization | **David Richmond**, Lockheed Martin

Towards the Detection of Faint Companions Around Geosats | **Henrique Schmitt**, Naval Research Laboratory

A Sensor Tasking Approach Using Deep Reinforcement Learning and Multi-Target Filtering | **Akhil Shah**, University of Texas at Austin

Recent Developments in Shadow Imaging Prediction | **David Sheppard**, Integrity Applications, Inc.

Conceptual Development of a Civil Space Traffic Management System (CSTM) Capability | **Mark Skinner**, The Aerospace Corporation

Photometric Measurements of Geostationary Satellites over the Western Pacific Region | **Jovan Skuljan**, Defence Technology Agency

~~Learning Signatures of Electromagnetic Incursions at Satellite Ground Stations from Small Datasets | **Dick Stottler**, Stottler Henke Associates, Inc.~~ CXLD

Synthetic Heterogeneous Anomaly and Maneuver - Neural Network Event Winnowing System | **Dwight Temple**, ExoAnalytic Solutions

Daytime SBR Modeling of GEOs in the SWIR for Low-cost, Ground-based Imaging | **Grant Thomas**, Air Force Institute of Technology

Advances in Acoustic Imaging for Space Situational Awareness | **Zachary Watson**, HartSCI LLC

Tomographic Wave Front Sensing using an Imaging Shack-Hartmann Wave Front Sensor and Multi-aperture Phase Retrieval | **Matthew Willson**, Georgia State University

THU | POSTER PRESENTERS

Space Debris Mapping Services for use by LEO Satellite Operators | **Adam Archuleta**, DigitalGlobe, Inc.

Estimating Sidereal Rotation Period of Resident Space Objects using Non-uniformly Sampled Light Curves | **Katiyayni Balachandran**, University of Texas at Arlington

Bayesian Inference of Spacecraft Pose Using Particle Filtering | **Maxim Bazik**, Vision Systems Inc.

Utilizing Supercomputing to Analyze Risks of an Emergent Large-Scale Debris Field in Low Earth Orbit | **David Buehler**, AFRL/RV

Optical Ground Based Space Surveillance Obscured Sky Mitigation | **Robert Bruck**, GEODSS

Optical Tracking of Artificial Earth Satellites with COTS Sensors | **Tanner Campbell**, University of Arizona

De-Orbiting Small Satellites Using Inflatables | **Aman Chandra**, University of Arizona

Approaches for Astrometry using Event-Based Sensors | **Gregory Cohen**, Western Sydney University

Applications of Random Sampling Consensus to Space Object Motion Analysis | **Brien Flewelling**, ExoAnalytic Solutions

Exploring Photometry System Trades with a Pixel-Level Data Simulator | **Nicole Gagnier**, The Boeing Company

ELROI: A Satellite License Plate to Simplify Space Object Identification | **Rebecca Holmes**, Los Alamos National Laboratory

Image Formation with Coherent Illumination in Deep Turbulence | **Richard Holmes**, The Boeing Company

Short-Term TLE Uncertainty Estimation Using an Artificial Neural Network Model | **Hai Jiang**, National Astronomical Observatories, Chinese Academy Sciences

Automating the Assessment of Orbit Predictions and Estimations for Building and Maintaining a New Catalogue | **Michael Lachut**, Space Environment Research Centre

Fengyun-1C Debris Cloud Evolution Over One Decade | **John Lambert**, Cornerstone Defense

Integrating Orbital Debris Measurements and Modeling - How Observations and Laboratory Data are used to Help Make Space Operations Safer | **Sue Lederer**, NASA Johnson Space Center Orbital Debris Program Office

THU | POSTER PRESENTERS (CONTINUED)

Recovering Astronomical Images with Deep Neural Network Supported Bispectrum Processing | **Jacob Lucas**, The Boeing Company

FireOPAL: Technical Performance and First Results | **Greg Madsen**, Lockheed Martin

Demonstration of Precise Orbit Determination of GEO Spacecraft for Geolocation Using the Fourier SRP Model | **Jay McMahon**, University of Colorado Boulder

System Level Studies to Design Optical Surveillance Networks in the Frame of the EU SST Support Framework | **Vincent Morand**, CNES

Near-real-time Continuous Filtering of Sensor Measurements using Data Stream Management Systems | **Sven Müller**, Institute of Space Systems, Technische Unviversität Braunschweig

Conservation of First Post-Newtonian Energy Integral | **Joseph O'Leary**, University of South Australia

Novel Sparse Recovery Algorithms for 3D Debris Localization using Rotating Point Spread Function Imagery | **Chao Wang**, Chinese University of Hong Kong

Mass Estimation Through Fusion of Astrometric and Photometric Data Collection with Application to Orbital Debris Characterization | **Thomas Kelecy**, L3 Applied Defense Solutions

Modeling Energy Dissipation in a Tumbling Defunct Satellite Using a Finite Element Method | **Ryotaro Sakamoto**, University of Colorado Boulder

Accurate Optical Observation of Space Objects in LEO regime | **Noelia Sánchez-Ortiz**, DEIMOS Space

Optical Tracking and Attitude Determination of LEO CubeSats with LEDs: A Balloon Demonstration | **Patrick Seitzer**, University of Michigan

A Numerical Solution to Orbital Pursuit-Evasion Games | **Dan Shen**, Intelligent Fusion Technology, Inc.

Optical Survey for Space Objects in High Earth Orbital Region | **Rong-yu Sun**, Purple Mountain Observatory, Chinese Academy of Sciences

High Resolution Imaging of Satellites in Daylight | **Ryan Swindle**, AFRL

~~High Resolution Imaging during the day with Laser-guided Adaptive Optics | **Ryan Swindle**, AFRL~~ CXLD

Fragmentation Event Identification Using Back Propagation with Ballistic Coefficient Variation | **Kristen Tetreault**, Virginia Tech

On-Orbit Meteor Impact Monitoring Using CubeSat Swarms | **Ravi teja Nallapu**, University of Arizona/SpaceTREx

Laser Beam for External Position Control and Traffic Management of On-Orbit Satellites | **Himangshu Kalita**, University of Arizona/SpaceTREx

How State Error Covariance Matrices Evolve in Six Dimensions | **Mark Vincent**, Raytheon

Imaging GEOs with a Ground-Based Sparse Aperture Telescope Array | **Michael Werth**, The Boeing Company

Moving Point Source Detection and Localization in Wide-Field Images | **Przemek Wozniak**, Los Alamos National Laboratory

Real-time Optical SSA of LEO with Small Telescopes | **Peter Zimmer**, JTMA

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