

6TH ANNUAL

# INTELLIGENCE COMMUNITY ACADEMIC RESEARCH SYMPOSIUM

Agenda



# SESSIONS, WEDNESDAY, 16 SEPTEMBER 2020

## Session One Automatic Feature Extraction/Mapping

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Curt Davis**: DeePRK - Measuring Human Performance of DNN-Assisted Object Search and Detection over North Korea
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **Panos Markopoulos**: Improving CNNs Towards Real-Time Multi-Modal Object Detection in Remote Sensing Imagery
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **Preston Hartzell**: Robust Confidence Measures for Multi-Temporal 3D Spatial Change Detection
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **Shashi Shekhar**: Identifying Aberration Patterns in Multi-attribute Trajectory Data with Gaps
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Dr. **Eduardo Blanco**: Mining Spatiotemporal Knowledge from Language and Images

## Session Two Big Data/Network Analytics

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Lisa Durbeck**: Scalable Incremental Partitioning of Sparse Stochastic Block Model Graphs
- 12:40 - 12:50 Break**
- 12:50 - 1:20 **1:30 - 1:40 Break**
- 1:40 - 2:10 **Mitchell Plyler**: Counterfactual Explanations for Text Classifiers
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **Cedric Spire**: Automated Error Detection & Repair in Structured Databases
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Dr. **Rebecca Willett**: Analysis of High-Dimensional Autoregression Point Processes

## Session Three Geophysics/Sensors

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Felipe Guzman**: Optomechanical Gravimeters and Gravity Gradiometers
- 12:40 - 12:50 Break**
- 12:50 - 1:20 **Adam Hines**: Optomechanical Inertial Sensors for Gravimetry
- 1:30 - 1:40 Break**
- 1:40 - 2:10 **Andrea Nelson**: Compact Quasi-Monolithic Heterodyne Laser Interferometers
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **Logan Richardson**: Hybridizing High Bandwidth Optomechanical Accelerometers with Atom Interferometers for Improved Inertial Measurements
- 2:50 - 3:00 Break**
- 3:00 - 3:30

## Session Four Power Sources/Energy

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Nathan Banek**: Sustainable Conversion of Biomass to Li-ion Grade Graphite
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **Candace Chan**: Integrated Foldable Battery and Components with Flexible/Stretchable Interconnects
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **John Chivers**: An Integrated System for Thermophotovoltaic Power Generation
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **Jeffery Lopez**: Understanding and Design of Materials for High Energy Density Batteries
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Dr. **Yuzhang Li**: Graphene Cage Design and Cryo-Electron Microscopy Characterization for High Energy Batteries

## Session Five Predictive Analytics

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Raoul Guiazon**: Intrusion Detection Systems for Sensor Networks
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **Jerone Andrews**: Conditional Adversarial Camera Model Anonymisation
- 1:30 - 1:40 Break**
- 1:40 - 2:10 **CPT Alexander Pytlar**: Understanding the Urban Environment: A New Framework for Urban Resilience and Stability
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **Daniel Becker**: Modeling Changes in Migratory Behavior as a Driver of Zoonotic Disease in an Avian Host
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Dr. **Yun Tao**: Transient Dynamics in Outbreak Management and a Retrospective Analysis of the 2001 FMDV Epidemic in the United Kingdom

## Session Six Quantum

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Mattias Fitzpatrick**: Charge State Dynamics and OD-ESR Contrast of Shallow NV Centers in Diamond
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **Laura Kim**: Plasmonic Quantum Metasurfaces Using Nitrogen-Vacancy Ensembles
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **Sara Mouradian**: Trapped Ions as Useful Quantum Sensors
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **Harry Bostock**: Developing a Trapped Ion Quantum RF and Microwave Sensor
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Dr. **Dodd Gray, Jr.**: Hybrid CMOS-LiNbO<sub>3</sub> Optical Frequency Comb Integrated with Trapped-Ion Optical Clocks

# SESSIONS, WEDNESDAY, 23 SEPTEMBER 2020

## Session One Big Data/Network Analytics

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Guillermo Sapiro**: Learning Privacy and Do-No-Unnecessary-Harm Fairness
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **Joseph Shaheen**: Towards a Principled, Computational and Risk-Based Perspective in Dark Networks
- 1:30 - 1:40 Break**
- 1:40 - 2:50 Drs. **Deepti Joshi** and **Leen-Kiat Soh**: Leveraging Environment and Culture to Anticipate Social Unrest with Integrated Model-and Data-Driven Approaches  
Drs. **Regina Werum** and **Ashok Samal**: Leveraging Environment and Culture to Anticipate Social Unrest with Integrated Model-and Data-Driven Approaches
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Drs. **Karina Mrakovcich** and **Christopher LaMonica**: Exploring the Links Between Food Insecurity and Maritime Crime in Coastal West Africa

## Session Two Special Materials

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Nathan Carter**: Development and Direct-Write Printing of Low-temperature Sintering Inks on Flexible and Self-healing Substrates
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **Helen Tran**: Stretchable and Fully Degradable Semiconductors for Transient Electronics
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **Michael Jesser-Stone**: Frequency and Energy Methods in Direct Shear Behavior of Ultra-High Performance Concrete
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **Martin Smyth**: Information Processing on Social Media Networks as Emergent Collective Intelligence
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Dr. **Luce le Gorrec**: Scalable Partitioning of Large Complex Networks

## Session Three Geophysics/Sensors

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Michael Ketterer**: Uranium Isoscapes: Examining the Geospatial Distribution of Natural and Anthropogenic Sources
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **Juliette Jordan**: Early Detection of Chemical-Induced Temporal Stress Signatures in GMO and Non-GMO Maize (by Carbon NT Release)
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **Nebila Lichiheb**: Improving the Prediction of Hazardous Material Dispersion in an Urban Environment
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **Keng Tiong Ng**: Identification of Illegal Threat Manufacturing Activity via Wastewater Markers
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Dr. **Sunita Yadav**: Monitoring Agricultural Croplands Using Optical Time Series Imagery Data

## Session Four Spectral Science

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Shawn Serbin**: Plant Spies: Using Foliar Messages to Remotely Detect Tunneling
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **David Messinger**: Radiometrically Accurate Spatial Resolution Enhancement of Spectral Imagery for Improved Exploitation
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **Jan van Aardt**: Toward Enhanced 3D Sub-Canopy Mapping via Airborne/Spaceborne Full-Waveform LiDAR
- 2:10 - 2:20 Break**
- 2:20 - 2:50 **Steven Spiegel**: LiDAR Classification using Synthetic Data
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Dr. **Kevin Dobbs**: Rapid Mapping Flood Inundation from the May 2020 Edenville, Michigan Dam Break

## Session Five Automatic Feature Extraction/Mapping

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Laurie Baise**: Benchmark Data Development to Classify Damage for Natural Disaster Relief Efforts
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **Gordon Christie**: Semantic Representations for Multi-Viewpoint Multimodal Geolocation
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **Ryan Corey**: Cooperative Listening with Networked Audio Devices
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **Katherine McCormick**: Toward a Sensitive, High-Resolution Atomic Magnetometer Based on Feshbach Resonances
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Dr. **Dieter Pfoser**: Generation and Management of Crowdsourced Place Gazetteers

## Session Six Robotics

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Neel Doshi**: Planning and Control of Robotic Manipulation Primitives
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **David Limbaugh**: The Cognitive Process Ontology and Modeling Autonomous Machines
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **Bryce Doerr**: Motion Planning and Control for On-Orbit Assembly using LQR-RRT\* and Nonlinear MPC
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **Daniel Drew**: New Directions for Designing Effective and Efficient Microrobots
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Dr. **Tim Helps**: Insect-Inspired Semi-Autonomous Agents for Remote Missions

# SESSIONS, WEDNESDAY, 30TH SEPTEMBER 2020

## Session One Quantum

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Lia Ying Li**: Optomechanical Sensors: Rapid Prototyping for Navigation and Quantum Technologies
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **Loren Alegria**: High-Energy Quasiparticle Injection in Mesoscopic Superconductors
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **Robert Pettit**: Quantum Communication by Optical Fiber Links Using Quantum Dot Molecules
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **John Serafini**: A Compact Configuration for Two-Photon Interference to Support Quantum Computing
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Dr. **Claire Marvinney**: Position-Dependent Response of Large-Area Superconducting Nanowire Single Photon Detectors

## Session Two Geophysics/Sensors

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Manoranjan Majji**: Geomagnetic Sensor Fusion for Alternative Positioning and Navigation
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **Janna Caspersen**
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **Pencho Petrushev**: Oblique Derivative Boundary Value Problem with Application to Geomagnetic Field Modeling
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **May Kim**: Improving the Stability of Atomic Clocks Using a Multi-Ensemble Protocol and Adaptive Optimization with a Servo Feedback Scheme
- 2:50 - 3:00 Break**
- 3:00 - 3:30 **Christopher Linick**: Sources of Small-Scale Gravity Variations at a Coastal Site

## Session Three Spectral Science

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Aswin Sankaranarayanan**: Optical Computing for Hyperspectral Imaging and Material Classification
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **David Benirschke**: Frequency Comb Based Hyperspectral Imaging Systems
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **John Beck**: Spatial Dynamics and Analysis of Crops Using Super Multispectral Image Resolution and Radar Fusion
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **Charles Bachmann**: Hyperspectral Video Imaging and Mapping of Littoral Conditions
- 2:50 - 3:00 Break**
- 3:00 - 3:30 SMSgt **Robert Colter**: Identifying Influence Behaviors Among Nationally Sorted GitHub User Populations

## Session Four Predictive Analytics

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **David Harris**: Evaluating Virtual Reality Training of Cognitive Skills for Counter Terror Policing
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **Christine Brugh**: The Heterogeneity of Terrorist Actors and Outcomes
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **Andrea Bertozzi**, **Bohan Chen**, and Dr. **Christian Parkinson**: Sparsity Models for Spatiotemporal Analysis and Modeling of Human Activity and Social Networks in a Geographic Context
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Drs. **Alvitta Ottley** and **R. Jordan Crouser**: The Role of Individual Differences in Moderating Complex Analytic Workflows
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Dr. **Christopher Metzler**: Data-Driven Solutions to Challenging Imaging Problems

## Session Five Special Materials

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 **Stephen Bass**: Electrically Reconfigurable Antennas
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **Michelle Povinelli**: Designing Microstructured Materials with Tailored Thermal Emission
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **Albert Ryou**: Ultra-Low-Power Microwave-to-Optical Signal Transducers to Facilitate Deep Neural Net Operation
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **Candace Chan**: Expanded Temperature Range Li-Ion Battery Electrolytes Using Eutectic Mixtures
- 2:50 - 3:00 Break**
- 3:00 - 3:30 **Rachel Jones**: Lineament Extraction from SAR and Magnetometry Fused Data Products for Groundwater Potentiality Exploration

## Session Six Robotics

- 12:00 - 12:10 ICARS Opening Introduction  
ODNI Director of Science and Technology, Dr. **John Beiler**
- 12:10 - 12:40 Dr. **Edmund Hunt**: Risk-Sensitive Robot Swarms for Effective Environmental Monitoring and Anomaly Investigation
- 12:40 - 12:50 Break**
- 12:50 - 1:20 Dr. **Byong Kwon**: Artificial Neural Tissue (ANT)-Controlled Robotic Teams for Spatial Structure Assembly/Inspection/Repair
- 1:30 - 1:40 Break**
- 1:40 - 2:10 Dr. **Jason Gross**: Localization and Planning for a UAV/Robot Team in Subterranean Environments
- 2:10 - 2:20 Break**
- 2:20 - 2:50 Dr. **Charles Toth**: Scalable Collaborative Swarm Mapping in GNSS-Denied Environments
- 2:50 - 3:00 Break**
- 3:00 - 3:30 Dr. **Jorge Chen**: Mobile Indoor Laser Scanning Using COTS and Open Source