

## DAY-1 – Thursday, October 6, 2022 (Venue: Bartos Theater)

**8:30-9:00 Opening Remarks**—*Erik Blasch, Sai Ravela, Frederica Darema*

**9:00-9:45 Keynote-1 (Session-Chair: Frederica Darema)**

DDDAS for Systems Analytics in Applied Mechanics

*Yuri Bazilevs*

**9:45-10:45 DDDAS Session 1: Aerospace Systems – I (Session-Chair: Frederica Darema)**

Generalized multifidelity active learning for Gaussian-process-based reliability analysis

*Anirban Chaudhuri, Karen Willcox*

Essential Properties of a Multimodal Hypersonic Object Detection and Tracking System

*Zachary Mulhollan, Marco Gamarra, Anthony Vodacek and Matthew Hoffman*

**10:45-11:00 Break**

**11:00-12:30 DDDAS Session 2: Aerospace Systems – II (Session-Chair: Artem Korobenko)**

Dynamic Airspace Control via Spatial Network Morphing

*David Sacharny, Thomas Henderson and Nicola Wernecke*

Towards the formal verification of data-driven flight awareness: Leveraging the Cramér-Rao lower bound of stochastic functional time series models

*Peiyuan Zhou, Saswata Paul, Airin Dutta, Carlos Varela and Fotis Kopsaftopoulos*

Coupled Sensor Configuration and Path-Planning in a Multimodal Threat Field

*Chase St. Laurent and Raghvendra Cowlagi*

**12:30-13:30 Lunch Break**

**13:30-15:00 DDDAS Workshop - Session 1: Earth Planets, Climate and Life**

13:30 Introduction to CLEPS -- Information-Inference Couplings in Climate, Life, Earth and Planets

*Sai Ravela (MIT)*

14:00 AI Research for Climate Change and Environmental Sustainability

*Claire Monteleoni (CU)*

14:30 Knowledge-guided Machine Learning: Advances in An Emerging Field Combining Scientific Knowledge with Machine Learning

*Anuj Karpatne (Virginia Tech)*

**15:00-15:15 Break**

**15:15-17:15 DDDAS Workshop - Session 2: Earth Planets, Climate and Life**

15:15 New Systems for Intelligent Atmospheric Sensing from Space: CREWSR and VIDEO

*William Blackwell (MIT-LL)*

15:45 Monitoring and Accelerating Sustainable Development with AI

*Stefano Ermon (Stanford)*

16:15 Localizing Climate Impacts for Sustainable Strategies

*Mayank Ojha and Miho Mazereeuw (MIT)*

16:45 The role of social-media advertising algorithms in mediating the climate discourse

*Aruna Sankaranarayanan (MIT)*

**17:00 – End of Day-1**

## DAY-2 – Friday, October 7, 2022 (Venue: Bartos Theater)

**8:15-8:30 2<sup>nd</sup> Day Opening Comments - Erik Blasch and Sai Ravela**

**8:30-9:15 Keynote-2: (Session-Chair: Sai Ravela)**

Computing for Emerging Aerospace Autonomous Vehicles

*Sertac Karaman*

**9:15-10:45 DDDAS Session 3: Space Systems (Session-Chair: Carlos Varela)**

Geometric Solution to Probabilistic Admissible Region Based Track Initialization

*Utkarsh Mishra*, Suman Chakravorty, Islam Hussein, Weston Faber, Siamak Hesar and Benjamin Sunderland

Radar cross-section modeling of space debris

*Justin Henry*, Ram Narayanan and Puneet Singla

High Resolution Imaging Satellite Constellation

*Xiaohua Li*, Yezhan Wang, Yu Chen and Erika Ardiles-Cruz

**10:45-11:00 Break**

**11:00 -12:30 DDDAS Session 4: Network Systems (Session-Chair: Nurcin Celik)**

Reachability Analysis to Track Non-cooperative Satellite in Cislunar Regime

*David Schwab*, Roshan Eapen and Puneet Singla

Physics-Aware Machine Learning for Dynamic, Data-Driven Radar Target Recognition

*Sevgi Gurbuz*

DDDAS for Optimized Design and Management of Wireless Cellular Networks

*Nurcin Celik*, Frederica Darema, Temitope Runsewe, Walid Saad and Abdurrahman Yavuz

**12:30-13:30 Lunch Break**

**13:30-15:30 DDDAS Workshop - Session III: Earth Planets, Climate and Life**

13:30 Learning from observations by combining data assimilation and machine learning

*Tijana Janjic (LMU)*

14:00 Deep Gaussian Processes for Parameter Estimation and Uncertainty Quantification in Nonlinear Dynamical Systems - Applications to Earth System Modeling

*Nishant Yadav (Microsoft)*

14:30 Modeling our future: Advancing climate research and optimization intervention strategies using AI

*Peetak Mitra (PARC)*

15:00 Improving Generalization in Learning Spatiotemporal Dynamics

*Rose Yu (UCSD)*

**15:30-15:40 Break**

**15:40-17:20 DDDAS Session 5: Systems Support Methods (Session-Chair: Alex Aved)**

DDDAS-based Learning for Edge Computing at 5G and Beyond 5G

*Temitope Runsewe*, *Abdurrahman Yavuz*, *Nurcin Celik* and *Walid Saad*

Monitoring and Secure Communications for Small Modular Reactors

*Maria Pantopoulou*, *Stella Pantopoulou*, *Madeleine Roberts*, *Derek Kultgen*, *Lefteri Tsoukalas* and *Alexander Heifetz*

Data Augmentation of High-Rate Dynamic Testing via a Physics-Informed GAN Approach

*Celso Do Cabo*, *Mark Todisco* and *Zhu Mao*

Unsupervised Wave Physics-Informed Representation Learning for Guided Wavefield Reconstruction

*Joel B. Harley*, *Benjamin D Haeffele* and *Harsha Vardhan Tetali*

Passive Radio Frequency-based 3D Indoor Positioning System via Ensemble Learning

*Liangqi Yuan*, *Houlin Chen*, *Robert Ewing* and *Jia Li*

**17:20 – 17:30 Break**

**17:30 – 18:15 POSTERS (Session-Chair: Frederica Darema)**

**18:15 – End of Day-2**

# DDDAS2022 Conference, October 6-10, 2022

## DAY-3 – Saturday, October 8, 2022 (Venue: Bartos Theater)

8:15-8:30 2<sup>nd</sup> Day Opening Comments – Erik Blasch and Sai Ravela

8:30-9:15 Keynote-3: (Session-Chair: Frederica Darema)

From genomics to therapeutics: Single-cell dissection and manipulation of disease circuitry  
*Manolis Kellis*

9:15-10:45 DDDAS Session 6: Deep Learning - I (Session-Chair: Luda Werbos)

Deep Learning Approach for Data and Computing Efficient Situational Assessment and Awareness in Human Assistance and Disaster Response and Damage Assessment Applications

*Jie Wei, Weicong Feng, Philip Morrone, Erika Ardiles-Cruz and*

*SpecAL: Towards Active Learning for Semantic Segmentation of Hyperspectral Imagery*

*Aneesh Rangnekar, Emmett Ientilucci, Chris Kanan and Matthew Hoffman*

Multimodal IR and RF based sensor system for real-time human target detection, identification, and Geolocation

*Peng Cheng, Peter Lin, Yunqi Zhang, Erik Blasch and Genshe Chen*

10:45-11:00 Break

11:00-12:30 DDDAS Session 7: Deep Learning - II (Session-Chair: Luda Werbos)

Learning Interacting Dynamic Systems with Neural Ordinary Differential Equations

Learning Interacting Dynamic Systems with Neural Ordinary Differential Equations

*Song Wen, Hao Wang and Dimitris Metaxas*

Relational Active Feature Elicitation for DDDAS

*Nandini Ramanan, Phillip Odom, Kristian Kersting and Sriraam Natarajan*

Explainable Human-in-the-loop Dynamic Data-Driven Digital Twins

*Nan Zhang, Rami Bahsoon, Nikos Tziritas and Georgios Theodoropoulos*

12:30-13:30 Lunch Break

13:30-15:30 DDDAS Workshop: Earth Planets, Climate and Life - Session IV

13:30 Enhancing Exoplanet Discovery with Deep Learning: Progress and Paths Forward

*Andrew Vanderburg (MIT)*

14:00 Dynamic Data Driven Downscaling

*Anamitra Saha (MIT)*

14:30 Beyond Correlations: Deep Learning for Seismic Interferometry

*Hongyu Sun (Caltech)*

15:30-15:45 Break

15:45-17:00 DDDAS Workshop: Earth Planets, Climate and Life - Session V

15:15 Exploring the Deep with Active Learning

*Genevieve Patterson (Climate.AI)*

15:45 Cooperative control of utility-scale wind farms through flow modeling, uncertainty quantification, and optimization

*Michael Howland (MIT)*

16:15 Data-Efficient Machine Learning for Smart and Energy-Efficient Buildings

*Hari Prasanna Das (Berkeley)*

17:00 – End of Day-3

## DAY-4 – Sunday, October 9, 2022 (Venue: Bartos Theater)

8:15-8:30 2<sup>nd</sup> Day Opening Comments – Erik Blasch and Sai Ravela

8:30-9:15 Keynote-4: (Session-Chair: Erik Blasch)

Data Augmentation to Improve Adversarial Robustness of AI-Based Network Security Monitoring  
*Nathanael Bastian*

9:15-10:45 **DDDAS Workshop: Earth Planets, Climate and Life - Session VI**

9:15 Data-Efficient Automated Machine Learning (AutoML) for High Performance Precision Agriculture (HiPPA)

*Bryan Low (NUS)*

9:45 SICKLE: A Multi-Sensor Satellite Imagery Dataset Annotated with Key Cropping Parameters

*Saket Anand (IIIT)*

10:15 Climate and Computation

*Raf Ferrari (MIT)*

10:45-11:00 Break

11:00-12:30 **DDDAS Session 8: Tracking (Session-Chair: Dimitri Metaxas)**

Transmission Censoring and Information Fusion for Communication-Efficient Distributed Nonlinear Filtering  
*Ruixin Niu*

Distributed Estimation of the Pelagic Scattering Layer using a Buoyancy Controlled Robotic System

*Cong Wei and Derek A. Paley*

Towards a data-driven bilinear Koopman operator for controlled nonlinear systems and sensitivity analysis

*Damien Gueho and Puneet Singla*

12:30-12:45 **Mini-Keynote: (Session-Chair: Dimitri Metaxas)**

Towards Continual Unsupervised Data Driven Adaptive Learning

*Andreas Savakis*

12:45-13:30 Lunch Break

13:30-15:00 **DDDAS Session 9: Security (Session-Chair: Alex Aved)**

Tracking Dynamic Gaussian Density with a Theoretically Optimal Sliding Window Approach

*Yinsong Wang, Yu Ding and Shahin Shahrampour*

Dynamic Data-Driven Digital Twins for Blockchain Systems

*Georgios Diamatopoulos, Nikolaos Tziritas, Rami Bahsoon and Georgios Theodoropoulos*

Adversarial Forecasting through Adversarial Risk Analysis within a DDDAS Framework

*Tahir Ekin, Roi Naveiro and Jose Manuel Camacho Rodriguez*

15:00-15:10 Break

15:10-16:40 **DDDAS Session 10: Distributed Systems (Session-Chair: Alex Aved)**

Power Grid Resilience: Data Gaps for Data-Driven Disruption Analysis

*Maureen Golan, Javad Mohammadi, Erika Ardiles-Cruz, David Ferris, and Philip Morrone*

Attack-resilient Cyber-physical System State Estimation for Smart Grid Digital Twin Design

*Masud Rana, Sachin Shetty, Alex Aved, Erika Ardiles-Cruz, David Ferris and Philip Morrone*

Applying DDDAS Principles for Realizing Optimized and Robust Deep Learning Models at the Edge

*Robert Canady, Xingyu Zhou, Yogesh Barve and Aniruddha Gokhale*

16:40 – End of Day-4

# DDDAS2022 Conference, October 6-10, 2022

## DAY-5 – Monday, October 10, 2022 (Venue: 1-190)

8:15-8:30 2<sup>nd</sup> Day Opening Comments – Erik Blasch and Sai Ravela

8:30-9:15 **Keynote-5: (Session-Chair: Frederica Darema)**

Improving Predictive Models for Environmental Monitoring using Distributed Spacecraft Autonomy  
*Sreeja Nag*

9:15-9:30 **Break**

9:30-12:00 **Panel on Wildfires Session Chairs: Frederica Darema and Sreeja Nag**

Panelists: Ilkay Altintas (UCSD); Jan Coen (NCAR), Fatemeh (Clemson); Milton Halem (UMBC);  
Thomas Huang (NASA JPL); Mrinal Kumar (Ohio State U); Kamran Mohseni/UFI)

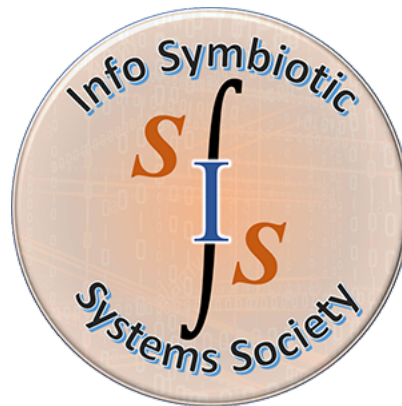
12:00-13:00 **Lunch Break**

13:30-15:00 **DDDAS Workshop: Earth Planets, Climate and Life - Session VII**

Seismic and Nuclear Explosion Monitoring Panel (ARA)

Eli Baker (AFRL), Karianne Bergen (Brown), Abdullah Mueen (UNM), Delaine Reiter (ARA), William Rodi (MIT), Jesse Williams (GTC), TBD (AFTAC).

15:00 **Closing Remarks - Erik Blasch and Sai Ravela**



## IMPORTANT COVID RELATED INFORMATION FOR ONSITE ATTENDEES

There are several COVID related items you must adhere to when visiting campus.

- COVID [Policies - MIT Now](#)
- [Face coverings - MIT Now](#)
- [Building access and visitors - MIT Now](#)

Attendees must attest that they have been fully vaccinated against Covid-19 or have a religious belief or medical condition that prevents them from receiving the vaccine. Tim Ticket users who are eligible for a booster vaccination must also attest to having received the booster shot. [Follow this link to obtain Tim Tickets.](#)

[ <https://visitors.mit.edu/?event=12af4c00-e89b-4dfb-a202-0352ed1d0fdb> ]

- Click or tap on Visitor.
- Enter your mobile number and click Send OTP to receive a one-time PIN code via SMS.
- Enter the PIN code you received and tap Login.
- Enter your contact details and complete the health attestation.
- The app will display a private QR code for you to scan at the electronic readers stationed outside building entrances to gain access.
- Present your Tim Ticket QR code below the scanner. You can display your QR code from the MIT Tim Tickets mobile application or by printing it out from the visitors.mit.edu website.
- Scan your QR code by holding your phone at least 6 inches below the scanner, with the QR code face up.
- Do not hold your phone in front of the scanner, too close to the scanner, or with the screen facing away from the scanner.
- You must repeat the health attestation each day prior to visiting campus. Questions? Email Alma Pellecer: [pellecer@mit.edu](mailto:pellecer@mit.edu)

Information for online attendees has been provided. Any issues, please email [dddas2022@easychair.org](mailto:dddas2022@easychair.org)