

# DDDAS2024 – Agenda

Venue:  
Busch Student Center, Multipurpose Room  
604 Bartholomew Rd, Piscataway, NJ 08854

**DAY-1 – Wednesday, November 6, 2024**

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## **TUTORIALS**

8:15am-12:30pm

Tutorials Sessions

- 8:15am-9:30am TUTORIAL-1: [Adversarial Learning: Secure and Robust, by George Kesidis and David Miller, Penn State University](#)

9:30am-9:45am

Break

- 9:45am-11:00am TUTORIAL-2: [Federated Learning – Introductory Tutorial, by Panos Markopoulos, UT San Antonio](#)

11:00am-11:15am

Break

- 11:15am-12:30pm TUTORIAL-3: [Predictive Digital Twins: From Design to Deployment, by Michael Kapteyn, UT Austin](#)

12noon -1:30pm

Lunch Break

## **MAIN TRACK of CONFERENCE BEGINS**

1:30pm-2:00pm

DDDAS2024 Opening Remarks - Erik Blasch, Frederica Darema, Dimitris Metaxas

2:00pm-2:45pm

Keynote-Session-1 (Session-Chair: Frederica Darema)

*Speaker:* [Sangtae Kim \(Purdue University\) - Updating the Top Ten Ways that DDDAS Can Save the World - An Update from the World of Drug Discovery](#)

## **Paper Presentations:**

2:45pm-3:45pm

DDDAS Session 1: *Materials Systems* – (Session-Chair: TBA)

- **Online Fault Detection for Metal Additive Manufacturing with Data-Driven Time Series Models**

*Authors: Alvin Chen\*; Fotis Kopsaftopoulos; Sandipan Mishra*

- **Weight Decay Optimized Unsupervised Autoencoder Based Anomaly Detection in Uncontrolled Dynamic Structural Health Monitoring**

*Authors: Kang Yang\*; zekun yang; Zhihui Tian; Harsha Vardhan Tetali; Joel B Harley*

- **Novel Deep Learning Image Registration Techniques with Application to Microscopy Images of Metal Alloys**

*Authors: Nathan Johnston; Nathan B Gaw\*; John Wertz; Bruce Cox; Erik Blasch; Matthew Cherry; Sean O'Rourke); Laura Homa*

3:45pm-4:00pm

Break

4:00pm-4:45pm

Keynote-Session-2 (Session-Chair: Frederica Darema)

- *Speaker:* [Theodore Rappaport \(New York University\) -Two Foundational Wireless Technologies Born from Dynamic Data Driven Applications and Systems](#)

4:45pm-5:30pm

Keynote-Session-3 (Session-Chair: Dimitris Metaxas)

- **Speaker (1): [Luis Neves – CEO, GeSI \(Global Enabling Sustainability Initiatives\) To talk about how most advanced digital technologies provided by ICT industry are enabling the acceleration of the sustainability efforts through data-driven science-based tools and metho](#)**
- **Speaker (2): [Chris White – President, NEC Laboratories America – To talk about AI and beyond from the technology point of view with emphasis on the cross-sector and cross-region collaborations to achieve optimal supply and demand decision making and others key areas](#)**

5:30pm

Reception/Dinner Begins

6:30pm–8:00pm

Panel: S&T Advances through DDDAS, Reliable AI, and Digital Twins Approaches (Moderator: Erik Blasch)

- [Nizar Kammourie, CEO, SAWACO Water Desalination and Industrial Divisions, SBCG](#)
- [Walid Saad, The Bradley Department of Electrical and Computer Engineering and NEWS@VTLab, Virginia Tech](#)
- [Brett Savoie, Charles Davidson Associate Professor of Chemical Engineering, Purdue University](#)
- [Molei Tao, Associate Professor, School of Mathematics, Georgia Institute of Technology](#)
- [Vahid Tarokh, Rhodes Family Distinguished Professor of Electrical and Computer Engineering, Duke University](#)
- [Chris White, President, NEC Laboratories America](#)

8:05am-8:15am	<b>Opening Comments</b>
8:15am-10:00am	<b>DDDAS Session-2: Security Systems – I (Session-Chair: TBA)</b> <ul style="list-style-type: none"><li>▪ <b>Dynamic Data Driven Security Framework for Industrial Control Networks using Programmable Switches</b> <i>Authors: Reuben Samson Raj*; Dong Jin</i></li><li>▪ <b>Security of RF Sensing and Imaging Systems in the Age of Digital Twins</b> <i>Authors: Lhamo Dorje; Qian Qu; Xiaohua Li*; Yu Chen; Erika G Ardiles cruz</i></li><li>▪ <b>CCTV-Gun: Benchmarking Handgun Detection in CCTV Images</b> <i>Authors: Zhenghong Li*; Srikar Yellapragada; Kevin Bhadresh Doshi; Purva Makarand Mhasakar; Heng Fan; jie wei; Erik Blasch; Bin Zhang; Haibin Ling</i></li><li>▪ <b>D4: Dynamic Data-Driven Discovery of Adversarial Vehicle Maneuvers</b> <i>Authors: Carlos Hernandez; Diego E Ortiz Barbosa*; Zengxiang Lei; Luis Burbano; Young Park; Satish V. Ukkusuri; Alvaro Cardenas</i></li><li>▪ <b>Data Poisoning: An Overlooked Threat to Power Grid Resilience</b> <i>Authors: Nora Agah*; Javad Mohammadi; alexander aved; David Ferris; Erika G Ardiles cruz; Philip Morrone</i></li><li>▪ <b>GAN-Based Approach for Detecting Energy Deception Attacks in CPS</b> <i>Authors: Papa Pene; Weixian Liao*; Wei Yu</i></li></ul>
10:00am-10:15am	<b>Break</b>
10:15am-11:15am	<b>DDDAS Session-3: Learning Methods (Session-Chair: TBA)</b> <ul style="list-style-type: none"><li>▪ <b>Towards Reliable Neural Optimizers: A Permutation Equivariant Neural Approximation for Information Processing Applications</b> <i>Authors: Meiyi li*; Javad Mohammadi</i></li><li>▪ <b>Fast Topological Data Analysis Feature for Nonstationary Time Series</b> <i>Authors: Daniel A Salazar Martinez*; Arman Razmarashooli; Yang Kang Chua; Simon Laflamme; Chao Hu; Paul Schrader; Austin Downey; Jason Bakos; Gurcan Comert; Negash Begashaw; Jacob Dodson</i></li><li>▪ <b>Predictive Modeling of Application Runtime in Dragonfly Systems</b> <i>Authors: Pietro Lodi Rizzini*; Xin Wang; Kevin A A Brown; Sourav Medya; Zhiling Lan</i></li><li>▪ <b>Adaptive Data Driven Network Slicing and Resource Blocks Assignment using Deep Reinforcement Learning</b> <i>Authors: Abdullah Alsaheal; Brent Langhals; Nurcin Celik*</i></li></ul>
11:15am-12:15pm	<b>DDDAS Session-4: Environmental Systems-I (Session-Chair: TBA)</b> <ul style="list-style-type: none"><li>▪ <b>Large Language Models for Explainable Decisions in Dynamic Digital Twins</b> <i>Authors: Nan Zhang*; Christian Vergara; Georgios Diamantopoulos; Jingran Shen; Nikos Tziritas; Rami K Bahsoon; Georgios Theodoropoulos</i></li><li>▪ <b>DDDAS Probability Learning for Natural Disaster Change Detection</b> <i>Authors: WEICONG FENG*; Ada Agrawal; Haibin Ling; Erik Blasch; Erika G Ardiles cruz; Paul Schrader; jie wei</i></li><li>▪ <b>Dynamic Data-Driven Digital Twin Testbed for Enhanced First Responder Training and Communication</b> <i>Authors: Hieu T Le*; Jian Tao; Alyssa Cassity; Hernan Santos; Erik Priest</i></li></ul>
12:15pm -1:30pm	<b>Lunch Break</b>

1:30pm-3:00pm

**DDDAS Session-5: *Security Systems -II* (Session-Chair: TBA)**

- **Adversarial Attacks and Data-Driven Dynamic Outlier Detection Systems**  
*Authors: Tahir Ekin\*; Laxmi Shaw; Venkata Surya Bellamkonda*
- **Utilizing Matrix Profile with the DDDAS Framework for Anomaly Detection in Nuclear Security**  
*Authors: Miltiadis Alamaniotis\**
- **Development of an Edge Resilient ML Ensemble to Tolerate ICS Adversarial Attacks**  
*Authors: Likai Yao\*; Qinxuan Shi; Zhanglong Yang; Sicong Shao; Salim Hariri*
- **Anomaly Detection Transformer: A Novel Approach for Time Series Analysis of Wearable Health Data**  
*Authors: Shiyang Sima\*; Alok Chaturvedi; Hossein Ghasemkhani; Ritika Chaturvedi*
- **A Spiral-Theoretic Approach for Trustworthy AI/ML in DDDAS**  
*Authors: Aspassia Daskalopulu\*; Alexander Chronaios; Ioannis Goulatis; Lefteri Tsoukalas*

3:00pm-3:15pm

**Break**

3:15pm-4:30pm

**DDDAS Session-6: *Tracking Systems* (Session-Chair: TBA)**

- **Data-Driven Pixel Control: Challenges and Prospects**  
*Authors: Zachary A Daniels\*; Saurabh Farkya; Aswin Raghavan; Gooitzen van der Wal; Michael Isnardi; Michael R Piacentino; David C Zhang*
- **Dynamic Data-Driven Approach for LEO PNT Selection of Satellites with Poorly Known Ephemerides**  
*Authors: Zaher Kassas\*; Joe Saroufim*
- **Improving Physics-based Motion and Physical Parameter Estimations of a Tumbling, Non-cooperative Space Object Through DDDAS**  
*Authors: Rabiul Hasan Kabir\*; Xiaoli Bai*
- **An Expected KLD Based Censoring Strategy for Target Tracking in Distributed Sensor Networks**  
*Authors: Dave Bordenkircher; Ruixin Niu\**
- **Reliable AI for UAVs Through Control/Perception Co-Design**  
*Authors: Veera Venkata Ram Murali Krishna Rao Muvva; Kunjan Theodore Joseph; Marilyn Wolf; Santosh Pilta*

4:30pm-5:45pm

**DDDAS Session-7: *Environmental Systems - II* (Session-Chair: TBA)**

- **A Dynamic Data Driven Agent Based Model for Characterizing the Space Utilization of Asian Elephants in Response to Water Availability**  
*Authors: Anjali Purathekandy; Deepak Subramani\**
- **Adaptive Multi-stage Sensor Fusion under Neuro-symbolic Framework for The Multi-modal Ranging System in Adverse Weather Conditions**  
*Authors: Yajie Bao\*; Peng Cheng; Ping Zhuang; Yunqi Zhang; Zhengyang Fan; Genshe Chen; Erik Blasch; Khanh Pham*
- **Towards a Dynamic Data Driven AI Regional Weather Forecast Model**  
*Authors: Sophia Hamer\*; Jennifer Sleeman; Milton Halem*
- **Autonomous Uncrewed Aircraft for Mobile Operations in Severe Weather**  
*Authors: John Bird\*; Eric W Frew; Brian Argrow*
- **Autonomous Planning for Targeted Observation of Severe Weather**  
*Authors: Michael Moncton\*; Himanshu Gupta; Zachary Sunberg; Eric W Frew*

5:45pm-6:00pm

**Break**

6:00pm

EVENING EVENT(Buffet-Dinner)

6:45pm–8:15pm

Keynote-Session-4 (Session-Chair: Prof. Dimitris Metaxas)

- *Speaker (1):* [Michael Mahoney, head of the Machine Learning and Analytics Group at the Lawrence Berkeley National Laboratory and UC Berkeley – Learning Dynamics with Language Models and Physics](#)
- *Speaker (2):* [Joe Hooper, Director, UN Development Programme Singapore Global Centre](#) to provide examples of technology driven projects with global collaboration network
- *Speaker (3):* [Nizar Kammourie, CEO, SAWACO Water Desalination](#) to talk about the water crisis and the critical role of AI and advanced digital technologies in sustainable water management

- 8:15am-8:35am**      **Opening Comments**
- 8:30am-9:15am**      **Keynote-Session-5 (Session-Chair: TBA)**
- **Speaker: [Karen Willcox - Mathematical and Computational Foundations for Predictive Digital Twins at Scale](#)**
- 9:15am-10:30am**      **DDDAS Session-8: Aerospace Systems & Geomechanics (Session Chair: TBA)**
- **A Probabilistic Machine Learning Pipeline Using Topological Descriptors for Real-Time State Estimation of High-Rate Dynamic Systems**  
*Authors: Yang Kang Chua\*; Daniel Coble; Arman Razmarasholi; Steve Paul; Daniel A Salazar Martinez; Chao Hu; Austin Downey; Simon Laflamme*
  - **Information Fusion of Ultrasonic Waves and Low-Frequency Vibrations: Leveraging Probabilistic Machine Learning and Stochastic Time Series Models for Structural Awareness**  
*Authors: Peiyuan Zhou\*; Yiming Fan; Fotis Kopsaftopoulos*
  - **Earthen Embankment Monitoring using LiDAR data by Randomized Consensus of Topological Data Analysis**  
*Authors: Austin Downey\*; Jie Wei; Sadik Khan; AQM Zohuruzzaman; Jason Bakos; Paul Schrader; Weicong Feng; Erik Blasch; Erika Ardiles-cruz*
- 10:30am-10:45am**      **Break**
- 10:45am-12:15am**      **DDDAS Session-9: Automation & Robotics (Session-Chair: TBA)**
- **Constraint-Aware Diffusion Models for Trajectory Optimization**  
*Authors: Anjian Li\*; Zihan Ding; Adji Bousso Dieng; Ryne Beeson*
  - **Data-Driven Dynamics of Robot Locomotion on Granular Media**  
*Authors: Shiyang Sima\*; Alok Chaturvedi; Hossein Ghasemkhani; Ritika Chaturvedi*
  - **A Physics-Enhanced Deep Learning Model for Fast Prediction of the Behavior of a Forced Dynamic System**  
*Authors: Ou Ma\*; Yufeng Sun*
  - **Edge-to-Cloud AI-Assisted Augmented Reality for Robust and Real-time Assistance to Operators**  
*Authors: Robert E Canady\*; Akhilesh Raj; Bach Tran; Shivakumar Sastry; Aniruddha S Gokhale*
  - **CAD Model Guided Semantic Segmentation for Radar Micro-UAV Signature Synthesis Across Different Clutter Environments**  
**Transformer: A Novel Approach for Time Series Analysis of Wearable Health Data**  
*Authors: Sean Kearney; Sevgi Z Gurbuz\**
- 12:15pm-1:00pm**      **Lunch Break (Catered Lunch)**

**1:00pm-2:00pm**

**Session-10: Session – AI/DL Techniques (Session-Chair: TBA)**

- **Explainable Diffusion Model via Schroedinger Bridge in Multimodal Image Translation**

*Authors: Zhengyi Lu\**

- **Using Mamba for Modeling Dynamical Systems in a Limited Data Senario**

*Authors: Hunter Quebedeaux\*; Tarek A Elgohary*

- **Application of a state space based neural network model for Uncertainty Propagation in dynamical systems**

*Authors: Pugazhenth Sivasankar\**

- **From Positive to Negative: On the Role of Negative Data in Enhancing Generative Models for Engineering Constraint Satisfaction**

*Authors: Lyle Regenwetter\*; Faez Ahmed*

**2:15pm-3:00pm**

**Student-Papers Awards / Closing Discussion/Comments**