

DDDAS2024 – Agenda

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

DAY-1 – Wednesday, November 6, 2024

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: Miltos Alamaniotis)

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

- 1:30pm-3:00pm** **DDDAS Session-5: *Security Systems -II* (Session-Chair: Francesco Restuccia)**
- **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: Salim Hariri)**
- **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: Haibin Ling)**
- **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(Buffer-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: Marilyn Wolf)**
- **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 Razmarashooli; 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: Zachary Daniels)**
- **Constraint-Aware Diffusion Models for Trajectory Optimization**
Authors: Anjian Li; Zihan Ding; Adji Bouso Dieng; Ryne Beeson*
 - **Data-Driven Dynamics of Robot Locomotion on Granular Media**
Authors: Christina Nikiforidou; Balakumar Balachandran
 - **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: Jie Wei)

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

*Authors: Zhengyi Lu**

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

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