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, Anirban Chaudhuri, Sebastian Henao-Garcia, Prof. Karen Willcox, 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: 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)**

- **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**

DAY-2 – Thursday, November 7, 2024

8:05am-8:15am **Opening Comments**

8:15am-10:00am **DDDAS Session-2: *Security Systems – I* (Session-Chair: Na Li)**

- **Dynamic Data Driven Security Framework for Industrial Control Networks using Programmable Switches**
  Authors: Reuben Samson Raj; Dong Jin*
- **Security of RF Sensing and Imaging Systems in the Age of Digital Twins**
  Authors: Lhamo Dorje; Qian Qu; Xiaohua Li; Yu Chen; Erika G Ardiles cruz*
- **CCTV-Gun: Benchmarking Handgun Detection in CCTV Images**
  Authors: Zhenghong Li; Srikar Yellapragada; Kevin Bhadresh Doshi; Purva Makarand Mhasakar; Heng Fan; jie wei; Erik Blasch; Bin Zhang; Haibin Ling*
- **D4: Dynamic Data-Driven Discovery of Adversarial Vehicle Maneuvers**
  Authors: Carlos Hernandez; Diego E Ortiz Barbosa; Zengxiang Lei; Luis Burbano; Young Park; Satish V. Ukkusuri; Alvaro Cardenas*
- **Data Poisoning: An Overlooked Threat to Power Grid Resilience**
  Authors: Nora Agah; Javad Mohammadi; alexander aved; David Ferris; Erika G Ardiles cruz; Philip Morrone*
- **GAN-Based Approach for Detecting Energy Deception Attacks in CPS**
  Authors: Papa Pene; Weixian Liao; Wei Yu*

10:00am-10:15am **Break**

10:15am-11:15am **DDDAS Session-3: *Learning Methods* (Session-Chair: Molei Tao)**

- **Towards Reliable Neural Optimizers: A Permutation Equivariant Neural Approximation for Information Processing Applications**
  Authors: Meiyi li; Javad Mohammadi*
- **Fast Topological Data Analysis Feature for Nonstationary Time Series**
  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*
- **Predictive Modeling of Application Runtime in Dragonfly Systems**
  Authors: Pietro Lodi Rizzini; Xin Wang; Kevin A A Brown; Sourav Medya; Zhiling Lan*
- **Adaptive Data Driven Network Slicing and Resource Blocks Assignment using Deep Reinforcement Learning**
  *Authors: Abdullah Alsaheal; Brent Langhals; Nurcin Celik**

11:15am-12:15pm **DDDAS Session-4: *Environmental Systems-I* (Session-Chair: Nurcin Celik)**

- **Large Language Models for Explainable Decisions in Dynamic Digital Twins**
  Authors: Nan Zhang; Christian Vergara; Georgios Diamantopoulos; Jingran Shen; Nikos Tziritas; Rami K Bahsoon; Georgios Theodoropoulos*
- **DDDAS Probability Learning for Natural Disaster Change Detection**
  Authors: WEICONG FENG; Ada Agrawal; Haibin Ling; Erik Blasch; Erika G Ardiles cruz; Paul Schrader; jie wei*
- **Dynamic Data-Driven Digital Twin Testbed for Enhanced First Responder Training and Communication**
  Authors: Hieu T Le; Jian Tao; Alyssa Cassity; Hernan Santos; Erik Priest*

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(Buffet-Dinner)**
6:45pm–8:15pm	**Keynote-Session-4 (Session-Chair: Prof. Dimitris Metaxas)** ▪ ***Speaker:*** ***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

DAY-3 – Friday, November 8, 2024

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-10:15am **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*

10:15am-10:30am **Break**

10:30am-12:00pm **DDDAS Session-9: *Automation & Robotics* (Session-Chair: Zachary Daniels)**

- **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: 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**

12:00pm-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: Pugazhenthi 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**