



2016 Annual Review of the AFOSR DDDAS Program

Dr. Frederica Darema | January 27-29, 2016 | Arlington, VA

Basic Research Innovation and Collaboration Center (BRICC)
4075 Wilson Blvd., Suite 350 – Liberty Room
Arlington, VA 22203

Agenda Day 1 – January 27, 2016

Time	Title	Speaker
7:30-8:00	Registration	
8:00-8:30	Introduction to the Program	Frederica Darema
Air Vehicle Structural Health Monitoring – Environment Cognizant		
8:30-10:00	<ul style="list-style-type: none"> ➤ Advanced Simulation, Optimization, and Health Monitoring of Large Scale Structural Systems <ul style="list-style-type: none"> ○ <i>PI: Yuri Bazilevs (UCSD), and Team</i> ➤ Dynamic Data-Driven Methods for Self-Aware Aerospace Vehicles <ul style="list-style-type: none"> ○ <i>PI: Karen Willcox (MIT), and Team</i> ➤ Progressive Fault Identification and Prognosis in Aircraft Structure Based on Dynamic Data Driven Adaptive Sensing and Simulation <ul style="list-style-type: none"> ○ <i>Shiyu Zhou (U. Wisconsin)</i> 	
10:00-10:15	BREAK	
10:15-11:00	<ul style="list-style-type: none"> ➤ Robust Data-Driven Aero-elastic Flight Envelope Tailoring <ul style="list-style-type: none"> ○ <i>Balachandran, University of Maryland</i> ➤ Dynamic Data-driven Prediction, Measurement Adaptation, and Active Control of Combustion Instabilities in Aircraft Gas Turbine Engines <ul style="list-style-type: none"> ○ <i>Asok Poy, PennState</i> 	
11:15-12:15	<ul style="list-style-type: none"> ➤ An Integrated Approach to the Space Situational Awareness Problem <ul style="list-style-type: none"> ○ <i>PI: Suman Chakravorty (TAMU), and Team</i> ➤ Cloud Computing Based Robust Space Situational Awareness <ul style="list-style-type: none"> ○ <i>Raktim Bhattacharya, TexasA&M</i> 	
12:15-12:45	LUNCH (Pick-up Lunches)	
Spatial Situational Awareness (UAV Swarms + Ground Systems Coordination)		
12:45-3:00	<ul style="list-style-type: none"> ➤ EAGER- Real-time Discovery and Timely Event Detection from Dynamic and Multi-Modal Data Streams <ul style="list-style-type: none"> ○ <i>Schaar, UCLA</i> ➤ Dynamic Data-Driven Motion Planning and Control for Pervasive Situational Awareness Application Systems <ul style="list-style-type: none"> ○ <i>PI: Sertac Karaman (MIT), and Team</i> ➤ An Adaptive Distributed Approach to DDAS for Surveillance Missions with UAV Swarms <ul style="list-style-type: none"> ○ <i>Gupta, U of NotreDame</i> 	

	<ul style="list-style-type: none"> ➤ EAGER- Novel Approaches for Optimization, Control, and Learning in Distributed Multi-Agent Networks <ul style="list-style-type: none"> ○ <i>Yin(Wotao), UCLA</i> ➤ EAGER-DynamicData: Generative Statistical Modeling for Dynamic and Distributed Data <ul style="list-style-type: none"> ○ <i>Li(Jia), Pennsylvania State Univ</i> ➤ EAGER- Adaptive Ensemble-Based Uncertainty Prediction for Satellite Collision Avoidance <ul style="list-style-type: none"> ○ <i>Ridley, University of Michigan Ann Arbor</i>
3:00-3:15	BREAK
	(UAV Swarms + Ground Systems Coordination)
3:15-4:14	<ul style="list-style-type: none"> ➤ Dynamic Data Driven Adaptation via Embedded Software Agents for Border Control Scenario <ul style="list-style-type: none"> ○ <i>PI: Shashi Phoha (Penn State), and Team</i> ➤ Multiscale Analysis of Multimodal Imagery for Cooperative Sensing <ul style="list-style-type: none"> ○ <i>PIs: Erik Blasch, Guna Seetharaman, RI Directorate, AFRL</i> ➤ Energy-Aware Time Change Detection using Synthetic Aperture Radar on High-Performance Heterogeneous Architectures: A DDDAS Approach <ul style="list-style-type: none"> ○ <i>Ranka, UofFlorida</i>
4:15-5:00	<ul style="list-style-type: none"> ➤ EAGER - Dynamic Data-Driven Random Sampling and Consensus for Large-Scale Learning Algorithms <ul style="list-style-type: none"> ○ <i>Giannakis, University of Minnesota</i> ➤ EAGER- Management of Dynamic Big Sensory Data <ul style="list-style-type: none"> ○ <i>Cai, Georgia State University</i> ➤ EAGER- Subspace Learning From Binary Sensing <ul style="list-style-type: none"> ○ <i>Chi, Ohio State University</i>
5:00-6:00	Discussion of all Projects Discussed in Day 1
6:00	MEETING ADJOURNED FOR THE DAY

Agenda Day 2 – January 28, 2016

Time	Title	Speaker
7:30-10:00	<ul style="list-style-type: none"> ➤ Dynamic Data Driven Information Fusion For Situational Awareness <ul style="list-style-type: none"> ○ <i>Biao Chen, Syracuse University</i> ➤ Collaborative Image Processing in Vehicle Ensembles via Probabilistic Graphical Models and a Self-optimizing Support System <ul style="list-style-type: none"> ○ <i>Jose Martinez, Cornell U.</i> ➤ Dynamic Modality Switching Aided Object Tracking using an Adaptive Sensor <ul style="list-style-type: none"> ○ <i>Matthew Hoffman, RIT</i> ➤ Software for Data Streaming Analytics and its Application to Safer Flight Systems <ul style="list-style-type: none"> ○ <i>Varela, RPI</i> ➤ DDDAMS-based Urban Surveillance and Crowd Control via Aerostats & UAVs and UGVs <ul style="list-style-type: none"> ○ <i>PI: Young-Jun Son (University of Arizona), and Team</i> 	
10:00-10:15	BREAK	
10:15-12:15	<p>Energy Efficiencies</p> <ul style="list-style-type: none"> ➤ (YIP) DDDAMS-based Real-time Assessment and Control of Electric-Microgrids <ul style="list-style-type: none"> ○ <i>PI: Nurcin Celik (University of Miami)</i> ➤ EAGER- A Scalable Framework for Data-Driven real-Time Event Detection in Power Systems <ul style="list-style-type: none"> ○ <i>Dominguez-Garcia, UIUC</i> ➤ EAGER- A Hierarchical Approach to Dynamic Big Data Analysis in Power Infrastructure Security <ul style="list-style-type: none"> ○ <i>Mohsenian-Rad, UCRiverside</i> ➤ EAGER- Data-Driven Operation and Maintenance of Wind Energy Systems under Uncertainty <ul style="list-style-type: none"> ○ <i>Perez, Texas State University - San Marcos</i> ➤ EAGER- Collaborative Research: Dynamically Data-driven Morphing of Reduced Order Models and the Prediction of Transients <ul style="list-style-type: none"> ○ <i>Sapsis, Massachusetts Institute of Technology</i> ➤ EAGER- Machine Intelligence for Dynamic Data-Driven Morphing of Nodal Demand in Smart Energy Systems <ul style="list-style-type: none"> ○ <i>Tsoukalas, Purdue U.</i> ➤ EAGER- Power Aware Data Driven Distributed Simulation on Micro-Cluster Platforms <ul style="list-style-type: none"> ○ <i>Fujimoto</i> 	
12:15-1:00	LUNCH	
1:00-3:00	<p>Space Weather and Atmospheric Events – Modeling/Observations</p> <ul style="list-style-type: none"> ➤ Guna Seetharaman ➤ Fluid SLAM and the Robotic Reconstruction of Localized Atmospheric Phenomena <ul style="list-style-type: none"> ○ <i>PI: Sai Ravela (MIT)</i> ➤ Retrospective Cost Model Refinement and State Estimation for Space Weather Modeling and Prediction <ul style="list-style-type: none"> ○ <i>Dennis Bernstein, UMich</i> ➤ Dynamic Data-Driven UAV Network for Plume Characterization <ul style="list-style-type: none"> ○ <i>PI: Kamran Mohseni (U. of Florida)</i> 	

	<ul style="list-style-type: none"> ➤ EAGER- Transforming Wildfire Detection and Growth Forecasting with Smart Sensing <ul style="list-style-type: none"> ○ Coen, NCAR
3:15-3:30	BREAK
	Sensing&Tracking
3:30-4:30	<ul style="list-style-type: none"> ➤ Optimized Routing of Intelligent, Mobile Sensors for Dynamic, Data-Driven Sampling <ul style="list-style-type: none"> ○ PI: Derek Paley (UMD) ➤ A Distributed Dynamic Data Driven Applications System (DDDAS) for Multi-Threat Tracking <ul style="list-style-type: none"> ○ Schizas, UT Arlington
4:30-5:15	Materials Modeling
	<ul style="list-style-type: none"> ➤ Dynamic, Data-Driven Modeling of Nanoparticle Self Assembly Processes <ul style="list-style-type: none"> ○ Y. Ding (TAMU), and Team ➤ EAGER- A New Scalable Paradigm for Optimal resource Allocation in Dynamic Data Systems via Multi-Scale and Multi-Fidelity Simulation and Optimization <ul style="list-style-type: none"> ○ Xu(Jie), George Mason U.
5:15-6:00	Discussion of all Projects Discussed in Day 2
6:00	MEETING ADJOURNED FOR THE DAY

Agenda Day 3 – January 29, 2016

Time	Title	Speaker
8:00-10:00	<ul style="list-style-type: none"> ➤ Dynamic Integration of Motion and Neural Data to Capture Human Behavior <ul style="list-style-type: none"> ○ <i>PI: Dimitri Metaxas (Rutgers U), and Team inadvertently</i> ➤ Stateless Networking: Principles, Architectures, and Codes <ul style="list-style-type: none"> ○ <i>Wornell, MIT</i> ➤ Stateless Networking: Principles, Architectures, and Codes, <ul style="list-style-type: none"> ○ <i>Parrilo, MIT</i> ➤ Universal Laws and Architectures <ul style="list-style-type: none"> ○ <i>John Doyle, CalTech</i> 	
10:00-10:15	BREAK	
10:15-12:15	<ul style="list-style-type: none"> ➤ Using Trajectory Sensor Data Stream Cleaning to Ensure the Survivability of Mobile Wireless Sensor Networks in Cyberspace <ul style="list-style-type: none"> ○ <i>PI: Niki Pissinou, Florida International University</i> ➤ Adaptive Stream Mining: A Novel Dynamic Computing Paradigm for Knowledge Extraction <ul style="list-style-type: none"> ○ <i>PI: Shuvra Bhattacharyya (U. Of Maryland) and Team</i> ➤ Data-Adaptable Modeling and Optimization for Runtime Adaptable Systems <ul style="list-style-type: none"> ○ <i>Roman Lycesky</i> ➤ Cloud support for Surveillance <ul style="list-style-type: none"> ○ <i>Alex Aved, AFR:/RI</i> 	
12:15-1:00	LUNCH (Pick-up Lunches) Discussion of all Projects Discussed in Morning of Day 3	
1:00-2:00	Systems Software CyberSecurity	
	<ul style="list-style-type: none"> ➤ Data-Driven and Real-Time Verification for Industrial Control System Security <ul style="list-style-type: none"> ○ <i>Kevin Jin (Illinois Institute of Technology)</i> ➤ DDDAS-based Resilient Cyberspace (DRCS) <ul style="list-style-type: none"> ○ <i>PI: Salim Hariri (University of Arizona. Tucson), and Team</i> 	
2:00-3:00	Systems Software	
	<ul style="list-style-type: none"> ➤ Performance Analysis and Diagnosis of Cloud-based DDDAS Applications <ul style="list-style-type: none"> ○ <i>Mohammad Khan, UConn</i> ➤ (YIP) From Sensor Data to High-value Information: ultra-low-energy platforms for deriving inferences from complex embedded signals <ul style="list-style-type: none"> ○ <i>Naveen Verma (Princeton U.)</i> 	
3:00-3:15	BREAK	
	Systems Software (cont'd)	

<p>3:15-4:15</p>	<ul style="list-style-type: none"> ➤ Amorphous Polyhedral Model for Stochastic Control of Autonomous UAVs <ul style="list-style-type: none"> ○ <i>PI: Sanjay Rajopadhye</i> (Colorado State) ➤ Architecture and Programming Models for High Performance Interactive Computation <ul style="list-style-type: none"> ○ <i>PI: XiaoMing Li and Guang Gao</i> (U of Delaware) ; Jack Dennis and Arvind (MIT) ➤ Hybrid Systems Modeling and Middleware-enabled DDDAS for Next-generation US Air Force Systems <ul style="list-style-type: none"> ○ <i>PI: Aniruddha Gokhale</i> (Vanderbilt U.), and Team
<p>4:15-6:00</p>	<p>Discussion of all Projects – Collaborations, Directions in the Program</p>
<p>6:00</p>	<p style="text-align: center;">MEETING ADJOURNED</p>