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 and Chengshan Xiao

8:30-10:00	**Air Vehicle Structural Health Monitoring – Environment Cognizant**
	
	➢ Advanced Simulation, Optimization, and Health Monitoring of Large Scale Structural Systems
	   ○ *PI: Yuri Bazilevs (UCSD), and Team*
	➢ Dynamic Data-Driven Methods for Self-Aware Aerospace Vehicles
	   ○ *PI: Karen Willcox (MIT), and Team*
	➢ Progressive Fault Identification and Prognosis in Aircraft Structure Based on Dynamic Data Driven Adaptive Sensing and Simulation
	   ○ *Shiyu Zhou (U. Wisconsin)*	

10:00-10:15	**BREAK**	

10:15-11:15	➢ Robust Data-Driven Aero-elastic Flight Envelope Tailoring
	   ○ *Balachandran,* University of Maryland
	➢ Dynamic Data-driven Prediction, Measurement Adaptation, and Active Control of Combustion Instabilities in Aircraft Gas Turbine Engines
	   ○ *Asok Ray, PennState*	

11:15-12:15	➢ An Integrated Approach to the Space Situational Awareness Problem
	   ○ *PI: Suman Chakravorty (TAMU) , and Team*
	➢ Cloud Computing Based Robust Space Situational Awareness
	   ○ *Raktim Bhattacharya, TexasA&M*	

12:15-12:45	**LUNCH (Pick-up Lunches)**	

12:45-3:00	**Spatial Situational Awareness (UAV Swarms + Ground Systems Coordination)**
	
	➢ EAGER- Real-time Discovery and Timely Event Detection from Dynamic and Multi-Modal Data Streams
	   ○ Schaar, UCLA
	➢ Dynamic Data-Driven Motion Planning and Control for Pervasive Situational Awareness Application Systems
	   ○ *PI: Sertac Karaman (MIT), and Team*
	➢ An Adaptive Distributed Approach to DDAS for Surveillance Missions with UAV Swarms
	   ○ *Gupta, U of NotreDame*	

	- EAGER- Adaptive Ensemble-Based Uncertainty Prediction for Satellite Collision Avoidance *Ridley, University of Michigan Ann Arbor* - EAGER- Management of Dynamic Big Sensory Data *Cai, Georgia State University* - EAGER- Generative Statistical Modeling for Dynamic and Distributed Data *Li(Jia), Pennsylvania State Univ*
3:00-3:15	**BREAK**
3:15-4:15	**(UAV Swarms + Ground Systems Coordination)** - Dynamic Data Driven Adaptation via Embedded Software Agents for Border Control Scenario *PI: Shashi Phoha (Penn State), and Team* - Multiscale Analysis of Multimodal Imagery for Cooperative Sensing *PIs: Erik Blasch, Guna Seetharaman, RI Directorate, AFRL* - Energy-Aware Time Change Detection using Synthetic Aperture Radar on High-Performance Heterogeneous Architectures: A DDDAS Approach *Ranka, UofFlorida*
4:15-5:00	- EAGER- Subspace Learning From Binary Sensing *Chi, Ohio State University* - Cloud-Based Preception and Control of Sensor Nets and Robot Swarms *Geoffrey Fox*
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	- Dynamic Data Driven Information Fusion For Situational Awareness *Biao Chen, Syracuse University* - Collaborative Image Processing in Vehicle Ensembles via Probabilistic Graphical Models and a Self-optimizing Support System *Jose Martinez, Cornell U.* - Dynamic Modality Switching Aided Object Tracking using an Adaptive Sensor *Matthew Hoffman, RIT* - Software for Data Streaming Analytics and its Application to Safer Flight Systems *Varela, RPI* - DDDAMS-based Urban Surveillance and Crowd Control via Aerostats & UAVs and UGVs *PI: Young-Jun Son (University of Arizona), and Team*	
10:00-10:15	**BREAK**	
10:15-12:15	**Energy Efficiencies** (YIP) DDDAMS-based Real-time Assessment and Control of Electric-Microgrids *PI: Nurcin Celik (University of Miami)* - EAGER- A Scalable Framework for Data-Driven real-Time Event Detection in Power Systems *Dominguez-Garcia, UIUC* - EAGER- A Hierarchical Approach to Dynamic Big Data Analysis in Power Infrastructure Security *Mohsenian-Rad, UCRiverside* - EAGER- Data-Driven Operation and Maintenance of Wind Energy Systems under Uncertainty *Perez, Texas State University - San Marcos* - EAGER- Collaborative Research: Dynamically Data-driven Morphing of Reduced Order Models and the Prediction of Transients *Sapsis, Massachusetts Institute of Technology* - EAGER- Machine Intelligence for Dynamic Data-Driven Morphing of Nodal Demand in Smart Energy Systems *Tsoukalas, Purdue U.* - EAGER- Power Aware Data Driven Distributed Simulation on Micro-Cluster Platforms - Fujimoto	
12:15-1:00	**LUNCH**	
1:00-3:00	**Space Weather and Atmospheric Events – Modeling/Observations** - Fluid SLAM and the Robotic Reconstruction of Localized Atmospheric Phenomena *PI: Sai Ravela (MIT)* - Retrospective Cost Model Refinement and State Estimation for Space Weather Modeling and Prediction - Dennis Bernstein, UMich - Dynamic Data-Driven UAV Network for Plume Characterization *PI: Kamran Mohseni (U. of Florida)* - EAGER- Transforming Wildfire Detection and Growth Forecasting with Smart	

	Sensing ○ *Coen, NCAR* ➢ EAGER- Dynamic Data-Driven Random Sampling and Consensus for Large-Scale Learning Algorithms ○ *Giannakis, University of Minnesota* ➢ EAGER- Novel Approaches for Optimization, Control, and Learning in Distributed Multi-Agent Networks ○ *Yin(Wotoo), UCLA*
3:15-3:30	**BREAK**
3:30-4:30	**Sensing &Tracking** ➢ Optimized Routing of Intelligent, Mobile Sensors for Dynamic, Data-Driven Sampling ○ *PI: Derek* Paley (UMD) ➢ A Distributed Dynamic Data Driven Applications System (DDDAS) for Multi-Threat Tracking ○ *Schizas, UTArlington*
4:30-5:15	**Materials Modeling**
	➢ Dynamic, Data-Driven Modeling of Nanoparticle Self Assembly Processes ○ *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 ○ *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	➤ Dynamic Integration of Motion and Neural Data to Capture Human Behavior
	    o *PI: Dimitri Metaxas (Rutgers U), and Team inadvertently*
	➤ Stateless Networking: Principles, Architectures, and Codes
	    o *Wornell, MIT*
	➤ Stateless Networking: Principles, Architectures, and Codes,
	    o *Parrilo, MIT*
	➤ Universal Laws and Architectures
	    o John *Doyle, CalTech*	

10:00-10:15	**BREAK**	

10:15-12:15	➤ Using Trajectory Sensor Data Stream Cleaning to Ensure the Survivability of Mobile Wireless Sensor Networks in Cyberspace
	    o *PI: Niki Pissinou, Florida International University*
	➤ Adaptive Stream Mining: A Novel Dynamic Computing Paradigm for Knowledge Extraction
	    o *PI: Shuvra Bhattacharyya (U. Of Maryland) and Team*
	➤ Data-Adaptable Modeling and Optimization for Runtime Adaptable Systems
	    o *Roman Lysecky*
	➤ Cloud support for Surveillance
	    o *Alex Aved, AFR:/RI*	

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**	

	➤ Data-Driven and Real-Time Verification for Industrial Control System Security
	    o *Kevin Jin (Illinois Institute of Technology)*
	➤ DDDAS-based Resilient Cyberspace (DRCS)
	    o *PI: Salim Hariri (University of Arizona. Tucson), and Team*	

2:00-3:00	**Systems Software**	

	➤ Performance Analysis and Diagnosis of Cloud-based DDDAS Applications
	    o *Mohammad Khan, UConn*
	➤ (YIP) From Sensor Data to High-value Information: Ultra-low-energy Platforms for Deriving Inferences from Complex Embedded Signals
	    o *Naveen Verma (Princeton U.)*	

3:00-3:15	**BREAK**	
	Systems Software (cont'd)	

3:15-4:45	➢ [Amorphous Polyhedral Model for Stochastic Control of Autonomous UAVs](#) 　　o *PI: Sanjay* Rajopadhye (Colorado State) ➢ Architecture and Programming Models for High Performance Interactive Computation 　　o *PI: XiaoMing Li and Guang Gao* (U of Delaware) ; Jack Dennis and Arvind (MIT) ➢ [Hybrid Systems Modeling and Middleware-enabled DDDAS for Next-generation US Air Force Systems](#) 　　o *PI: Aniruddha Gokhale (Vanderbilt U.), and Team*
4:45-6:00	**Discussion of all Projects – Collaborations, Directions in the Program**
6:00	**MEETING ADJOURNED**