

**FY 2009 MULTIDISCIPLINARY UNIVERSITY RESEARCH INITIATIVE (MURI) – SELECTED PROJECTS**

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Agency	MURI Title	Lead Institution Team Member Institutions <sup>1</sup>	Principal Investigator	State
<b>MURI Topic 1: Cellular, Molecular, Genetic and Biochemical Correlates of Training</b>				
ONR	How Unsupervised Learning Impacts Training: From Brain to Behavior	University of California, San Diego University of California, Irvine	Howard Poizner	CA CA
ONR	From Attentive to Automatic Performance: A Multi-Scale, Multi-Species, and Multi-Modal Investigation of Spatial Learning	George Mason University	Giorgio Ascoli	VA
<b>MURI Topic 2: Removing the Botnet Threat</b>				
ONR	Infiltration of Botnet Command & Control and Support Ecosystems	University of California, San Diego University of California, Berkeley International Computer Science Institute <sup>2</sup>	Stefan Savage	CA CA
ONR	Botnet Attribution and Removal: from Axioms to Theories to Practice	Georgia Institute of Technology University of Michigan Stanford University University of California, Santa Barbara	Wenke Lee	GA MI CA CA
<b>MURI Topic 3: Machine Intelligence and Adaptive Classification for Autonomous Systems</b>				
	No Award Made			
<b>MURI Topic 4: Highly Decentralized Autonomous Systems for Force Protection and Damage Control</b>				
ONR	ANTIDOTE: Adaptive Networks for Threat and Intrusion Detection or Termination	University of Southern California Carnegie Mellon University University of Pennsylvania Massachusetts Institute of Technology	Gaurav Sukhatme	CA PA PA MA
<b>MURI Topic 5: Bio-inspired Autonomous Agile Sensing and Exploitation of Regions of Interest within Wide Complex Scenes</b>				
ONR	Figure-Ground Processing, Saliency and Guided Attention for Analysis of Large Natural Scenes	Johns Hopkins University Yale University California Institute of Technology University of Maryland, College Park Harvard University	Ernst Niebur	MD CT CA MD MA

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2. An independent, non-profit research institute is identified in the lead institution's proposal. No MURI funding will be provided to the independent, non-profit research institute.

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<b>MURI Topic 6: Computational Intelligence for Decentralized Teams of Autonomous Agents</b>				
<b>ONR</b>	<b>Decentralized Reasoning in Reduced Information Spaces</b>	<b>Carnegie Mellon University</b> Massachusetts Institute of Technology University of Pennsylvania University of Illinois, Urbana-Champaign University of Washington	<b>Andrew Bagnell</b>	<b>PA</b> MA PA IL WA
<b>ONR</b>	<b>Smart Adaptive Reliable Teams for Persistent Surveillance (SMARTS)</b>	<b>Massachusetts Institute of Technology</b> Boston University University of California, Berkeley University of Pennsylvania	<b>Daniella Rus</b>	<b>MA</b> MA CA PA
<b>MURI Topic 7: Dynamic Biological Adaptations to the Undersea Light Field</b>				
<b>ONR</b>	<b>Dynamic Camouflage in Benthic and Pelagic Cephalopods: An Interdisciplinary Approach to Crypsis Based on Color, Reflection, and Bioluminescence</b>	<b>Duke University</b> University of California, Santa Barbara University of California, San Diego	<b>Sonke Johnsen</b>	<b>NC</b> CA CA
<b>ONR</b>	<b>Development of Biological Response to the Dynamic Spectral-Polarized Underwater Light Field</b>	<b>University of Texas, Austin</b> University of Connecticut University of Rhode Island City College, City University of New York Texas A&M University Stanford University	<b>M Cummings</b>	<b>TX</b> CT RI NY TX CA
<b>MURI Topic 8: Grounding Language Understanding in Cognitive Architecture</b>				
<b>ONR</b>	<b>Unified Theories of Language and Cognition</b>	<b>Rensselaer Polytechnic Institute</b> Arizona State University University of Maryland, Baltimore County Stanford University University of Southern California	<b>Nicholas Cassimatis</b>	<b>NY</b> AZ MD CA CA

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<b>MURI Topic 9: Tailoring Electronic Bandgap of Nanostructured Graphene</b>				
<b>ONR</b>	<b>Functionalized Nanoscale Graphene: A Platform for Integrated Nanodevices</b>	<b>University of California, Berkeley</b> Rice University University of California, Los Angeles	<b>Michael Crommie</b>	<b>CA</b> <b>TX</b> <b>CA</b>
<b>ONR</b>	<b>Tailoring Electronic Properties of Graphene at the Nanoscale</b>	<b>University of Maryland, College Park</b> Columbia University Purdue University Stanford University University of Florida	<b>Michael Fuhrer</b>	<b>MD</b> <b>NY</b> <b>IN</b> <b>CA</b> <b>FL</b>
<b>ONR</b>	<b>Graphene Approaches to Terahertz Electronics (GATE)</b>	<b>Massachusetts Institute of Technology</b> Harvard University Boston University	<b>Michael Strano</b>	<b>MA</b> <b>MA</b> <b>MA</b>
<b>MURI Topic 10: Neurological System-Inspired Multifunctional Materials Design for Autonomous State Awareness Against Exogenous Threats</b>				
<b>AFOSR</b>	<b>Bio-Inspired Intelligent Sensing Materials for Fly-by-Feel Autonomous Vehicle</b>	<b>Stanford University</b> University of California, Los Angeles University of Denver University of Washington University of British Columbia <sup>3</sup>	<b>Fu-Kuo Chang</b>	<b>CA</b> <b>CA</b> <b>CO</b> <b>WA</b>
<b>MURI Topic 11: Chemical Energy Enhancement by Nonequilibrium Plasma Species</b>				
<b>AFOSR</b>	<b>Fundamental Mechanisms, Predictive Modeling, and Novel Aerospace Applications of Plasma Assisted Combustion</b>	<b>Ohio State University</b> Princeton University Drexel University Georgia Institute of Technology Pennsylvania State University	<b>Walter Lempert</b>	<b>OH</b> <b>NJ</b> <b>PA</b> <b>GA</b> <b>PA</b>

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<b>MURI Topic 12: Ultracold Molecules</b>				
<b>AFOSR</b>	<b>Production, Manipulation, and Applications of Ultracold Molecules</b>	<b>University of Connecticut</b> Harvard University Massachusetts Institute of Technology Yale University Temple University University of Colorado	<b>Susanne Yelin</b>	<b>CT</b> MA MA CT PA CO
<b>AFOSR</b>	<b>Ultracold Polar Molecules: New Phases of Matter for Quantum Information and Quantum Control</b>	<b>University of Maryland, College Park</b> Kansas State University University of Chicago University of Colorado Georgetown University	<b>Paul Julienne</b>	<b>MD</b> KS IL CO DC
<b>MURI Topic 13: Search for New Superconductors for Energy and Power Applications</b>				
<b>AFOSR</b>	<b>Towards New and Better High Temperature Superconductors</b>	<b>Stanford University</b> Princeton University Rutgers University Rice University Florida State University	<b>M.R. Beasley</b>	<b>CA</b> NJ NJ TX FL
<b>AFOSR</b>	<b>Search for New Superconductors for Energy and Power Applications</b>	<b>University of California, San Diego</b> University of California, Irvine University of Wisconsin, Milwaukee	<b>Ivan Schuller</b>	<b>CA</b> CA WI
<b>AFOSR</b>	<b>Broad-Based Search for New and Practical Superconductors</b>	<b>University of Maryland, College Park</b> University of California, San Diego Iowa State University	<b>Richard Greene</b>	<b>MD</b> CA IA
<b>MURI Topic 14: Complex Nonperiodic Nanophotonics</b>				
<b>AFOSR</b>	<b>Robust and Complex On-Chip Nanophotonics</b>	<b>Stanford University</b> Massachusetts Institute of Technology Cornell University	<b>Shanhui Fan</b>	<b>CA</b> MA NY

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<b>MURI Topic 15: Multi-Scale Fusion of Information for Uncertainty Quantification and Management in Large-Scale Simulations</b>				
<b>AFOSR</b>	<b>Multi-Scale Fusion of Information for Uncertainty Quantification in Large-Scale Simulations</b>	<b>Brown University</b> Massachusetts Institute of Technology Cornell University California Institute of Technology	<b>George Karniadakis</b>	<b>RI</b> <b>MA</b> <b>NY</b> <b>CA</b>
<b>MURI Topic 16: Learning Decision Architectures for Intelligent Cooperative Control of Autonomous Systems</b>				
<b>AFOSR</b>	<b>Distributed Learning and Information Dynamics in Networked Autonomous Systems</b>	<b>Georgia Institute of Technology</b> University of Maryland, College Park Massachusetts Institute of Technology Johns Hopkins University	<b>Jeff Shamma</b>	<b>GA</b> <b>MD</b> <b>MA</b> <b>MD</b>
<b>MURI Topic 17: Information Dynamics in Networks</b>				
<b>AFOSR</b>	<b>Information Dynamics as a Foundation for Network Management</b>	<b>Princeton University</b> California Institute of Technology Stanford University University of California, Irvine University of Pennsylvania Arizona State University University of Wisconsin, Madison	<b>Robert Calderbank</b>	<b>NJ</b> <b>CA</b> <b>CA</b> <b>CA</b> <b>PA</b> <b>AZ</b> <b>WI</b>
<b>MURI Topic 18: Synthesis, Analysis, and Prognosis of Hybrid-Material Flight Structures</b>				
<b>AFOSR</b>	<b>Synthesis, Characterization and Modeling of Functionally Graded Multifunctional Hybrid Composites for Extreme Environments</b>	<b>Texas A&amp;M University</b> University of Illinois, Urbana-Champaign Virginia Polytechnic Institute Stanford University University of Dayton	<b>Dimitris Lagoudas</b>	<b>TX</b> <b>IL</b> <b>VA</b> <b>CA</b> <b>OH</b>
<b>MURI Topic 19: Biophotonics: Optical Effects Through Nature's Photonic Control</b>				
<b>AFOSR</b>	<b>Bio-Inspired Optics: Offering Physical and Technological Insights in Color and Structure (BIOOPTICS)</b>	<b>Harvard University</b> University of California, San Diego University of Wisconsin, Madison University of Arizona Georgia Institute of Technology	<b>Joanna Aizenberg</b>	<b>MA</b> <b>CA</b> <b>WI</b> <b>AZ</b> <b>GA</b>

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<b>MURI Topic 20: Fundamental Graphene Material Studies and Device Concepts</b>				
<b>AFOSR</b>	<b>New Materials Approaches for Future Graphene-Based Devices</b>	<b>Columbia University</b> Cornell University	<b>Richard Osgood</b>	<b>NY</b> NY
<b>MURI Topic 21: Application Software and Data Protection for Untrusted Platforms</b>				
<b>AFOSR</b>	<b>Hardware, Languages, and Architectures for Defense Against Hostile Operating Systems</b>	<b>University of California, Berkeley</b> University of Illinois, Urbana-Champaign Harvard University University of Virginia State University of New York, Stony Brook	<b>David Wagner</b>	<b>CA</b> IL MA VA NY
<b>MURI Topic 22: Disruptive Fibers for Flexible Armor</b>				
<b>ARO</b>	<b>Multiscale Design and Manufacturing of Hybrid DWCNT-Polymer Fibers</b>	<b>Northwestern University</b> Massachusetts Institute of Technology University of Nebraska, Lincoln	<b>Horacio Espinosa</b>	<b>IL</b> MA NE
<b>MURI Topic 23: Network-Based Hard/Soft Information Fusion</b>				
<b>ARO</b>	<b>Unified Research on Network-Based Hard/Soft Information Fusion</b>	<b>State University of New York, Buffalo</b> Pennsylvania State University Iona College Tennessee State University	<b>James Llinas</b>	<b>NY</b> PA NY TN
<b>MURI Topic 24: Tailored Stress-Wave Mitigation</b>				
<b>ARO</b>	<b>Design of Adaptive Load Mitigating Materials Using Nonlinear Stress Wave Tailoring</b>	<b>University of Illinois, Urbana-Champaign</b> California Institute of Technology	<b>John Lambros</b>	<b>IL</b> CA
<b>MURI Topic 25: Integrated Quantum Circuits</b>				
<b>ARO</b>	<b>Quantum-Optical Circuits of Hybrid Quantum Memories</b>	<b>University of Maryland</b> University of Michigan University of California, San Diego Duke University University of Illinois, Urbana-Champaign Naval Research Laboratory <sup>4</sup>	<b>Christopher Monroe</b>	<b>MD</b> MI CA NC IL DC

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<b>MURI Topic 26: Adaptive Structural Materials</b>				
<b>ARO</b>	<b>Innovative Design and Processing of Multi-Functional Adaptive Structural Materials</b>	<b>Princeton University</b> Harvard University	<b>Ilhan Aksay</b>	<b>NJ</b> <b>MA</b>
<b>MURI Topic 27: Transformation Optics</b>				
<b>ARO</b>	<b>Transformation Optical Metamaterials</b>	<b>Duke University</b> University of California, Berkeley Purdue University North Carolina State University	<b>David Smith</b>	<b>NC</b> <b>CA</b> <b>IN</b> <b>NC</b>
<b>MURI Topic 28: Emergent Phenomena at Complex Oxide Interfaces</b>				
<b>ARO</b>	<b>Emergent Phenomena at Mott Interfaces</b>	<b>University of California, Santa Barbara</b> University of California, Davis Stanford University Harvard University University of Virginia University of British Columbia <sup>3</sup> International Business Machines Corporation <sup>4</sup>	<b>Susanne Stemmer</b>	<b>CA</b> <b>CA</b> <b>CA</b> <b>MA</b> <b>VA</b>
<b>MURI Topic 29: Application of Systems Biology to Regenerative Medicine</b>				
<b>ARO</b>	<b>Signalling Network Interactions Controlling Mouse and Salamander Limb Regeneration</b>	<b>Tulane University</b> University of California, Irvine University of Kentucky	<b>Ken Muneoka</b>	<b>LA</b> <b>CA</b> <b>KY</b>
<b>MURI Topic 30: Mechanisms of Bacterial Spore Germination</b>				
<b>ARO</b>	<b>Mechanism of Bacterial Spore Germination and Its Heterogeneity</b>	<b>University of Connecticut Health Center</b> University of Pittsburgh East Carolina University Oregon State University	<b>Peter Setlow</b>	<b>CT</b> <b>PA</b> <b>NC</b> <b>OR</b>

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<b>MURI Topic 31: Opportunistic Sensing</b>				
<b>ARO</b>	<b>Opportunistic Sensing for Object and Activity Recognition from Multi-Modal, Multi-Platform Data</b>	<b>Rice University</b> University of Maryland, College Park University of Illinois, Urbana-Champaign Yale University Duke University University of California, Los Angeles	<b>Richard Baraniuk</b>	<b>TX</b> <b>MD</b> <b>IL</b> <b>CT</b> <b>NC</b> <b>CA</b>
<b>MURI Topic 32: Cyber Situation Awareness</b>				
<b>ARO</b>	<b>A Cyber Awareness Framework for Attack Analysis, Prediction, and Visualization</b>	<b>University of California, Santa Barbara</b> University of California, Berkeley Georgia Institute of Technology	<b>Richard Kemmerer</b>	<b>CA</b> <b>CA</b> <b>GA</b>
<b>ARO</b>	<b>Computer-Aided Human Centric Cyber Situation Awareness</b>	<b>Pennsylvania State University</b> Arizona State University Carnegie Mellon University George Mason University North Carolina State University University of Maryland, College Park	<b>Peng Liu</b>	<b>PA</b> <b>AZ</b> <b>PA</b> <b>VA</b> <b>NC</b> <b>MD</b>

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