



# Workshop on Emerging Technologies, Military Operations, and National Security

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The Consortium on Emerging Technologies, Military Operations, and National Security

October 8, 2009 – October 10, 2009

INAMORI  
INTERNATIONAL CENTER  
FOR  
ETHICS AND EXCELLENCE  
CASE WESTERN RESERVE UNIVERSITY

**ASU** LINCOLN CENTER  
FOR APPLIED ETHICS  
ARIZONA STATE UNIVERSITY

UNITED STATES NAVAL ACADEMY  
*Stockdale Center for Ethical Leadership*



# INAMORI INTERNATIONAL CENTER FOR ETHICS AND EXCELLENCE

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CASE WESTERN RESERVE UNIVERSITY

The purpose of the Inamori International Center for Ethics and Excellence at Case Western Reserve University is to promote global ethical leadership. The Inamori Center seeks to fulfill its mission by awarding the annual [Inamori Ethics Prize](#) to an international figure "who has demonstrated exemplary ethical leadership and whose actions and influence have greatly improved the condition of humankind;" by collaborating with individuals and organizations at CWRU, in the regional community, around the United States and the world; and by sponsoring ethics research, scholarship, symposia, and lectures, supporting ethics education at every level, and encouraging ethical discourse across all disciplines and spheres of human endeavor.

The Inamori International Center for Ethics and Excellence began in July 2006 as the result of a generous gift from Dr. [Kazuo Inamori](#) and the [Inamori Foundation](#) of Kyoto, Japan. Dr. Inamori, founder of the Kyocera Corporation, believes that "people have no higher calling than to serve the greater good of humankind and society" and "the future of humanity can be assured only through the balance of scientific progress and spiritual maturity." The Inamori Center hopes to play a key role in the development of future leaders who will, in the words of Kazuo Inamori, "Serve humankind through ethical deeds rather than actions based on self-interest and selfish desires."

Since September 8<sup>th</sup>, 2008, the Director of the Inamori Center has been Dr. Shannon E. French. Dr. French is also the Inamori Professor of Ethics and a tenured member of the CWRU Philosophy Department in the College of Arts and Sciences. Dr. French earned her B.A. at Trinity University (San Antonio, TX) and her Ph.D. from Brown University (Providence, RI). She came to Case Western after teaching for eleven years at the United States Naval Academy in Annapolis, MD, where she also served as the Associate Chair of the Department of Leadership,

Ethics, and Law. Her primary research field is military ethics, and her first book was titled *The Code of the Warrior: Exploring Warrior Values, Past and Present*.

Contact the Inamori International Center for Ethics and Excellence: [inamori-center@case.edu](mailto:inamori-center@case.edu)

# **Workshop on Emerging Technologies, Military Operations, and National Security**

**Case Western Reserve University**

**Inamori International Center for Ethics and Excellence**

**and**

**The Consortium on Emerging Technologies, Military Operations, and National Security**

October 9-10, 2009

## **Desired Outcomes**

1. Create a community and networked team of subject matter experts, including practitioners and scholars representing numerous engineering, technological, humanities and social science disciplines, with the capability to address case studies and analyze behaviors along many dimensions (i.e. feasibility, legality, ethics, social implications, etc.) in the area of military operations, national security, and emerging technologies.
2. Identify specific case studies and issues for which funding proposals will be sought, and identify the project teams and PI/coordinators appropriate for each funding initiative.
3. Establish The Consortium on Emerging Technologies, Military Operations, and National Security to include the Lincoln Center for Applied Ethics at Arizona State University, the Inamori International Center for Ethics and Excellence at Case Western Reserve University, and the Vice Admiral James B. Stockdale Center for Ethical Leadership at the U. S. Naval Academy, to foster ongoing interdisciplinary research and study and support research teams and funding initiatives involving the ethics of emerging military technologies and operations.

## **Agenda**

### **Friday, October 9**

(Breakfast on your own; out-of-town guests have breakfast included in their stay at the Glidden House Inn)

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|-------------|--|
| 9:00-9:15   | Welcome (Shannon French/Peter French/George Lucas) |
| 9:15-10:00  | Keynote (Brad Allenby), including Q&A              |
| 10:00-10:30 | Keynote (Joel Garreau), including Q&A              |

- 10:30-11:00            Networking break (refreshments provided)
- 11:00-12:00            Participant introduction, including identification of topics of interest and funding opportunities (focus on your research initiatives and any ideas you may have concerning how the Consortium or individual members of the project might pursue funding or support funding activities)
- 12:00-1:30             Lunch at the Inamori International Center for Ethics and Excellence  
Lunchtime speaker: Karl Hasslinger (30 min)  
Briefing on Robotics Study: Pat Lin (10-15 min)
- 1:30-4:00             Presentation of five case studies: 20 minute presentation, 10 minute discussion each  
                              Lethal Autonomous Robots – Ron Arkin  
                              Neuroenhancement – Jason Robert  
                              Fear management – Joel Garreau  
                              Cogsci – Tony Jack  
                              Surveillance insects (cyborg and robotic) – Gary Marchant
- 4:00-4:30             Networking break (refreshments provided)
- 4:30-5:00             Introduction to initially suggested Thrust Areas (led by Thrust Leaders)  
                              Biomed Enhancement – Max Mehlman  
                              Cogsci – Tony Jack  
                              Nano – Elizabeth Corley  
                              Robotics – Pat Lin
- 5:00-6:00             Discussion: are these the right thrust areas, and leaders? What other thrust areas should be considered?
- 7:00-9:00             Dinner at the Intercontinental Hotel – North Coast Café (catered by Table 45) – transportation for out-of-town guests will be provided from Glidden House to the Intercontinental and back again after the meal

## **Saturday, October 10**

(Breakfast on your own; out-of-town guests have breakfast included in their stay at the Glidden House Inn)

- 9:00-11:00            Meetings of Thrust areas, led by Thrust Leader, to identify topics and targets of opportunity (funding proposals, critical technology areas), and possible team members

10:30-11:30	Networking break (refreshments provided)
11:30-12:30	Presentation of results by Thrust leaders
12:30-2:00	Working lunch, with summary by workshop leaders and discussion of next steps by all (food provided at the Inamori Center)
2:00	Ground transportation provided to airport for out-of-town guests

**NOTE:** Because of the exploratory and highly multidisciplinary nature of these discussions, “Gordon Conference” ground rules apply. Individuals may not be quoted for outside publication or attribution purposes regarding anything said within this conference unless their express permission is sought and granted in advance.

**PARTICIPANTS IN JOINT RESEARCH PROJECT ON  
ETHICAL ISSUES AND EMERGING TECHNOLOGIES**

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## **Brad Allenby, Ph.D.**

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Braden R. Allenby is currently Lincoln Professor of Engineering and Ethics; Professor of Civil, Environmental, and Sustainable Engineering, and of Law; and Founding Director, Center of Earth Systems Engineering and Management at Arizona State University, having moved from his previous position as the Environment, Health and Safety Vice President for AT&T in 2004. He is also a US Naval Academy Stockdale Fellow, a Batten Fellow in Residence at the University of Virginia's Darden Graduate School of Business Administration, a Fellow of the Royal Society for the Arts, Manufactures & Commerce, a 2008 AT&T Industrial Ecology Fellow, and a 2007-2008 Templeton Fellow. Dr. Allenby received his BA from Yale University in 1972, his J. D. from the University of Virginia Law School in 1978, his Masters in Economics from the University of Virginia in 1979, his Masters in Environmental Sciences from Rutgers University in the Spring of 1989, and his Ph.D. in Environmental Sciences from Rutgers in 1992. His areas of expertise include sustainable engineering, earth systems engineering and management, industrial ecology and Design for Environment. His latest book is Industrial Ecology and Sustainable Engineering, co-authored with Tom Graedel.

## **Ronald Arkin, Ph.D.**

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Ronald C. Arkin received the B.S. Degree from the University of Michigan, the M.S. Degree from Stevens Institute of Technology, and a Ph.D. in Computer Science from the University of Massachusetts, Amherst in 1987. He then assumed the position of Assistant Professor in the College of Computing at the Georgia Institute of Technology where he now holds the rank of Regents' Professor and is the Director of the Mobile Robot Laboratory. He also serves as the Associate Dean for Research in the College of Computing at Georgia Tech since October 2008. During 1997-98, Professor Arkin served as STINT visiting Professor at the Centre for Autonomous Systems at the Royal Institute of Technology (KTH) in Stockholm, Sweden. From June-September 2005, Prof. Arkin held a Sabbatical Chair at the Sony Intelligence Dynamics Laboratory in Tokyo, Japan and then served as a member of the Robotics and Artificial Intelligence Group at LAAS/CNRS in Toulouse, France from October 2005-August 2006.

Dr. Arkin's research interests include behavior-based reactive control and action-oriented perception for mobile robots and unmanned aerial vehicles, hybrid deliberative/reactive software architectures, robot survivability, multiagent robotic systems, biorobotics, human-robot interaction, robot ethics, and learning in autonomous systems. He has over 170 technical publications in these areas. Prof. Arkin has written a textbook entitled Behavior-Based Robotics published by MIT Press in May 1998, co-edited (with G. Bekey) a book entitled Robot Colonies published in 1997, and a book published in Spring 2009 entitled Governing Lethal Behavior in Autonomous Robots published by Chapman-Hall (Taylor & Francis). Funding sources have included the National Science Foundation, DARPA, U.S. Army, Savannah River Technology Center, Honda R&D, Samsung, C.S. Draper Laboratory, SAIC, NAVAIR, and the Office of Naval Research. Dr. Arkin serves/served as an Associate Editor for IEEE Intelligent Systems, International Journal of Social Robots, and the Journal of Environmentally Conscious Manufacturing, as a member of the Editorial Boards of Autonomous Robots, Machine Intelligence and Robotic Control,

Journal of Intelligent Service Robotics, Journal of Field Robotics, International Journal of Advanced Robotic Systems, and the Journal of Applied Intelligence, and is the Series Editor for the MIT Press book series Intelligent Robotics and Autonomous Agents. He also serves/served as a consultant for several major companies in the area of intelligent robotic systems. Prof. Arkin was elected to serve two consecutive 3 year terms on the Administrative Committee of the IEEE Robotics and Automation Society in both 1999 and 2002, served as the co-chair of the IEEE RAS Technical Committee on Robot Ethics from 2004-2009 and co-chair of the Society's Human Rights and Ethics Committee from 2006 to the present, is the IEEE RAS liaison to the IEEE Society on Social Implications of Technology, and also served on the National Science Foundation's Robotics Council from 2001-2002. In 2001, he received the Outstanding Senior Faculty Research Award from the College of Computing at Georgia Tech. He was elected a Fellow of the IEEE in 2003, and is a member of AAAI and ACM.

### **Ed Barrett, Ph.D.**

US Naval Academy



Edward T. Barrett is the Director of Research at the U.S. Naval Academy's Stockdale Center for Ethical Leadership, and an ethics professor in the Department of Leadership, Ethics, and Law.

Raised in suburban Chicago, he attended the University of Notre Dame on an Air Force ROTC scholarship. After serving nine years as an active duty C-130 instructor and examiner pilot, he began doctoral studies in political theory at the University of Chicago. While in graduate school, he served for two years as speechwriter to the Catholic Archbishop of Chicago, was an adjunct professor at the University of Chicago, and continued to serve as an instructor pilot in the Air Force Reserves.

Completing his Ph.D. in 2003, he was recalled to active duty for Operations Iraqi and Enduring Freedom, and served four deployments as an operations officer and aircraft commander. He returned to academia in 2006 as a research fellow and ethics professor at the Naval Academy, and assumed his current position at

the Stockdale Center in 2008.

He is also a Lieutenant Colonel at the Pentagon in the Air Force Headquarter's Division of Long Range Plans, and the author of *Human Persons and Liberal Democracy: The Ethical and Political Thought of Karol Wojtyla/John Paul II* (forthcoming, Lexington).

## **Jessica Berg, J.D., MPH**

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Jessica Wilen Berg is Professor of Law, Professor of Bioethics and Professor of Public Health with a joint appointment in Case Western Reserve University's Schools of Law and Medicine. She received both her B.A. and J.D., with honors, from Cornell University. She received her MPH from Case Western Reserve University Medical School. Ms. Berg teaches Bioethics and Law, Food and Drug Law, Research Law and Regulation, Public Health Law, and Scientific Integrity. She is first author on a book published by Oxford University Press entitled "Informed Consent: Legal Theory and Clinical Practice." Her publications and research span a variety of areas including medical decision-making, research with human subjects, confidentiality, reproductive law and ethics, genetic enhancement, end-of-life care, professionalism, public health law and ethics, and e-medicine.

## **Brad Bishop, Ph.D.**

US Naval Academy



Bradley Bishop graduated from Michigan State University in 1991 with a B.S.

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1994 and 1997, respectively. In 1997, he joined the faculty in the Weapons and Systems Engineering department at the United States Naval Academy, where he is currently a full professor. He was the first Associate Professor to ever receive the Naval Academy's highest teaching honor, the Class of 1951 Civilian Faculty Award for Excellence in Teaching, given in honor of Professor Theodore J. Benac. He currently teaches courses in emerging and advanced technologies as well as robotics. His research interests include disruptive technologies, field robotics and swarm control.

**Christopher Buneo, Ph.D.**

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Chris Buneo is an assistant professor of bioengineering in the School of Biological and Health Systems Engineering Bioengineering at Arizona State University. He earned his Bachelors of Science and Masters



of Science in Physical Therapy from Long Island University and his Ph.D. in Physiology from the University of Minnesota. He also served as a postdoctoral fellow and senior research fellow in the Division of Biology at the California Institute of Technology. Dr. Buneo's interests span the fields of rehabilitation, neuroscience and engineering. Included in his publications are articles addressing the role of the parietal lobe of the brain in the planning and control of movement, which have appeared in Science, Nature and the Annual Review of Neuroscience.

**Stephen Coleman, Ph.D.**

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Dr. Stephen Coleman is Senior Lecturer in Ethics and Leadership & Vincent Fairfax Foundation Fellow in the School of Humanities and Social Sciences, with the University of New South Wales at the Australian Defence Force Academy (UNSW@ADFA). He has previously held appointments in ethics at the Australian National University, Charles Sturt University and Monash University.

He is the author of one book (The Ethics of Artificial Uteruses: Implications for Reproduction and Abortion published in 2004) and over twenty papers in academic journals and edited collections on a diverse range of topics in applied ethics, including military ethics, police ethics, medical ethics, and the practical applications of human rights. In addition to these published papers he has presented at conferences in Australia, New Zealand, Hong Kong, the United Kingdom and the United States.

He has worked on research projects for both Foods Standards Australia and the Victorian Police, and as a special consultant on a recent project to provide the Australian Defence Force with a framework to deal with issues in military health ethics. He has provided advice on Codes of Conduct to the Police Forces of

New South Wales, Victoria and Western Australia, and on policies to ensure the ethical conduct of research involving humans for the Australian Defence Science and Technology Organisation.

At ADFA he teaches courses in military ethics and practical ethics at both undergraduate and post-graduate level and is also the convenor of the ADFA Human Research Ethics Advisory Panel. For the 2009-2010 academic year while on study leave from his permanent position in Australia, he is serving as a Resident Fellow in Ethics at the Vice Admiral James B. Stockdale Center for Ethical Leadership at the United States Naval Academy

He can also make balloon and origami animals, juggle, breathe fire and ride a unicycle.

**Elizabeth Corley, Ph.D.**

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Elizabeth A. Corley is the Lincoln Professor of Public Policy, Ethics & Emerging Technologies and an Associate Professor in the School of Public Affairs (SPA) at Arizona State University. Professor Corley's research interests focus on environmental policy & technology policy. She is currently the Principal Investigator for the external evaluation of the NSF-funded Learning in Formal and Informal Environments (LIFE) Center and serves as a Co-Principal Investigator for the NSF-funded Center for Nanotechnology in Society at Arizona State University (CNS-ASU). Professor Corley received three engineering degrees and a Ph.D. in Public Policy from the Georgia Institute of Technology. Before joining ASU, she held teaching and research positions at Georgia Tech, Bucknell University, and Columbia University.

## **Samara Firebaugh, Ph.D.**

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Samara Firebaugh is an Associate Professor in the Electrical and Computer Engineering Department at the United States Naval Academy. Professor Firebaugh received the B.S.E. degree in electrical engineering from Princeton University in 1995, and the M.S. and Ph. D. degrees in electrical engineering from the Massachusetts Institute of Technology in 1997 and 2001, respectively. She has conducted research in several areas of Microelectromechanical Systems (MEMS) including microscale chemical reactor systems, microwave switches, variable thermal radiators and microscale robotics. She also conducts pedagogical research related to undergraduate microsystems education.

## **Peter French, Ph.D.**

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Dr. Peter A. French is the Lincoln Chair in Ethics, Professor of Philosophy, and the Director of the Lincoln Center for Applied Ethics at Arizona State University. He was the Cole Chair in Ethics, Director of the Ethics Center, and Chair of the Department of Philosophy of the University of South Florida. Before that he was the Lennox Distinguished Professor of the Humanities and Professor of Philosophy at Trinity University in San Antonio, Texas. He has taught at Northern Arizona University; the University of Minnesota; Dalhousie University, Nova Scotia, and served as Exxon Distinguished Research Professor in the Center for the Study of Values at the University of Delaware.

Dr. French has a BA from Gettysburg College, an MA from the University of Southern California, a Ph.D. from the University of Miami. He received a Doctor of Humane Letters (L.H.D.) honorary degree from Gettysburg College in 2006.

Dr. French has an international reputation in ethical and legal theory and in collective and corporate responsibility and criminal liability. He is the author of nineteen books including *The Virtues of Vengeance*; *Cowboy Metaphysics: Ethics and Death in Westerns*; *Ethics and College Sports*; *Corporate Ethics*; *War and Border Crossings: Ethics When Cultures Clash*; *Responsibility Matters*; *Corporations in the Moral Community*; *The Spectrum of Responsibility*; *Collective and Corporate Responsibility*; *Corrigible Corporations and Unruly Laws*; *Ethics in Government*; and *The Scope of Morality*. He has just completed a book with the working title ***War and Moral Dissonance*** that includes a memoir of his experiences at bases around the world teaching ethics to Navy and Marine chaplains who were either returning from the war in Iraq and Afghanistan or about to be deployed. Dr. French has lectured at locations around the world. Some of his works have been translated into Chinese, Japanese, German,

Italian, French, Serbian, and Spanish. Amazon.com lists 49 books credited to him as author, editor, or co-editor published by major presses.

Dr. French is a senior editor of *Midwest Studies in Philosophy*. He was the editor of the *Journal of Social Philosophy* for 16 years and general editor of the *Issues in Contemporary Ethics* series. He has published dozens of articles in the major philosophical and legal journals and reviews, many of which have been anthologized. He was a member of the Board of Governors and a Founding Fellow of the Arizona Academy of Science, Technology and the Arts and served on the Board of Governors of the American Philosophical Association. In 2008 the APA's *Newsletter on Philosophy and Law* dedicated an issue to him. The editors wrote: "This edition honors the work and writings of Peter French and continues the analysis of topics central to his writings. His writings have had great influence in applied ethics and have helped establish the field of applied ethics as an abiding and substantive area of research in the philosophy discipline. His writings on collective responsibility from over thirty years ago continue to shape topics in ethics, applied ethics, and legal theory, and his articles are widely reprinted in anthologies.

### **Shannon French, Ph.D.**

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Shannon E. French, Ph.D., began her tenure as director of the Inamori International Center for Ethics and Excellence and Inamori Professor of Ethics at Case Western Reserve University on September 8, 2008.

Prior to leading the Inamori Center, French was the associate chair of the Department of Leadership, Ethics and Law at the United States Naval Academy, where she was a member of the civilian faculty for eleven years. At Case Western Reserve, Dr. French is also a tenured faculty member of the philosophy department in the College of Arts and Sciences.

French's research and scholarly interests are primarily in the area of military ethics, but also include leadership ethics, professional ethics, moral psychology, biomedical and environmental ethics. She has contributed articles and chapters on present-day conduct of war issues such as defining terrorism, the use of torture, warrior transitions and the moral responsibility of leaders not to erode values that provide the foundation for restraint and limit the awful scope of war. Her 2003 book, *The Code of the Warrior: Exploring Warrior Values, Past and Present*, features a forward by Senator John McCain.

Currently working on her second book, French has published numerous other works and is an associate editor for the *Journal of Military Ethics* and the *Encyclopedia of Global Justice*.

French has presented papers at prestigious international conferences around the globe. In 2004, she helped design and present four-day training seminars on moral reasoning and ethical advisement for the U.S. Navy's Chaplain Corps at Navy and Marine Corps bases around the United States and in Italy and Japan. The success of that program resulted in the development and presentation of a similar series of seminars on the subject of character development in 2006.

French received her bachelor's degree in philosophy, classical studies and history from Trinity University in San Antonio in 1990. She went on to earn her Ph.D. in philosophy from Brown University before joining the Naval Academy faculty.

**Joel Garreau**

The Washington Post





Joel Garreau is a student of culture, values, and change.

Most recently he is the author of *Radical Evolution: The Promise and Peril of Enhancing Our Minds, Our Bodies, and What It Means to Be Human*, published in 2005 by Doubleday. Joel's latest book takes an unprecedented, sometimes alarming, always spellbinding look at the hinge in history at which we have arrived. For hundreds of millennia, our technologies have been aimed outward at altering our environment in the fashion of fire, agriculture, or space travel. Now, for the first time, we are increasingly aiming inward at modifying our minds, memories, metabolisms, personalities, progeny and possibly our immortal souls. *Radical Evolution* is about altering human nature -- not in some distant tomorrow, but right now, on our watch.

A long-time reporter and editor at *The Washington Post* Joel is now principal of The Garreau Group, the network of his best sources committed to understanding who we are, how we got that way, and where we're headed, worldwide. He is a fellow at the New America Foundation, has served as a fellow at Cambridge University, the University of California at Berkeley and George Mason University, and is an affiliate of the James Martin Institute for Science and Civilization at Oxford. He is a member of Global Business Network, the pioneering scenario-planning organization, and is the troll of a small forest in the foothills of Virginia's Blue Ridge.

**CAPT Karl Hasslinger, US Navy (Retired)**

General Dynamics Electric Boat



Karl M Hasslinger is a retired Navy Captain and former nuclear attack submarine commander with a background in defense strategy. He served as a Fellow on the Chief of Naval Operations Strategic Studies Group, as the Strategic Planning Assistant to the Director of Submarine Warfare on the Chief of Naval Operations staff and as a Military Assistant in the Office of Secretary of Defense - Net Assessment. He is currently the Director of Washington Operations for General Dynamics Electric Boat, where he is responsible for the company's strategic analysis, government relations, business development and missile defense activities.

## **Steve Helms Tillery, Ph.D.**

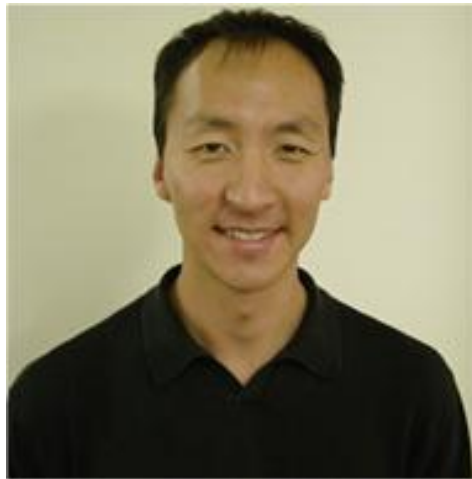
Arizona State University



Steve Helms Tillery is a neuroscientist at ASU who is particularly interested in how the brain learns to use sensory information in the control of skilled motor tasks. As an undergraduate, Steve studied psychology at ASU while on a music scholarship. He then moved to the University of Minnesota to study neuroscience under John Soechting and Tim Ebner, where he examined sensory processes underlying kinesthesia of the arm. He followed this with a post-doctoral fellowship at SUNY Health Science Center in Syracuse under Peter Strick, working on cognitive processing in basal ganglia and cerebellum. Eventually he returned to ASU to study neuroprosthetics with Andrew Schwartz. He has remained as a faculty member at ASU, where he uses neuroprosthetics as a novel test-bed to examine neural mechanisms underlying sensorimotor integration. In his field, he participates in studies using both nonhuman and human subjects, and is particularly concerned in seeing that these resources are used in a responsible manner. He is also intrigued to know how ethicists can contribute to determining how those resources can be marshaled to direct research in a way that provides value to society.

## **Insoo Hyun, Ph.D.**

Case Western Reserve University



Insoo Hyun received his Ph.D. in Philosophy from Brown University and his B.A. and M.A. in Philosophy from Stanford.

In 2005, Dr. Hyun was awarded a Fulbright Research Award by the U.S. Department of State to study the ethical, legal, and cultural dynamics of human research cloning in South Korea. In 2006 he chaired the Subcommittee on Human Biological Materials Procurement for the International Embryonic Stem Cell Guidelines Task Force, a multinational, multidisciplinary working group for the ISSCR (International Society for Stem Cell Research).

Currently, Dr. Hyun is Chair of the ISSCR's Ethics and Public Policy Committee and Co-Chair of the ISSCR's Task Force on Guidelines for the Clinical Translation of Stem Cells.

Dr. Hyun's bioethics articles have appeared in *Science*, *Nature*, *Cell Stem Cell*, *The Hastings Center Report*, and *The Kennedy Institute of Ethics Journal*, among others.

**Anthony Jack, Ph.D.**

Case Western Reserve University



Tony Jack obtained a BSc in Psychology and Philosophy from Oxford University, a PhD in experimental psychology from University College London, and trained in the emerging field of cognitive neuroscience at Washington University in St Louis Medical School. He has published on consciousness, attention and social cognition, examining these topics from the perspectives of philosophy, psychology and neuroscience. His current work focuses on the use of fMRI to elucidate the neural bases of individual differences in socio-emotional and spatio-visual cognition.

## **Orde Kittrie, J.D.**

Arizona State University



Orde Félix Kittrie is a tenured professor of law at Arizona State University's Sandra Day O'Connor College of Law, where his teaching and research focus on international law (especially nonproliferation and sanctions) and criminal law. Professor Kittrie is also the director of the new Sandra Day O'Connor College of Law Washington Legal Externship Program. Professor Kittrie is a leading expert on legal issues relating to the proliferation of weapons of mass destruction. Kittrie has testified on nonproliferation issues before committees of both the U.S. Senate and U.S. House of Representatives, including at hearings in July 2009, March 2009, July 2008, and April 2008. In addition, he is one of twelve members of a special National Academies of Science committee, created by Congressional mandate, to make recommendations on how to improve U.S. nonproliferation programs. Kittrie is chair of the Nonproliferation, Arms Control and Disarmament Interest Group of the American Society of International Law. He has a security clearance from the U.S. Department of Defense and regularly advises the Departments of Defense and State on issues relating to nonproliferation law and policy. Prior to entering academia, Kittrie served for eleven years (1993-2004) at the U.S. State Department. As the Department's lead nuclear affairs attorney, Kittrie participated in negotiating five U.S.-Russia nuclear agreements and a U.N. treaty to combat nuclear terrorism. In other assignments, Kittrie directed the Office of International Anti-Crime Programs, was Special Assistant to the Under Secretary for Economics and Business Affairs, and was the lead attorney for arms and dual-use trade controls. Prior to law school, Kittrie served as press spokesman and legislative assistant for foreign affairs and defense to a Member of

Congress. Kittrie received his J.D. from the University of Michigan and his B.A. from Yale University. He is a life member of the Council on Foreign Relations.

**Patrick Lin, Ph.D.**

California Polytechnic State University



Dr. Patrick Lin is the director of the Ethics and Emerging Sciences Group, based at California Polytechnic State University, San Luis Obispo. Most recently, he has led research efforts that culminated in two major reports: Autonomous Military Robotics: Risk, Ethics, and Design (funded by the U.S. Office of Naval

Research) and Ethics of Human Enhancement: 25 Questions & Answers (funded by the U.S. National Science Foundation). He has published several books and papers in the field of technology ethics, including the anthology Nanoethics: The Ethical and Social Implications of Nanotechnology. Dr. Lin earned his B.A. from University of California at Berkeley and M.A. and Ph.D. from University of California at Santa Barbara. He is currently an assistant professor in Cal Poly's philosophy department and also holds academic appointments at Dartmouth College and Western Michigan University.



**George Lucas, Jr., Ph.D.**

US Naval Academy



George Lucas is Professor of Philosophy and Director of Navy and National Programs in the Vice Admiral James B. Stockdale Center for Ethical Leadership at the United States Naval Academy (Annapolis, MD), and Visiting Professor of Ethics at the Naval Postgraduate School (Monterey, CA). He has taught at Emory University, Georgetown University, and served as Chair of the Department of Philosophy at Santa Clara University, and also as Assistant Director in the Division of Research Programs in the National Endowment for the Humanities. He was a Fulbright Fellow in Belgium in 1989, and held a fellowship from the American Council of Learned Societies in 1983.

Lucas received his Ph.D. in Philosophy from Northwestern University in 1978. He is author of four books, over fifty journal articles, translations, and book reviews, and has also edited eight book-length collections of articles in philosophy and ethics, including most recently: *Ethics and the Military Profession: the Moral Foundations of Leadership* (New York: Pearson Education, 2005), *Perspectives on Humanitarian Military Intervention* (University of California Press, 2001), "From Jus ad bellum to Jus ad pacem: Rethinking Just War Criteria for the Use of Military Force for Humanitarian Ends," in *Ethics and Foreign Intervention* (Cambridge University Press, 2003), and "The Role of the International

Community in the Just War Tradition: Confronting the Challenges of Humanitarian Intervention and Preemptive War,” *Journal of Military Ethics* (2003).

**Gary Marchant, Ph.D.**

Arizona State University



Gary Marchant is the Lincoln Professor Emerging Technologies, Law and Ethics at the Sandra Day O'Connor College of Law at Arizona State University. He is also a Professor of Life Sciences at ASU and Executive Director of the ASU Center for the Study of Law, Science and Technology. Professor Marchant has a Ph.D. in Genetics from the University of British Columbia, a Masters of Public Policy degree from the Kennedy School of Government, and a law degree from Harvard. Prior to joining the ASU faculty in 1999, he was a partner in a Washington, D.C. law firm where his practice focused on environmental and administrative law. Professor Marchant teaches and researches in the subject areas of environmental law, risk assessment and risk management, genetics and the law, biotechnology law, food and drug law, legal aspects of nanotechnology, and law, science and technology.

## **Max Mehlman, J.D.**

Case Western Reserve University



Maxwell J. Mehlman is Arthur E. Petersilge Professor of Law and Director of the Law-Medicine Center, Case Western Reserve University School of Law, and Professor of Biomedical Ethics, Case Western Reserve University School of Medicine. He received his J.D. from Yale Law School in 1975, and holds two bachelors degrees, one from Reed College and one from Oxford University, which he attended as a Rhodes Scholar. Prior to joining the faculty at CWRU in 1984, Professor Mehlman practiced law with Arnold & Porter in Washington, D.C., where he specialized in federal regulation of health care and medical technology. He is the author or editor of 7 books and numerous articles on subjects including the ethical, legal, and social implications of advances in human genetics, ethical and legal aspects of the patient-physician relationship, and medical malpractice reform.

## **Bob Miller, Ph.D.**

Case Western Reserve University



Dr. Robert Miller is the Allen C. Holmes Professor of Neurological Diseases and a Professor of Neurosciences at Case Western Reserve University in Cleveland, Ohio. Dr. Miller also holds appointments at the Cancer Center and Department of Neurosurgery, University Hospitals of Cleveland, and serves on the staff for the Brain Tumor Institute and Lerner Institute's Department of Neuroscience at the Cleveland Clinic Foundation. He is also the Director of the Center for Translational Neuroscience.

Dr. Miller has a primary interest in CNS neural development with a focus on understanding the biology of neural diseases including Multiple Sclerosis, Brain tumors and Cerebral Palsy. Dr. Miller's development research has focused on understanding the cellular and molecular mechanisms that regulate glial cell determination in the developing vertebrate CNS. Oligodendrocytes, the myelinating cells of the CNS, develop from precursors that arise in distinct locations within the embryonic neural tube. The origin of oligodendrocyte precursors is a result of local signaling including expression of sonic hedgehog. A number of other influences are required to develop the final pattern of oligodendrocyte in the mature tissue. These include dispersal signals to guide cell migration and stop signals such as the chemokine

CXCL1 that position precursors to receive appropriate proliferative and differentiative cues. Dr. Miller's lab is currently defining the interplay between these different signals in order to gain a complete understanding of oligodendrogenesis.

**Clark Miller, Ph.D.**

Arizona State University



Clark Miller is Associate Professor in the School of Politics and Global Studies and Associate Director of the Center for Nanotechnology in Society at Arizona State University. He is also the Chair of the PhD Program in Human and Social Dimensions of Science and Technology. His research focuses on science and technology policy, including particular emphases on the governance of new and emerging technologies and the global politics of expertise. Before joining ASU, he taught at Wisconsin and Iowa State and held a Postdoctoral Fellowship in Science, Technology and Public Policy at the Kennedy

School of Government at Harvard University. He also is a recipient of a National Science Foundation CAREER Award and over a dozen other major grants, including a Nanotechnology Undergraduate Education award. He serves on the advisory boards of the Nanotechnology Informal Science Education Network and the Bovay Center for Engineering, Ethics, and Society at the National Academy of Engineering. He is a founding co-organizer and member of the governing council of the Science and Democracy Network, a global professional community for research on the politics of science and technology.

## **BrigGen Richard O'Meara, US Army**

US Naval Academy



O'Meara is a retired Brigadier General in the United States Army and a combat veteran of the War in Vietnam. Following his Vietnam service he earned a law degree and joined the Judge Advocate General's Corps. For two decades, while serving in the U.S. Army Reserve, O'Meara acted as senior partner in the litigation firm, O'Meara & Hight. He retired from the United States Army in 2002, after 35 years of service. Following his retirement he earned graduate degrees in History and International Relations and took up teaching posts at Rutgers University-Newark and Richard Stockton College where he has taught courses in Security Studies, Human Rights, Terrorism, Genocide, War Crimes, International Law and Criminal Justice. He holds a Research Fellowship at the Stockdale Center for Ethical Leadership, United States Naval Academy and continues to serve as Adjunct Faculty with the Defense Institute of International Legal Studies where he has taught rule of law, governance, and peacekeeping subjects in such diverse locations as El Salvador, Peru, Cambodia, Rwanda, Philippines, Chad, Sierra Leone, Guinea, Ukraine, Moldova, and Iraq. He is a qualified Emergency Medical Technician and served at the World Trade Center Site in the months after 9/11.



## **Hunter Peckham, Ph.D.**

Case Western Reserve University



Dr. Hunter Peckham is a Professor and Interim Chair in the Biomedical Engineering Department at Case Western Reserve University. The major area of Dr. Peckham's research is in rehabilitation engineering and neuroprostheses. Dr. Peckham's research effort focuses on functional restoration of the paralyzed upper extremity in individuals with spinal cord injury. He and collaborators have developed implantable neural prostheses which utilize electrical stimulation to control neuromuscular activation. They have implemented procedures to provide control of grasp-release in individuals with tetraplegia. This function enables individuals with central nervous system disability to regain the ability to perform essential activities of daily living. His present efforts concern the integration of technological rehabilitation and surgical approaches to restore functional capabilities.

**Jenelle Piepmeier, Ph.D.**

US Naval Academy



Jenelle Piepmeier is an Associate Professor in the Weapons and Systems Engineering Department at the United States Naval Academy. Professor Piepmeier received the B.S.E. degree in engineering from LeTourneau University in 1993, and the M.S. and Ph.D. degrees in mechanical engineering from the Georgia Institute of Technology in 1995 and 1999, respectively. She joined the faculty of the United States Naval Academy in 1999. Her research interests include visual servoing of robots at any scale and stereo imaging of water surfaces.

## **Stephen Pratt, Ph.D.**

Arizona State University



I study how the complex behavior of animal societies emerges from the interactions of group members, despite the absence of any well-informed central controller. I focus particularly on the rich examples found in ants, bees, and other social insects. The appearance of order at one scale from purely local interactions at a lower scale is a general theme of modern biology, seen in genetic, neural, social, and ecological networks. My goal is to understand this process in systems whose middle rank between organisms and populations makes them especially tractable. My approach is to identify the behavioral rules, cues, and signals used by individuals, and to experimentally test hypotheses of how these parts interact to yield colony-level behavior. Although I focus on mechanisms, I also aim to link individual behavior to fitness benefits at the colony level. I work largely on two model systems: 1) decision-making during colony emigration by ants of the genus *Temnothorax* and 2) adaptive resource allocation during colony growth by honey bees.

Because intuition alone cannot take in this complexity, I rely extensively on mathematical and computational approaches. These include dynamic optimization models, statistical analyses of large data sets, and simulations of collective colony behavior. I am also collaborating on computational analyses of yeast genomic data, aimed at mapping and interpreting variation in nucleotide sequence at a genome-wide scale. In the future these and related approaches can contribute to understanding the collective behavior of honey bees. As the first social insect to have its genome completely sequenced, the honey bee represents a rich opportunity for genetic studies of sociality.

**Jason Scott Robert, Ph.D.**

Arizona State University



Jason Scott Robert is the Franca Oreffice Dean's Distinguished Professor in the Life Sciences, and the Lincoln Associate Professor of Ethics in Biotechnology and Medicine at Arizona State University, where he also directs the Bioethics, Policy, and Law Program, part of the Center for Biology and Society. In addition, he serves as Associate Professor of Basic Medical Sciences at the University of Arizona College of Medicine - Phoenix in partnership with Arizona State University. Professor Robert is extensively published in bioethics and the philosophy of biology, and his research currently focuses on how scientists try to justify controversial research, including invasive research with non-human primates. For more information, see <http://www.public.asu.edu/~jrobert6>.

**Veronica Santos, Ph.D.**

Arizona State University



Veronica J. Santos is currently an Assistant Professor of Mechanical and Aerospace Engineering at Arizona State University, with a graduate faculty appointment in Bioengineering. Dr. Santos received the B.S. degree in mechanical engineering with a music minor from the University of California at Berkeley in 1999, and the M.S. and Ph.D. degrees in mechanical engineering with a biometry minor from Cornell University, Ithaca, NY in 2004 and 2007, respectively. From 2007 to 2008, she was a postdoctoral research associate at the Alfred E. Mann Institute for Biomedical Engineering at the University of Southern California where she worked on a team to develop a novel biomimetic tactile sensor for prosthetic hands. From 2000 to 2001, she was a Quality Engineer and Research and Development Engineer at Guidant Corporation in Santa Clara, CA, specializing in life-saving cardiovascular technology. Her research interests include hand biomechanics, neural control of movement, robotics, prosthetics, tactile sensors, stochastic modeling, and clinical applications of biomechanical modeling. She is particularly interested in human-machine systems. Dr. Santos has received the Young Investigator Poster Presentation Award from the International Society of Biomechanics (2005), an Exceptional Teaching Assistant Award from the Sibley School of Mechanical and Aerospace Engineering at Cornell University (2005), and a National Science Foundation Graduate Research Fellowship (2001).

**Brian Smith, Ph.D.**

Arizona State University



Brian H Smith is a Professor in the School of Life Sciences at Arizona State University. He joined the ASU faculty in 2005 after having served 15 years on the faculty in Biological Sciences at The Ohio State University. He helped develop the new Interdisciplinary Graduate Degree Program in Neuroscience at ASU and is currently the Director. In addition, he is the Chair of the University Promotion & Tenure Committee at ASU, and this year he began a new position as Faculty Leader for Organismal, Integrative and Systems Biology within SoLS. He teaches Human Physiology and Neuroscience, and he regularly offers Neuroscience and Science Writing journal clubs for graduate students. He has over 80 peer-reviewed publications from research that has been funded by NIH, NSF and DARPA. His research interests are in sensory processing, learning and memory. In particular, interdisciplinary efforts, particularly with mathematicians in computational modeling of neural processing, figure prominently in this research program.

**Gary Wnek, Ph.D.**

Case Western Reserve University





Dr. Gary Wnek is The Joseph F. Toot, Jr., Professor of Engineering and is Faculty Director of The Institute for Management and Engineering (TiME). Dr. Wnek's research interests include Polymers with unusual electrical or optical properties; biomaterials for tissue engineering and regenerative medicine; electric field-mediated processing (electrospinning of nano- and micro fibers and morphology modulation in polymer blends); polymer-based microfluidic platforms; polymer product design.

## **Stuart Youngner, M.D.**

Case Western Reserve University



Stuart J. Youngner received a B.A. from Swarthmore College and an M.D. from Case Western Reserve University where he is Susan E. Watson Professor and Chairman of the Department of Bioethics. He did an internship in Pediatrics and a residency in Psychiatry at University Hospitals of Cleveland and subsequently received a fellowship from the National Endowment for the Humanities to study medical ethics at the Kennedy Institute of Ethics at Georgetown University.

Dr. Youngner serves on the editorial advisory boards of the Journal of Medicine and Philosophy, the Kennedy Institute of Ethics Journal, and the Journal of Law, Medicine, and Ethics. He has been elected a Fellow of the Hastings Center and the American Psychiatric Association and has been certified by the American Board of Psychiatry and Neurology. He has served as a consultant to the United States Congress Office of Technology Assessment, the Robert Wood Johnson Foundation, the Institute of Medicine, and the Pontifical Academy of Sciences. Dr. Youngner has testified before the United States Congress. He served as President of the Society for Bioethics Consultation from 1994-1997 and is a founding member of the Board of Directors of the American Society for Bioethics and Humanities and was given the organization's Distinguished Service Award in 2000. He co-directed a national task force

that examined the need for standards for ethics committees and clinical ethics consultation. He is the on the Medical Board of Trustees and ethics committee of the Musculoskeletal Foundation.

Dr. Youngner is a nationally and internationally recognized scholar in biomedical ethics and has published and spoken on topics including: decisions to limit life-sustaining treatment, ethics committees, physician-assisted suicide, advance directives, definitions of death, and ethical issues in organ and tissue retrieval and transplantation. He has published over 90 articles in peer-reviewed scholarly journals. He is the editor or coeditor of eight books, including *The Definition of Death: Contemporary Controversies* (Johns Hopkins University Press). His latest book, *Transplanting Human Tissue: Ethics, Policy and Practice*, was published by Oxford University Press in September, 2003.