



OSU150

The Promise and the Peril of Artificial Intelligence and Robotics

October 23, 2018 • Oregon State University

Agenda

10:00 – 10:15 a.m. Opening Remarks and Welcome

- **Steve Clark**, Vice President of University Relations and Marketing, Oregon State University
- **Ed Ray**, President, Oregon State University

10:15 – 10:50 a.m. A short primer on robotics, AI and why they matter

Two Oregon State University experts summarize the state of AI and robotics and provide an introduction to the field to enable the audience to engage in the discussions to follow throughout the day. This session will discuss the future of AI and robotics, as seen by the researchers shaping that future and as perceived by the media and general public. The session also will address the increasing gap between these different perspectives.

Presenters:

- **Thomas Dietterich**, professor emeritus in computer science, OSU
- **Kagan Tumer**, professor of robotics and the director of Collaborative Robotics and Intelligent Systems (CoRIS) Institute, OSU

11:05 – 12:00 p.m. The good, the bad, and the ugly of AI and robotics

A panel of experts discusses the challenging ethical issues raised by the widespread adoption of AI and robotics technologies in areas ranging from social media and law enforcement to defense systems and health care. For example, many AI systems require vast amounts of training data, typically collected from online activities. How does this “surveillance economy” conflict with expectations of privacy? Law enforcement agencies increasingly use face recognition and other biometric technologies. What ethical issues are raised when these systems are biased or make mistakes? Military units across the globe are exploring the application of AI and robotics in autonomous weapons systems. What are the risks, and who should be held responsible for errors committed by these systems? And robots are being deployed in medical applications, from precision surgery to infectious disease management. What happens to patient rights in this new health care delivery paradigm?

Moderator:

Thomas Dietterich, professor emeritus of computer science, OSU

Panelists:

- **Cindy Grimm**, associate professor of mechanical engineering in the Collaborative Robotics and Intelligent Systems Institute, OSU
- **Geoffrey A. Hollinger**, assistant professor in the Collaborative Robotics and Intelligent Systems Institute, OSU
- **Stephanie Jenkins**, assistant professor in the School of History, Philosophy and Religion, OSU
- **Jason Millar**, assistant professor in the School of Electrical Engineering and Computer Science, University of Ottawa, and affiliate researcher at the Center for Automotive Research, Stanford University

12:00 – 1:30 p.m. Innovation Fair and lunch at CH2M HILL Alumni Center

(Lunch is included if registered for the Innovation Fair)



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1:30 – 2:20 p.m. How will humans interact with future robots?

How we will interact with robots as they become part of our daily routines at home, on the road, at work, at the doctor's office and in other parts of our lives is an open question. Many people believe that we will simply talk to them, just as we do to other humans. Yet even if robots can understand our words, they lack the social skills and background knowledge that people have to make our interactions effective. Are there better ways to interact with robots? Do we need different ways to understand what robots are doing and thinking, as well as to tell them what to do? Do the ways we will interact with robots differ based on how the robots look, the places they are located, or how they are used? Oregon State University experts who use robots for real-world tasks or study how humans can interact with robots will discuss the current and future limitations of interacting with robots and suggest possible ways of communicating effectively with them in the future.

Moderator:

Bill Smart, director of the robotics program at OSU, associate director of the Collaborative Robotics and Intelligent Systems Institute and professor of robotics

Panelists:

- **Julie A. Adams** (via Video Conference), professor of robotics and an associate director of Collaborative Robotics and Intelligent Systems Institute, OSU
- **Naomi Fitter**, assistant professor in the School of Mechanical, Industrial and Manufacturing Engineering, OSU (January 2019)
- **Heather Knight**, assistant professor of robotics, OSU
- **Kipp Shearman**, associate professor in the College of Earth, Ocean and Atmospheric Sciences, OSU

2:35 – 3:25 p.m. The tech economy: AI and robotics in the workplace

When AI and robotics come up in workplace conversation, talk often turns to employment. From retail to manufacturing, automation is already affecting the work environment, and the pace of change will likely increase in the future. Though most economists predict a net gain in jobs, a Pew Research Center report shows there is widespread concern that robots will displace both blue-collar and white-collar jobs, changing future workforce dynamics. In this panel, experts from industry and OSU will share their views on the future state of technologies and jobs and the impact of AI and robotics on the workplace.

Moderator:

Brian Wall, assistant vice president for research, commercialization and industry partnerships, OSU

Panelists:

- **Jon Brewster**, HP Fellow and VP, Chief Technologist for Software
- **Alan Fern**, professor of computer science and associate head of research for the School of Electrical Engineering and Computer Science at OSU
- **Lama Nachman**, Intel fellow and director of Anticipatory Computing Lab
- **Derek Rotz**, director of advanced engineering, Daimler Trucks North America



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3:40 – 4:30 p.m. The future of AI and robotics: Opportunities and potential threats

If you have searched the internet, read a voice message on your phone or adjusted travel plans to account for traffic, you have taken advantage of artificial intelligence. Such benefits may pale in comparison to more sophisticated applications on the horizon – think self-driving vehicles, a more efficient power grid, automated security systems. This panel of experts will consider the opportunities and potential threats posed by artificial intelligence and robotics. Speakers will offer perspectives from philosophy, computer science and communications while exploring our deepening reliance on automation driven by trends in these technologies.

Moderator:

Jacob Darwin Hamblin, professor of history and director of environmental arts and humanities, OSU

Panelists:

- **Finale Doshi-Velez**, assistant professor of computer science at the Harvard Paulson School of Engineering and Applied Sciences
- **Rebecca Hutchinson**, assistant professor with a cross-disciplinary appointment in computer science and fisheries & wildlife, OSU
- **Joseph Oroscio**, professor in the School of History, Philosophy, and Religion, OSU
- **Joshua Reeves** has a joint appointment in new media communications and speech communication, OSU

5:00 – 6:00 p.m. Keynote—Jacob Ward

The former editor-in-chief of *Popular Science* magazine, Jacob Ward is a science and technology television correspondent for CNN and Al Jazeera. He's the host of a landmark four-hour series on the science of human decisions and bias, "Hacking Your Mind," airing in 2019 on American public television, and writes for *The New Yorker*, *Wired* and *Men's Health*. Ward's 10-episode audible podcast, *Complicated*, racked up more than 20,000 subscribers per episode in 2017 with its discussion of humanity's most difficult problems. Ward is writing a book about how artificial intelligence is poised to amplify humanity's best and worst instincts and regularly speaks to audiences around the world about the future, including the latest innovations in science, medicine, energy and transportation.

6:00 – 7:30 p.m. Innovation Fair & evening reception at the CH2M HILL Alumni Center



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Moderator and Presenter Biographies

Dr. Julie A. Adams is a professor of robotics and an associate director of Collaborative Robotics and Intelligent Systems Institute at Oregon State University. She was a full professor at Vanderbilt University and worked in human factors at Honeywell, Inc. and the Eastman Kodak Company. Her research interests include distributed artificial intelligence, robotic swarms and human-machine teaming for systems that adapt to the current circumstances in dynamic, unstructured environments during long-duration missions. She focuses on domains such as mass casualty and the U.S. military, the integration of drones into the national air space, and future nuclear power plant control rooms.

Jon Brewster is an HP fellow and vice president serving as chief technologist for software. An OSU graduate, Brewster has been with HP since 1977. He started in customer support, learning to understand customer needs, and spent the bulk of his career starting new businesses. Saying he never met a technology he didn't like, Brewster is an active software developer for work and play. His current day job is tackling big data strategies and machine learning/AI approaches for existing and future businesses.

Dr. Thomas Dietterich is an Oregon State University professor emeritus of computer science has dedicated his career to the study of machine learning and artificial intelligence. He has published more than 200 scientific articles and has served as president of the Association for the Advancement of Artificial Intelligence and the International Machine Learning Society. The focus of his current research is on developing methods for making AI systems robust and safe. He is also part of the TAHMO project that aims to install and operate a network of 20,000 automated weather stations throughout all of sub-Saharan Africa.

Dr. Finale Doshi-Velez is an assistant professor of computer science at the Harvard Paulson School of Engineering and Applied Sciences. She completed her Ph.D. at MIT and her postdoc at Harvard Medical School. Her research focuses on probabilistic methods for decision making under uncertainty and interpretable machine learning. Her core application areas involve assisting with the treatment of patients with HIV and psychiatric disease and in critical care situations, as well as advising on regulation of machine learning under the law.

Dr. Alan Fern is a professor of computer science and associate head of research for the School of Electrical Engineering and Computer Science at Oregon State University. He received his Ph.D. and M.S. from Purdue University and his B.S. from the University of Maine. His research spans a range of AI topics, including machine learning and automated planning, with application interests including decision support, cybersecurity, activity recognition and design. He received an NSF CAREER Award, has won a number of best paper awards in top AI venues and is associate editor for the Journal of Artificial Intelligence Research and Machine Learning Journal.

Naomi Fitter will join Oregon State as an assistant professor in the School of Mechanical, Industrial and Manufacturing Engineering in January 2019. Fitter's research interests include physical human-robot interaction, socially assistive robotics, haptics, robots in education, and wearable electronics. As robots enter more everyday environments, she aims to equip them with the ability to engage and empower people in interactions from playful high-fives to challenging physical therapy routines.



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Dr. Cindy Grimm works in surface modeling and visualization with an emphasis on biomedical applications. Her current projects include modeling the developing heart, understanding how the shape of bat ears influences their sonar patterns, 3D sketching, and interfaces for 3D medical image segmentation. A member of OSU's mechanical engineering faculty and the Collaborative Robotics and Intelligent Systems Institute, Dr. Grimm received her Ph.D. from Brown University in 1995 in surface modeling. She spent two years at Microsoft Research working on facial animation, then 10 years on the faculty of Washington University in St. Louis.

Dr. Jacob Darwin Hamblin is a professor of history and director of environmental arts and humanities at Oregon State University. His books include "Oceanographers and the Cold War" (2005), "Poison in the Well: Radioactive Waste in the Oceans at the Dawn of the Nuclear Age" (2008), and "Arming Mother Nature: the Birth of Catastrophic Environmentalism" (2013). He writes about the history and politics of science, technology and environmental issues, and his work has appeared in the New York Times, Salon and numerous other publications. "Arming Mother Nature" received the American Historical Association's Birdsall Prize for best book in military and strategic history, and the History of Science Society's Davis Prize for best book for a general audience.

Dr. Geoffrey A. Hollinger is an assistant professor in the Collaborative Robotics and Intelligent Systems (CORIS) Institute at Oregon State University. His current research interests are in adaptive information gathering, distributed coordination, and learning for autonomous marine and aerial robotic systems. He has previously held research positions at the University of Southern California, Intel Research Pittsburgh, the University of Pennsylvania's GRASP Laboratory, and NASA's Marshall Space Flight Center. He received a Ph.D. (2010) and M.S. (2007) in robotics from Carnegie Mellon University and a B.S. in general engineering along with a B.A. in philosophy from Swarthmore College (2005).

Dr. Rebecca Hutchinson is an assistant professor with a cross-disciplinary appointment in computer science (Electrical Engineering and Computer Science) and Fisheries & Wildlife at Oregon State University. Her research focuses on machine learning models and algorithms inspired by problems and datasets in ecology. Examples of her work include methods for modeling species distributions from data collected by volunteers, or "community scientists," and methods for predicting links in networks of plant and pollinator species.

Dr. Stephanie Jenkins is an assistant professor in OSU's School of History, Philosophy & Religion, coordinator of the OSU Disability Network, and instructor for the "Philosophy School of Phish" at Oregon State University. She earned her dual Ph.D. in philosophy and women's studies from Pennsylvania State University in 2012. Her research and teaching interests include feminist philosophy, disability studies, critical animal studies, and ethics. She is currently co-editing a collection titled "Crippling Critical Animal Studies."

Dr. Heather Knight is a computer science professor at Oregon State University. Her research interests include human-robot interaction, non-verbal machine communications and non-anthropomorphic social robots. She directs the CHARISMA Research Lab – Collaborative Humans and Robots: Interaction, Sociability, Machine Learning, and Art – whose goal is to operationalize methods from the performing arts to make more charismatic robots. Off campus, she heads up robot theater company



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Marilyn Monrobot, which has an annual Robot Film Festival and features robot comedy performances by Ginger the Robot. Past honors include the 2011 Forbes List for 30 under 30 in Science, a TED talk on robot comedy, and the VMA-winning “This too shall pass” OK GO Rube Goldberg Machine music video.

Jason Millar is an Assistant Professor at the University of Ottawa’s School of Electrical Engineering and Computer Science, and an Affiliate Researcher at the Center for Automotive Research at Stanford. He researches the ethical engineering of robotics and artificial intelligence (AI), with a focus on developing tools and methodologies engineers can use to integrate ethical thinking into their daily engineering workflow. Jason has provided expert testimony at the UN CCW and the Senate of Canada on the ethics of military robotics. He consults internationally on policy and ethical engineering issues in emerging robotics and AI applications.

Dr. Lama Nachman is an Intel Fellow and director of the Anticipatory Computing Lab in Intel Labs. Her research is focused on context-aware and proactive computing. Nachman and her team create technologies to gain a deep understanding of people through sensing and sense-making and use this context to assist them. They develop sensing systems, algorithms and applications to enable compelling experiences and transfer these technologies to various Intel business units, to be included in future Intel products. Nachman also led a team of researchers who developed a new system to help Stephen Hawking communicate and released it to open source.

Dr. Joseph Orosco is professor of philosophy in the School of History, Philosophy, and Religion at OSU. His areas of research specialization are social and political philosophy, focusing on democratic theory, social movements, peace and nonviolence, and immigration. He is also interested in theories of anarchism and utopian/dystopian political thought, particularly in science fiction, and regularly teaches a course on the philosophy and ethics of “Star Trek.” As co-director of the Anarres Project for Alternative Futures at OSU, he is inspired by the work of science fiction and fantasy author Ursula K. Le Guin to examine the ways in which we can imagine and build radical alternatives to our current social, political and economic institutions.

Dr. Joshua Reeves has a joint appointment in new media communications and speech communication at Oregon State University. An associate editor of the journal *Surveillance & Society*, Reeves is the author of “Citizen Spies: The Long Rise of America’s Surveillance Society” (NYU Press). His research on surveillance and artificial intelligence has culminated in a new book on military AI that is forthcoming from Duke University Press. Before coming to OSU he taught at the University of Memphis, where he was an affiliate faculty with the Institute for Intelligent Systems.

Derek Rotz is a director of advanced engineering at Daimler Trucks North America, focusing on technologies to improve fuel economy, safety and connectivity. Previously he served as principle investigator for the SuperTruck program, in which his team built and tested a prototype truck that achieved 115 percent improvement in freight efficiency. Rotz is also deeply involved in development of autonomous vehicle technologies, supporting development of the world’s first licensed autonomous truck in Nevada in May 2015.

Dr. Kipp Shearman is an associate professor in the College of Earth, Ocean and Atmospheric Sciences. He uses a variety of observational tools to study fronts and eddies in the ocean in order to understand



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how these features evolve and impact the global and regional distributions of heat, salt and nutrients. Shearman specializes in the use of autonomous underwater vehicle gliders – buoyancy-propelled robots – in combination with ships and aircraft to resolve some of the complex physical features in the sea.

Dr. Bill Smart is a professor of robotics, an associate director of the Collaborative Robotics and Intelligent Systems Institute, and director of the robotics program at Oregon State University. Before coming to OSU, he was an associate professor of computer science and engineering at Washington University in St. Louis and spent a sabbatical at Willow Garage, a robotics startup in the San Francisco Bay Area. His research interests include human-robot interaction, machine learning for robotics, long-term autonomy, and the interaction between robotics, law and policy. He has applied his work to a variety of domains, including aviation flight planning, industrial automation, and the treatment of highly infectious diseases such as ebola.

Dr. Kagan Tumer is a professor of robotics and the director of the Collaborative Robotics and Intelligent Systems (CORIS) Institute at Oregon State University. Prior to arriving at OSU, he was a research scientist and group lead at the NASA Ames Research Center. His research focuses on multi-robot coordination, long-term autonomy, and AI in unstructured environments, with an emphasis on what AI systems need to do rather than how they do it. His work has been applied to rover coordination, air traffic management, power plant control and unmanned aerial vehicle coordination.

Brian Wall is the assistant vice president for research, commercialization and industry partnerships at Oregon State University. He leads a strategic priority of OSU, the OSU Advantage, to connect business with faculty expertise, student talent and world-class facilities to look for solutions, bring ideas to market and launch companies. He also chairs the OSU Venture Development Fund Advisory Council, working collaboratively with the OSU Foundation to raise gap funding and supporting use-inspired research, innovation and entrepreneurship at OSU.