



Carnegie Mellon University
Institute for Strategic Analysis

National Defense University

AI Executive Short Course

November 15, 2018

5000 Forbes Ave
Pittsburgh, PA 15213

Agenda

AI Executive Short Course
for
Dwight D. Eisenhower School
National Defense University
Senior Acquisition Students

November 15 - November 16, 2018

Thursday, November 15

0800 Registration and Continental Breakfast

Location: ***GHC 6th Floor Commons***

0900 Welcome & overview of Carnegie Mellon University
● George Darakos, Director of Partnerships

Location: ***Gates-Hillman Center 6115***

0910 AI Stack
● Andrew Moore, Dean, School of Computer Science

Location: ***Gates-Hillman Center 6115***

0930 Artificial Intelligence, Machine Learning, and Deep Learning: Historical
Perspective, Recent Developments, and Open Challenges
● Roni Rosenfeld, Head of Machine Learning Department

Location: ***Newell-Simon Hall 3305***

1050 AI in systems: Tackling the engineering challenges
● Bill Scherlis, Director; Professor, Institute for Software Research

Location: ***Newell-Simon Hall 3305***

1145 Break

1150 AI in Use: Ethics, Impacts, and Responses
● David Danks, Professor of Philosophy & Psychology

Location: ***Newell-Simon Hall 3305***

1230 Post-survey

1240 Lunch discussion: What human-robot interaction is and the types of

investigations it spans

- Jodi Forlizzi, Director of Human-Computer Interaction Institute

Location: ***Newell-Simon Hall 3305***

1330

Lab tour – Robot demonstration - Biorobotics

- Howie Choset, Kavcic-Moura Professor of Computer Science
- Arun Srivatsan Rangaprasad, Postdoctoral Fellow, The Robotics Institute

Location: ***Newell Simon Hall 3305***

1415

Travel and join another NDU Group

1445

[Advanced Robotics for Manufacturing Institute](#) (ARM)

Lisa Masciantonio, Director of Partnerships & Outreach

lisa.masciantonio@arminstitute.org

O: 412-681-5201 C: 412-260-1342

Location: ***10 40th Street, Pittsburgh, PA 15201***

1515

[National Robotics Engineering Center](#) (NREC)

Rob Toth, Associate Director of Business Development

rmtoth@andrew.cmu.edu

O: 412-683-4147

Location: ***10 40th Street, Pittsburgh, PA 15201***

1600

Robot-chassis building exercise with Girls of Steel Robotics

www.girlsofsteelrobotics.com

Location: ***10 40th Street, Pittsburgh, PA 15201***

1730

Return to Hotel

Friday, November 16

0800

Depart Hotel

0815

Continental Breakfast at [AlphaLab Gear](#) (ALG)

Afshan Khan, Executive-in-Residence, Innovation Works

akhan@innovationworks.org

O: 412-855-7434

- Overview of ALG by Afshan Khan
- Presentations by early-to-later stage companies (TBD)
- Working lunch
- Overview of NDU by CAPT Ken Epps, USN
- Continuation of company presentations

Location:

6024 Broad Street, Pittsburgh, PA 15206

1230

Meeting Adjourned

Instructors



Prof. David Danks
Department Head, Professor of Philosophy and Psychology,
Department of Philosophy, Carnegie Mellon University

Dr. David Danks is Professor of Philosophy & Psychology, and Head of the Department of Philosophy, at Carnegie Mellon University. He is also an associate/adjunct member of: the Center for the Neural Basis of Cognition (CMU); the Center for Advanced Study of Language (Univ. of Maryland); and both the Department of History & Philosophy of Science and Center for Philosophy of Science (Univ. of Pittsburgh). He has received a James S. McDonnell Foundation Scholar

Award, as well as funding from the NSF and NIH. Before arriving at CMU, he received an A.B. in Philosophy from Princeton University, an M.A. and Ph.D. in Philosophy from University of California, San Diego, and was a Research Scientist at the Florida Institute for Human & Machine Cognition.

His interests largely fall at the intersection of philosophy, cognitive science, and machine learning, using ideas and frameworks from each to inform the others. His primary research is in computational cognitive science: developing fully-specified computational models to describe, predict, and most importantly, explain human behavior. The fullest expression of that work can be found in his book, *Unifying the Mind: Cognitive Representations as Graphical Models* (2014; The MIT Press). More recently, his research has turned towards the role of humans in cyber-systems, with a particular emphasis on ethical challenges and opportunities during cyber-conflicts. He has published widely in philosophy, psychology, and computer science.



Prof. Andrew Moore
Dean, School of Computer Science
Carnegie Mellon University

Andrew W. Moore is the fifth dean of the School of Computer Science at Carnegie Mellon University. He began his new role Aug. 18, 2014. A member of the CMU faculty since 1993, Moore's appointment as the new dean of SCS marks a homecoming of sorts for the professor of robotics and computer science. He has been on a leave of absence from CMU since January 2006, when he opened the Pittsburgh office of Google Inc. While at Google, Moore has led projects to improve

user experiences in advertising and shopping and to help combat fraud.

In October 2011, while continuing to serve as leader of Google's Pittsburgh office, Moore was named vice president of engineering of Google Commerce, where he became responsible for developing new products and services.

Moore's tenure at Google Pittsburgh has been characterized by the office's rapid growth both in size and importance. Google Pittsburgh started with just two employees in a rented office on the CMU campus. It now includes more than 275 employees in 140,000 square feet in East Liberty's Bakery Square development, located just a few miles from Carnegie Mellon. Work being done at Google Pittsburgh includes everything from the company's signature search engine to shopping, advertising and the Android mobile platform.

Moore's research interests broadly encompass the field of "big data"—applying statistical methods and mathematical formulas to massive quantities of information, ranging from Web searches to astronomy to medical records, in order to identify patterns and extract meaning from that information. His past research has also included improving the ability of robots and other automated systems to sense the world around them and respond appropriately.

From 2002 to 2005, Moore served as co-director of the Biomedical Security Center at the University of Pittsburgh, and along with Michael M. Wagner and Ron M. Aryel, he was editor of the Handbook of Biosurveillance, a guide to detecting and fighting outbreaks of communicable diseases in real-time.

In 2005, Moore was named a Fellow of the Association for the Advancement of Artificial Intelligence (AAAI) for his significant contributions to machine learning, data mining and statistical artificial intelligence, as well as for his role in transferring those technologies to industry and government.

A graduate of the University of Cambridge, where he studied mathematics and computer science, Moore was born in Bournemouth, U.K., Jan. 15, 1965, and began his career working for Hewlett-Packard's Bristol research lab. He returned to Cambridge in 1986 to earn his Ph.D. in computer science.

Moore spent three years as a post-doctoral researcher at the Massachusetts Institute of Technology before joining the CMU faculty. From 1995 to 2001, Moore served as co-founder and chief technology officer of a small, Pittsburgh-based consulting company specializing in data mining technology. He received a doctorate from the University of Cambridge in 1991 and joined the CMU faculty in 1993 following two years of post-doctoral research. In 2005, he was elected a fellow of the American

Association for Artificial Intelligence. Andrew lives in Pittsburgh with his wife, Mary, and two children, William and Lucy.

Moore succeeds Randal Bryant, who will return to the CMU faculty after serving as dean since 2004.

Education

University of Cambridge, B.S., mathematics and computer science

University of Cambridge, Ph.D., computer science



Prof. Roni Rosenfeld
Professor and Head, Machine Learning Department
School of Computer Science
Carnegie Mellon University

Roni Rosenfeld (B.Sc., mathematics and physics, 1985, Tel-Aviv University; M.Sc. 1991, Ph.D. 1994, computer science, Carnegie Mellon University) is head of the Machine Learning Department and professor of machine learning, language technologies, computer science and computational biology, in the School of Computer Science at Carnegie Mellon University, Pittsburgh, Pennsylvania. He also holds a courtesy appointment at the Heinz School of Public Policy at Carnegie Mellon, and an adjunct appointment at the University of Pittsburgh School of Medicine.

Rosenfeld has been teaching machine learning and statistical language modeling since 1997. He has taught thousands of undergraduate and graduate students, has been a mentor to four post-doctoral students and an advisor to about a dozen Ph.D. students and a score of Masters and undergraduate students.

Professor Rosenfeld's current interests include tracking and forecasting epidemics, using speech and language technologies to aid international development, using machine learning for social good, and advancing data numeracy for all. He has also performed research in statistical language modeling, machine learning, speech recognition and viral evolution. He has published well over 100 scientific articles in academic journals and conferences.

Rosenfeld is a recipient of the Allen Newell Medal for Research Excellence and of the Spira Teaching



Prof. Bill Scherlis
Director, Institute for Software Research
Professor of Computer Science, School of Computer Science
Carnegie Mellon University

William L. Scherlis is a Professor of Computer Science and director of CMU's Institute for Software Research (ISR), one of seven academic departments in the School of Computer Science (SCS). Scherlis founded the PhD Program in Software Engineering in 1999 and directed it for more than a decade. During 2012 and early 2013 he was the Acting CTO for the Software Engineering Institute, a

Department of Defense research FFRDC at CMU.

Scherlis joined the Carnegie Mellon faculty after completing an A.B. magna cum laude at Harvard University in applied mathematics, a year in the Department of Artificial Intelligence at the University of Edinburgh (Scotland) as a John Knox Fellow, and a Ph.D. in computer science at Stanford University. His research relates to software assurance, cybersecurity, software analysis, and assured safe concurrency. His team has developed analysis tools based on techniques to verify safe concurrency, information flow, and other properties that tend to defy conventional testing and heuristic analysis. He has led several large research projects including the National Security Agency Science of Security Lablet at CMU since its inception seven years ago and, previously, the CMU/NASA High Dependability Computing Project.

Scherlis has testified before Congress on federal software sustainment, on computing technology and innovation, and on roles for a Federal CIO. He interrupted his career at CMU to serve at Defense Advanced Research Projects Agency (DARPA) for more than six years, departing in 1993 as a federal senior executive. Scherlis chaired the National Research Council (NRC) study committee that produced the report *Critical Code: Software Producibility for Defense* in 2010. He served multiple terms as a member of the DARPA Information Science and Technology Study Group (ISAT). He has been an advisor to the DoD and to major technology and defense companies and is a founder of CMU spin-off companies.

Scherlis is a Fellow of the IEEE and a lifetime National Associate of the National Academy of Sciences.

Scherlis has testified before Congress on software rejuvenation, on innovation and information technology, and on roles for a Federal CIO. He chaired the National Research Council (NRC) study committee on defense software producibility, which recently released its final report *Critical Code: Software Producibility for Defense*. He served multiple terms as a member of the DARPA Information Science and Technology Study Group (ISAT). He also chaired a NRC study on e-government, and has led or participated in other national studies related to cybersecurity, crisis response, analyst information management, Ada, and health care informatics. He has been an advisor to major IT companies and is a founder of two Carnegie Mellon spin-off companies, Panopto and SureLogic. He has served as program chair for a number of technical conferences, including the ACM Foundations of Software Engineering (FSE) Symposium and the ACM Symposium on Partial Evaluation and Program Manipulation (PEPM). He has more than 80 scientific publications. He is a Fellow of the IEEE and a lifetime National Associate of the National Academy of Sciences.