DAVID A. MINDELL

Dibner Professor of the History of Engineering and Manufacturing
Professor of Aeronautics and Astronautics
Margaret MacVicar Faculty Fellow
Housemaster, MIT Edgerton House
Massachusetts Institute of Technology
Building E51-194A, Cambridge, MA 02139, mindell@mit.edu
http://web.mit.edu/mindell/www

PROFESSIONAL EXPERIENCE

2011-2012 *Visiting Scholar*, *Aurora Flight Sciences Inc.*, Cambridge, Mass. Visiting scientist pursuing research on operations and navigation of advanced autonomous flight vehicles. Proposal development, instrument design, system design, human system integration architecture for autonomous helicopter system.

2007 - present, *Housemaster, MIT Edgerton House* (with wife Pamela Mindell). Residential position providing intellectual and community leadership for 180-student graduate student building. Oversee student governance, organize intellectual and musical events, advocate for student community to MIT administration.

2006 - 2011, *Department Head, Science, Technology and Society (STS)*, Massachusetts Institute of Technology. Direct a department at the intersection of history, anthropology, sociology and science and technology (13 faculty, ~27 Ph.D. students). Prepare hiring, promotion, and tenure cases for faculty. Increase intellectual and demographic diversity of the faculty and students. Review promotion and tenure cases for School of Humanities, Arts, and Social Sciences. Increase quality of graduate admissions and education. Develop and expand undergraduate program and major. Encourage sponsored research and undertake resource development from private donors. Develop department vision with faculty and articulate to potential sponsors and MIT leadership.

1996 - present, *Frances and David Dibner Professor of the History of Engineering and Manufacturing, Professor of Aeronautics and Astronautics (2009-present), Professor of Engineering Systems (Associate Prof., 2000-2005) (Assistant Prof., 1996-2000)*. Massachusetts Institute of Technology. Cross intellectual, research, and educational boundaries between history and engineering. Mentor and advise graduate students (11 Ph.D. dissertations as primary advisor). Research and writing in the history of technology, particularly the history of human-machine relationships, from the American Civil War to the Apollo lunar landings and modern autonomous systems. Founded research groups in Technology, Archaeology, and the Deep Sea and Space, Policy and Society. Only MIT faculty member with a dual appointment in the school of engineering and the school of humanities and social science.

1996- present, *Visiting Investigator*, Deep Submergence Lab, Woods Hole Oceanographic Institution. Collaborate on a variety of oceanographic, archaeological, and engineering projects exploring the deepest parts of the ocean for traces of the human past. Develop technology for precise investigation of archaeological sites. Founded the field of technology, archaeology, and the deep sea. Participant, co-investigator, or leader of over 20 oceanographic expeditions.

1990-95, *Ocean Engineer*, Deep Submergence Laboratory, Woods Hole Oceanographic Institution, Department of Applied Ocean Physics and Engineering. Develop control systems for robotic vehicles to explore the deepest parts of the ocean.

1986-present, *Technical Consultant,* Hermetic Sciences Co. Technology development, oceanographic expeditions, curriculum development and writing, for a variety of industrial and government clients including: Woods Hole Oceanographic Institution, Marine Sonic Technology Inc., National Academy of Sciences, Product Genesis Inc., National Geographic Society, Xerox Corp, National World War II Museum.

EDUCATION

1991-96 **Massachusetts Institute of Technology:**
Ph.D., History and Social Study of Science and Technology, Program In Science, Technology, and Society. Dissertation title: *"Datum for its Own Annihilation:" Feedback, Control, and Computing 1916-45.*

1984-88 **Yale University:**
B.S. 1988, Electrical Engineering (*cum laude)*
B.A. 1988, Literature *(distinction in the major)*

FELLOWSHIPS AND HONORS

Honors

2012 Gardner-Lassiter Aerospace History Award for *Digital Apollo*, American Institute of Aeronautics and Astronautics.

2009 Eugene Emme Award for Astronautical Literature, for *Digital Apollo*, American Astronautical Society

2001 *Sally Hacker Prize*, Society for the History of Technology for *War, Technology, and Experience aboard the USS* Monitor, recognizing the best book published in the history of technology during 1998-2000 directed to a broad audience of readers, including students.

2001 *IEEE Life Member Prize in Electrical History*, Society for the History of Technology, for "Opening Black's Box: Rethinking Feedback's Myth of Origin," best paper published in 2000 on a topic in electrical history.

2001-2011 *Margaret MacVicar Faculty Fellow*, MIT, 10-year fellowship for sustained and significant contributions to teaching and undergraduate education at MIT.

2001 Honorable mention for best book in the history of science and technology, *War, Technology, and Experience*, American Association of Publishers.

1999 *Ogilve Young Investigator Lecturer*, Department of Ocean Engineering, MIT.

1998 *Abbott Payson Usher Prize*, Society for the History of Technology, for best published paper in the history of technology in the previous three years, for "The Clangor of the Blacksmith's Fray: Technology, War, and Experience Aboard The USS *Monitor*."

1988 *Alvin Kernan Prize for best Yale senior thesis in literature*, "Reading Reciprocal Spaces: Gravity's Rainbow and the Alchemical Elite."

Fellowships

2003-04 *Senior Fellow*, Dibner Institute for the History of Science and Technology
1999 *Visiting Research Fellow*, Lemelson Center for Innovation, National Museum of American History, Smithsonian Institution.
1995-96 *Graduate Fellow*, Dibner Institute for the History of Science and Technology.
1993-95 *Graduate Fellow*, National Science Foundation.

PROFESSIONAL ORGANIZATIONS AND ACTIVITIES

Member, NASA Historical Advisory Committee
IEEE Spectrum, Editorial Board
Marine Technology Society Journal, Editorial Board (2003-05)
Member, Deep Submergence Science Committee, NSF/NOAA/ONR University-National Oceanographic System (UNOLS) (2000-05) (oversees "National Deep Submergence Facility" of undersea vehicles Alvin and Jason for federal sponsoring agency; monitors vehicle operators' relationship with science users).
Institute of Electrical and Electronics Engineers

1999-2003 *Member*, IEEE History Committee.
1996-98 *Member*, Administrative Committee, IEEE Society for Social Implications of Technology.
1995-98 *Book Review Editor,* IEEE Technology and Society Magazine.

Fellow, Explorer's Club
Fellow, Massachusetts Historical Society
Society for the History of Technology (peer reviewer, prize committees)
History of Science Society
American Institute of Aeronautics and Astronautics
Instrument-rated private pilot

SELECTED MIT SERVICE ACTIVITIES

Chair, MIT 150th Anniversary Committee (2011)
School Council, School of Humanities, Arts and Social Sciences
Engineering Systems Council
Organizer, "Leading an Extraordinary Life" course for graduate students
Organizer/Lecturer, "Steam, Steel, and Speed," MIT Alumni tour of UK
Member, Task Force on the Undergraduate Educational Commons (effort to reform MIT's undergraduate curriculum for the first time in 40 years)
Institute Nominations Committee
Campus Energy Task Force
Search Committee, Dean for Undergraduate Education
Search Committee, Dean for Humanities, Arts, and Social Sciences
Search Committee, Director, Engineering Systems Division
Search Committee, Director, Knight Science Journalism Fellows Program
Search Committee (chair), Director, MIT Museum
Committee on the Undergraduate Program
Lecturer, MIT Alumni tours of Africa, Black Sea
"MIT on the Road" lectures to MIT Alumni clubs

PUBLICATIONS OF DAVID A. MINDELL

Books

Iron Coffin: War, Technology and Experience aboard the USS Monitor, Johns Hopkins University Press, Spring, 2012 (revised and updated edition of 2000 book listed below).

Digital Apollo: Human and Machine in Spaceflight, MIT Press (Spring, 2008). http://digitalapollo.mit.edu

Greil Marcus and Werner Sollors, eds., *A New Literary History of America* (member, editorial board). Harvard University Press, 2009.

Between Human and Machine: Feedback, Control, and Computing before Cybernetics, Johns Hopkins University Press (Spring, 2002).

War, Technology and Experience aboard the USS Monitor, Johns Hopkins University Press, Spring, 2000. (Awarded Sally Hacker Prize for best popular book in the history of technology, Society for the History of Technology).

Peer reviewed articles, history and policy:
D.A. Mindell, S. Uebelhart, A. Siddiqi, S. Gerovitch, "The Future of Human Spaceflight: Objectives and Policy Options in a Global Context," *AAAS Occasional Paper*, American Academy of Arts and Sciences, 2009.

"Opening Black's Box: Rethinking Feedback's Myth of Origin," *Technology and Culture*, July: 405-34. (Awarded IEEE Life Members Prize in Electrical History), 2000.

"The Clangor of That Blacksmith's Fray: Technology, War, and Experience Aboard the USS Monitor," *Technology and Culture*, April: 242-70. (Awarded Abbott Payson Usher Prize), 1995.

Peer reviewed articles, engineering and archaeology:
Bingham, B., Foley, B., Singh, H., Camilli, R., Delaporta, K., Eustice, R., Mallios, A., Mindell, D., Roman, C. and Sakellariou, D. (2010), "Robotic tools for deep water archaeology: Surveying an ancient shipwreck with an autonomous underwater vehicle." *J. Field Robotics*, 27: 702–717.

B. Foley, D. Mindell, et. al., "New methods for underwater archaeology: The 2005 Chios ancient shipwreck survey," *Hesperia* 78:2009.

B. Bingham, D. Mindell, T. Wilcox, and A. Bowen, "Integrating precision relative positioning into JASON/MEDEA ROV operations", Marine Technology Society (MTS) Journal, vol. 40, no. 1, pp. 87-96, Spring 2006.

D.A. Mindell, H. Singh, D. Yoerger, L.Whitcomb, J.Howland, "Precision mapping and imaging of underwater sites at Skerki Bank using robotic vehicles," in A.M. McCann and J.P. Oleson, eds., Deep-water Shipwrecks off Skerki Bank: the 1997 Survey, *Journal of Roman Archaeology,* Suppl. Series., 2004.

D.A. Mindell and K. Croff, "Deep water, archaeology, and technology development," *Marine Technology Society Journal*, Vol 36, No. 3, 13-20, 2002.

B.P. Foley and D.A. Mindell, "Precision survey and archaeological methodology in deep water," *ENALIA, Journal of the Hellenic Institute of Marine Archaeology*, Volume VI (2002): 49-56.

R.D. Ballard, L.E. Stager, D. Master, D.R. Yoerger, D. Mindell, L.L. Whitcomb, H. Singh, and D. Piechota, "Iron age shipwrecks in deep water off Ashkelon, Israel," *American Journal of Archaeology*, October, 2001.

H. Singh, J. Adams, D. Mindell, and B.P. Foley, "Imaging underwater for archaeology," *Journal of Field Archaeology*, October, 2000.

R.D. Ballard, A.M. McCann, D.Yoerger, L. Whitcomb, D. Mindell, et al., "The discovery of ancient history in the deep sea using advanced deep submergence technology," *Deep-Sea Research* I 47 (2000): 1591-1620.

L. Whitcomb, D. Yoerger, H. Singh, and D. Mindell, "Toward precision robotic maneuvering, survey, and manipulation in unstructured undersea environments," in Y. Shirai and S. Hirose, editors, *Robotics Research—The Eighth International Symposium* (London: Springer-Verlag, 1998).

Policy White Paper: "The Future of Human Spaceflight," Space Policy and Society Research Group, MIT, December 2009. (Briefed to Obama transition team, OBM, OSTP, and Capitol Hill staffers).

Book chapters:
"Precision Navigation and Remote Sensing for Underwater Archaeology" in James Wiseman and Farouk El-Baz, eds., *Remote Sensing in Archaeology* (Springer Verlag, 2007).

D.A. Mindell, "Human and Machine in the History of Spaceflight," in Dick, Steven J., and Roger D. Launius eds. *Critical Issues in the History of Spaceflight*. Washington, DC: NASA, 2006.

D.A. Mindell, S. Gerovitch, and J. Segal, "From Communications Engineering to Communications Science: Cybernetics and Information Theory in America, France, and Russia," in Mark Walker, ed., *Science and Ideology: A Comparative History* (Harwood Academic Publishers, 2000).

D. A. Mindell, "Automation's Finest Hour: Radar and System Integration in World War II," in Thomas P. Hughes and Agatha Hughes, eds., *Systems, Experts, and Computers: The Systems Approach in Management and Engineering, World War II and After*, MIT Press: 27-56.

G. Smith and D. A. Mindell, "The Emergence of the Turbofan Engine," in Peter Galison and Alex Roland, eds., *Atmospheric Flight in the Twentieth Century Archimedes New Studies in the*

History and Philosophy of Science and Technology Volume 3 (Kluwer Academic Publishers, 2000):107-56

Funding a Revolution: Government Support for Computing Research, National Research Council, Computer Science and Telecommunications Board, 1999 (Consultant, author of Chapters 4 and 6): 85-135, 159-68.

"Beasts and Systems: Taming and Stability in the History of Control," in Miriam Levin, ed., *Technology and Control* (Harwood Academic Publishers, 1999): 205-24.

"Engineering and the Real World," in "From Know-How to History," *Proceedings of the Symposium in Honor of Elting Morison*, MIT STS Working Paper #22, December, 1995.

Selected proceedings of refereed conferences:
D. Mindell and Z. Mirmalek, "An Ethnographic Approach to Human-Machine Relationships in Commercial Aviation: Heads-Up Guidance and Enhanced Vision," *49th AIAA Aerospace Sciences Meeting*, Orlando, Florida, Jan. 4-7, 2011. AIAA-2011-966.

B. Bingham, B. Blair, and D. Mindell, "on the design of direct sequence spread-spectrum signaling for range estimation," *IEEE/MTS Oceans Conference* 2007.

B. Bingham, D. Mindell, T. Wilcox, and Andy Bowen, "Integrating SHARPS II precision navigation Into JASON/MEDEA two-vehicle operation", *IEEE/MTS Oceans Conference* 2005.

B. Bingham, D.A. Mindell, D.Yoerger, B.P. Foley and W.Seering, "Acoustic multipath identification with expectation-maximization," *IEEE/MTS Oceans Conference*, Sept. 2003.

D. A. Mindell and B. Bingham, "New archaeological uses of autonomous undersea vehicles," *IEEE/MTS Oceans Conference*, November, 2001.

D. A. Mindell and B. Bingham, "A High-frequency, narrow-beam sub-bottom profiler for archaeological applications" *IEEE/MTS Oceans* conference, November, 2001.

Other major publications:
D.A. Mindell, "Bodies, Ideas, and Dynamics: Historical Perspectives on Systems Thinking in Engineering," ESD-MIT Engineering Systems Division working paper 2003-01.23-*ESD Internal Symposium*.

Funding a Revolution: Government Support for Computing Research, National Research Council, Computer Science and Telecommunications Board, 1999 (Consultant, author of Chapters 4 and 6).

National Research Council, Marine Board, Committee on Undersea Vehicles, *Undersea Vehicles and National Needs,* 1997 (contributing writer and editor).

"Engineering and the Real World," in "From Know-How to History," *Proceedings of the Symposium in Honor of Elting Morison*, MIT STS Working Paper #22, December, 1995.

Book reviews (selected):
An Ocean in Common: American Naval Officers, Scientists, and the Ocean Environment. By Gary Weir. *Technology and Culture*, October 2003.

The One Best Way: Frederick Winslow Taylor and the Enigma of Efficiency by Robert Kanigel, *Technology and Culture* (January, 1999).

Alexander Graham Bell: The Life and Times of the Man who Invented the Telephone by Edwin S. Grosvenor and Morgan Wesson, *New England Quarterly* (December, 1998).

Disaster on the Mississippi by Gene Eric Salecker, *Journal of American History* (Sept. 1997).

A Quest for Glory: A Biography of Rear Admiral John A. Dahlgren by Robert Shneller, *Technology and Culture* (July, 1997).

The Grammar of the Machine: Technical Literacy and Early Industrial Expansion in the United States Edward W. Stevens, Jr., *Journal of Interdisciplinary History* (Spring, 1997).

Changing Large Technical Systems Jane Summerton, ed., *Technology and Culture* (July, 1996).

The Computer: From Pascal to von Neumann by Herman H. Goldstine, *IEEE Technology and Society* (March, 1996).

High Performance: The Culture and Technology of Drag Racing by Robert C. Post, *IEEE Technology and Society* (April, 1995).

Telerobotics, Automation, and Human Supervisory Control by Thomas B. Sheridan, *IEEE Technology and Society* (June, 1993).

Other reviews, *Byte Magazine* (1988-1990).

Encyclopedia entries, articles in magazines, chapters in popular books (selected):
"What Price Glory? Technology and Experience Aboard the USS Monitor," *BBC History Magazine*, August, 2000.

"Into the New Century," in Thomas B. Allen ed., *We Americans*, National Geographic Society, 1999.

"Technology's Interaction with Society," *Wiley Encyclopedia of Electrical Engineering*, 1999.

"Automation's Finest Hour: Bell Laboratories' Control Systems in World War II," *IEEE Control Systems Magazine*, December, 1995.

"Engineers, Psychologists, and Administrators: Wartime Control Systems Research, 1941-1945," *IEEE Control Systems Magazine*, August, 1995.

"Fire Control," and "Military Procurement — Arsenals," entries *in Oxford Companion to American Military History*, Oxford University Press, 1999.

"Antiaircraft Fire Control and the Development of Integrated Systems at Sperry, 1925-1940," *IEEE Control Systems Magazine*, April, 1995.

"Shipwrecks of Memory: Excavating Guadalcanal," *Thresholds* (MIT Department of Architecture and Urban Planning), Spring, 1995.

"Fiber Optics on the Face of the Deep: Computing in the Jason Project," Feature Article, *Byte Magazine,* February, 1990.

"Reading the Analog World: Digital Signal Processing Moves to Micros", Feature Article, *Byte Magazine,* August, 1989.

"Xerox Facilities CAD: Standards and Procedures," *Architectural & Engineering Systems*, August, 1989.

Invited lectures and conference presentations. (selected)

Plenary Speaker, "Exploration Telerobotics Symposium," NASA Goddard Space Flight Center, Greenbelt, MD, May 2012.

"Technology and Military Professionalism," Invited lectures, United States Air Force Academy, Colorado Springs, CO, April 2012.

Invited Lecturer, "Hampton Roads Weekend," *USS Monitor Museum*, March 2012.

"*Human, Remote, Autonomous: New Studies of Presence in Socio- Technical Systems*," part of session organized at Annual Meeting of the Society for the Social Study of Science (4S), 4S Meeting, "Human Presence and Social Relationships in Remote and Autonomous Systems," Cleveland, Ohio, November 2011.

Invited Panelist, "The Future of Human Spaceflight," Goddard Symposium, American Astronautical Association, Greenbelt, Maryland, March 2011.

"Digital Apollo: Human and Machine in Six Lunar Landings," *Altair Lunar Lander design group,* NASA Johnson Space Center, November, 2009.

"Automation, Robotics, and Society: New Directions in Research," University of California at San Diego, Cognitive Systems Laboratory, August, 2009.

Keynote Speaker, US Air Force "Future Operator Symposium," Maxwell Air Force Base, Montgomery Alabama, July, 2009.

"Lunar Landing and Heads Up Displays," Heads Up Guidance User Symposium, Rockwell Collins Inc., Portland Oregon, June, 2009.

"Digital Apollo: Human and Machine in Six Lunar Landings," *Johns Hopkins Applied Physics Laboratory Weekly Colloquium* (October, 2007).

"Digital Apollo: Human and Machine in Six Lunar Landings," *Indiana University School of Informatics Weekly Colloquium* (February, 2006).

“Feedback, Control, and Computing before Cybernetics,” *American Control Conference,* Boston, June 2004.
“Digital Apollo: Electronics, Manufacturing, and the Flights to the Moon”, *IEEE Bletchley Park Conference on the History of Electronics*, June 2004.
“Historical Perspectives on Systems Thinking,” *MIT ESD External Symposium,* March 2004.
“Precision Navigation in Archaeology,” *DeepArch Seminar*, MIT, February 2004.
“Digital Apollo: Human and Machine in the Race to the Moon,” *Dibner Institute* weekly colloquium, February 2004.
“Precision Navigation and Robotic Surveys in Deep Water,” *California Institute of Technology*, Mechanical Engineering Departmental Colloquium, October 2003.
“Precision Navigation of Undersea Vehicles,” *Woods Hole Oceanographic Institution, Department of Applied Ocean Physics and Engineering*, weekly colloquium, September 2003
“John Ericsson and the *Monitor*” *American Swedish Historical Foundation*, invited lecture, September 2003.
“Robotic Archaeology in the Deep Sea,” IEEE *Life Members* talk, Lincoln Labs, September 2003.
“Digital Apollo: Human and Machine in the Race to the Moon,” *Johns Hopkins Colloquium in the History of Science,* September 2003.
“Exploring Archaeology in the Deep Ocean,” *American Isotope Society* Banquet Speaker, June 2003.
“Technology, War, and Experience Aboard the USS *Monitor*,” *Mariner’s Museum Hampton Roads Symposium*, March 2003.
“Archaeological Exploration in the Deep Ocean,” *Explorer’s Club Annual Meeting Lecture*, New York, March 2003.
“Perspectives of an Inventor/Historian,” *Lemelson Seminar on Historical Perspectives on Invention*, April, ’03.
“Web-based History of the Apollo Guidance Computer,” *Symposium on History of Recent Science and Technology on the World Wide Web*, MIT, March, ’03.
“Between Human and Machine: Feedback, Control, and Computing Before Cybernetics,” *Authors@MIT Series* (video posted on MIT World), Spring ’03.
“Embodying Cybernetics: Engineers, Astronauts, and the Apollo Guidance Computer,” *Society for History of Technology*, annual meeting, Santa Clara, Calif., October, 2001.
"Automation's Finest Hour: Managing Military Innovation in World War II," *MIT/Cambridge workshop on Cultures of Innovation,* University of Cambridge, May, 2001.
"Automation's Finest Hour: Reflections on the History of Control Systems," *University of Pennsylvania, departmental colloquium, department of History and Sociology of Science and Technology*, April, 2001.
"War, Technology, and Experience aboard the USS *Monitor*," *Colby College departmental colloquium*, STS Program, April, 2001.
"Technology, Archaeology, and the Deep Sea," *University of Pennsylvania, Museum of Anthropology*. March, 2001.
"War, Technology, and Experience aboard the USS *Monitor*," *Explorers Club, New England Chapter*, March, 2001.
"War, Technology, and Experience aboard the USS *Monitor*," *University of Southampton (UK), Department of Archaeology*, March, 2001.

"Technology, Archaeology, and the Deep Sea," *University of Southampton (UK), Oceanography Center*, March, 2001.
“Three Lectures on Technology, Archaeology, and the Deep Sea,” *Program on Maritime Archaeology*, University of Trapani, Sicily. March, 2001.
"Gravity's Other Rainbow: Control Systems and Representation in World War II," *Departmental colloquium, Department of German Literature, U.C., Santa Barbara*, February, 2001.
"Technology, Archaeology, and the Deep Sea," *weekly colloquium, Monterey Bay Aquarium Research Institute (MBARI)*, February, 2001.
"The History of Technology and the New Engineering Education at MIT*,"* Society for the History of Technology annual meeting, Munich, Germany, August 2000.
“The History of Control Systems,” *EMC Corp. Distinguished Lecture*, March, 1999.
“Archaeological Questions and Technology Development,” *Technology and Archaeology in the Deep Sea* conference, January ,1999.
“From Laboratory to Field: Archaeologists and Technology” (with Brendan Foley), Society for Historical Archaeology annual meeting, Salt Lake City, January 1999.
“Archaeology in the Deep Sea,” *Distinguished Scholars Lecture Series, Rochester Museum and Science Center*, March, 1998.
“Deep Sea Archaeology: Historical and Sociological Perspectives” (with R.D. Ballard et al*.)* Society for Historical Archaeology annual meeting, Atlanta, Georgia, January 7-10, 1998.
G. Smith and D. A. Mindell, “The Emergence of the Turbofan Engine*,” Dibner Conference on Flight in the Twentieth Century*, Cambridge, Mass., April, 1997.
“Automation’s Finest Hour: Radar and System Integration in World War II*,” Dibner Conference on The Spread of the Systems Approach*, Cambridge, Mass., May 3-5, 1996.
“Control Engineering in World War II: an International Comparison,” Society for the History of Technology annual meeting, London, August 3, 1996. Session organizer.
“Rethinking the History of Information: World War II’s Secret Cybernetics,” departmental colloquium, MIT Program in Science, Technology, and Society, April 1, 1996.
“Naval Control Systems at the Sperry Gyroscope and Ford Instrument Companies,” Naval Academy Historical Symposium, Annapolis, Md., October, 1995.
“The History of Control Systems,” *Departmental colloquium, Mechanical Engineering, Johns Hopkins University*, September 21, 1995.
“What Can the History of Control Systems Contribute to the History of Computing?” IEEE Electrical History Conference, Williamstown, Mass., August, 1995.
“The Clangor of That Blacksmith's Fray: Technology, War, and Experience Aboard the *USS Monitor,"* Social Science History Conference, Atlanta, Georgia, October, 1994.
“From Machinery to Information: Control System Research at MIT in the 1930s," Society for the History of Technology annual meeting, Lowell, Mass., October, 1994. Session organizer.

Selected oceanographic cruises and projects:
July, 2006, *Co-Principal* Investigator, Survey of Santorini Caldera, Greece.
July, 2004, *Co-Principal Investigator*, Precision survey of ancient shipwreck off of Chios, Greece.
August, 2003, *Co-Principal Investigator*, Precision survey of ancient shipwrecks in the anoxic layer of the Black Sea. (Chief Scientist: R.D. Ballard) .
May 2003, *Chief Scientist*, Autonomous Underwater Vehicle (AUV) precision survey of USS *Monitor*.

July, 2001, V*isiting Scientist*, Acoustic profiles of *USS Monitor* turret (guest of *Monitor* National Marine Sanctuary), Hatteras, North Carolina.
June, 2001, *Principal Investigator*, Autonomous underwater vehicle surveys of Nisyros, Greece.
Nov., 2000, *Visiting Scientist*, Acoustic profile surveys of *CSS Hunley*, Charleston, South Carolina.
Sept., 2000, *Chief Scientist*, Precision sonar surveys of *Defense*, Penobscot Maine.
July, 1999, *Co-Chief Scientist*, Sinop Sonar and Video Surveys, continuing survey of Black Sea area and shipwrecks/possible dwelling sites located in 1998.
June, 1999, *Co-Principal Investigator*, Archaeological Surveys off Ashkelon, Israel.
July, 1998, *Chief Scientist*, Sinop Sonar Surveys, survey of coastal area of Black Sea surrounding port of Sinop, Turkey.
May, 1998, *Co-Chief Scientist*, Midway Yorktown Expedition, discovery of WWII aircraft carrier *Yorktown*.
June, 1997, *Co-principal investigator*, Skerki Bank '97 project, search and survey of Roman and Carthaginian shipwrecks in Mediterranean.
August, 1993, *Engineer/navigator* photographic and sonar survey of *Lusitania*, off Kinsale, Ireland.
August, 1992, *Engineer/navigator* photographic survey of Japanese and American warships in Guadalcanal, Solomon Islands.
Nov., 1991, *Engineer/navigator,* Jason Project, Galapagos Islands, Ecuador.
August, 1991, *Engineer/navigator, CREST (JASON/ALVIN)* surveys of hydrothermal vent sites, Juan de Fuca ridge, Pacific Ocean.
July, 1991, *Engineer/navigator,* JASON survey, Dumpsite 106, Atlantic Ocean.
April, 1990, *Engineer/navigator* photographic and sonar survey of *Hamilton* and *Scourge*, Hamilton, Ontario.