

## CURRICULUM VITAE

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Updated May 2019

### RESEARCH INTERESTS:

Design, modeling, and simulation of embedded, real-time computational systems.

### ACADEMIC POSITIONS:

University of California at Berkeley  
**Professor in the Graduate School and  
Robert S. Pepper Distinguished Professor Emeritus,**  
January 2018 — present

University of California at Berkeley  
**Robert S. Pepper Distinguished Professor,**  
September 2006 — December 2017

Mälardalen University, [Embedded Systems Group](#), Sweden  
**Visiting Professor**  
February 2018 — September 2018

University of California at Berkeley  
**Vice Chair for Computer, Network and Instructional Labs (CNIL),**  
EECS Department, July 2008 — June 2011

University of California at Berkeley  
**Chair of Electrical Engineering and Computer Sciences,**  
July 2006 — June 2008

University of California at Berkeley  
**Chair of Electrical Engineering, Associate Chair of EECS,**  
January 2005 — June 2006

University of California at Berkeley  
**Professor,** July 1994 — December 2017

INRIA, Sophia-Antipolis, France  
**Visiting Professor**, September 1994 — December 1994

University of California at Berkeley  
**Associate Professor**, July 1990 — July 1994

University of California at Berkeley  
**Assistant Professor**, June 1986 — July 1990

## **MAJOR RESEARCH PROJECTS:**

**Director: iCyPhy: Industrial Cyber-Physical Systems Center.** 2012 — Present.

iCyPhy is a collaborative effort between academia and industry that conducts pre-competitive research on design, modeling, and analysis techniques for cyber-physical systems, with emphasis on industrial applications. Cyber-physical systems integrate computing, networking, and physical components. Applications include transportation systems, industrial automation, security, smart buildings, smart cities, medical systems, energy generation and distribution, water distribution, agriculture, military systems, process control, asset management, and robotics.

**Director: TerraSwarm Research Center.** January 2013 — December 2017.

This center is addressing the huge potential (and associated risks) of pervasive integration of smart, networked sensors and actuators into our connected world. The center is funded by the STARnet phase of the Focus Center Research Program (FCRP) administered by the Semiconductor Research Corporation (SRC). Funding comes from the Defense Advanced Research Projects Agency (DARPA) and the SRC industry partners, including Applied Materials, GLOBALFOUNDRIES, IBM, Intel Corporation, Micron Technology, Raytheon, Texas Instruments, and United Technologies.

**Director: CHESS: Center for Hybrid and Embedded Systems Software.** September 2002 — 2016.

This center focuses on developing model-based and tool-supported design methodologies for real-time fault tolerant software on heterogeneous distributed platforms. It bridges the gap between computer science and systems science by developing the foundations of a modern systems science that is simultaneously computational and physical.

**Director: Ptolemy Project.** January 1990 — present.

Ptolemy is a research project focused on system-level modeling, simulation, and design, with special emphasis on embedded, real-time, and reactive systems such as signal processing, communications, and real-time control systems. The key underlying principle in the project is the use of multiple models of computation in a hierarchical heterogeneous design environment.

## **INDUSTRIAL POSITIONS:**

**BDTI**, Berkeley CA  
Vice President, Co-Founder and Senior Technical Advisor (1992 — present)

**Institute Advisor**, Daegu Gyongbuk Institute of Science and Technology (DGIST), Daegu, Korea (2006-2008).

**Bell Telephone Laboratories**, Holmdel, NJ  
Member of Technical Staff (1979 — 1982)  
Advanced Data Communications Laboratory

**Consultant for a number of companies.**

- BDTI, Inc (1994 — present)
- Airbus (2016)
- United Technologies (2015)
- National Instruments (2009 — present)
- The Mathworks (2000 — 2005)
- Kestrel Institute (2001 — 2002)
- Comdisco Systems (1989 — 1994)
- Hitachi America (1990 — 1992)
- Cypress Semiconductor (1991)
- EDC/Mentor Graphics (1991)
- Star Semiconductor (1990 — 1991)
- Weber Associates (1990)
- Apple Computer (1989)
- Rockwell (1988)
- Bizcomp (1988)
- Micom (1987)
- GTE Government Systems (1986)
- Fujitsu America (1986)
- Telebit (1985)

**AWARDS AND HONORS:**

- The Berkeley Citation, February, 2018.
- Paper selected as a best SoSyM paper over the past year to be presented in a special session at MODELS 2018 in Copenhagen, Denmark, 2018.
- Honorary Professor, Amity School of Engineering & Technology, Amity University, Uttar Pradesh, India, Feb. 23, 2018.
- Principles of Modeling: Festschrift Symposium in Honor of Edward A. Lee, Oct. 13, 2017. See <https://ptolemy.eecs.berkeley.edu/conferences/17/program.htm>
- Best paper award, IoTDI 2017, a CPS Week conference.
- Outstanding Technical Achievement and Leadership Award from the IEEE Technical Committee on Real-Time Systems (TCRTS), 2016.
- Best paper award, IoTDI 2016, a CPS Week conference.
- Robert S. Pepper Distinguished Professorship, UC Berkeley, 2006 – 2017.
- MacKay Professorship, EECS Department, UC Berkeley, 2005
- Electrical Engineering Outstanding Teaching Award, EECS Dept., UC Berkeley, 1999
- Miller Professorhip, 1999
- Frederick Emmons Terman Award for Engineering Education, 1997

- Fellow of the IEEE
- IEEE Signal Processing Society Paper Award, 1990
- NSF Presidential Young Investigator Award, January, 1987
- David J. Sakrison Memorial Prize, U.C. Berkeley, 1986
- IBM Faculty Development Award, August, 1986
- Samuel Silver Memorial Scholarship Prize, U.C. Berkeley, 1985
- Magna Cum Laude, Yale 1979
- Distinction in Engineering and Applied Science, Yale, 1979
- Tau Beta Pi, Yale 1979

## EDUCATION:

### University of California at Berkeley

Ph.D. in Electrical Engineering, December, 1986

Dissertation title: *A Coupled Hardware and Software Architecture for Programmable Digital Signal Processors*

Advisor: Prof. David Messerschmitt

### Massachusetts Institute of Technology

SM in Electrical Engineering, December 1981

### Yale University

BS, May 1979, Magna cum Laude

Double Major: Computer Science and Engineering and Applied Science

## COURSES TAUGHT:

- EECS 149/249A, "Introduction to Embedded Systems" (undergrad/graduate)
- EECS 249B, "Embedded System Design: Modeling, Analysis, and Synthesis" (graduate)
- EECS 219D, Concurrent Models of Computation (graduate)
- edX, EECS149.1x, MOOC on CPS: <https://www.edx.org/course/uc-berkeleyx/uc-berkeleyx-eeecs149-1x-cyber-physical-1629>, May-June 2014. Peak enrollment near 9000.
- EECS 144/244, "Algorithms for System Modeling, Analysis, and Optimization" (undergrad/graduate)
- EECS 20n, "Structure and Interpretation of Signals and Systems" (undergrad)
- EECS 121, "Noise in Communications Systems" (undergrad)
- EECS 123, "Digital Signal Processing" (undergrad)
- EECS 224, "Digital Communication" (graduate)
- EECS 225a, "Digital Signal Processing" (graduate)
- EECS 290n, "Advanced topics in System Theory" (graduate)
- EECS 290t, "Advanced topics in Signal Processing" (graduate)
- EECS 298-13, "Design, Modeling, and Specification of Systems" (seminar)
- EECS 298-20, "Topics in Communications and Signal Processing" (seminar)
- "Digital Signal Processing," National Technological University (televised)
- "Digital Communication," National Technological University (televised)
- "Modern Digital Communication" (short course) Berkeley/Oxford Extension
- "VLSI for Signal Processing" (IEEE tutorial)
- "Communications ICs" (short course) Berkeley Extension

- “Digital Signal Processor Development” (short course) UCSB Extension
- “Telecommunications Applications of Prog. DSPs” (short course) UCSB Extension

## INVITED TALKS

- **Invited talk**, Software Certification Consortium (SCC): “Deterministic Modeling of Uncertain Systems: Implications for Certification,” May 3, 2019.
- **Distinguished lecture** at George Washington University, ECE Department: “A Personal View of Real-Time Computing,” April 22, 2019.
- **Distinguished lecture** at Boston University, CISE: “A Personal View of Real-Time Computing,” April 19, 2019.
- **Keynote**: “Freedom From Choice and the Power of Models,” International Symposium on Physical Design (ISPD), San Francisco, April 16, 2019.
- **Academic Keynote** “Intelligence and Computation,” Embedded Systems Innovation (ESI) Symposium, at TU Eindhoven, April 9, 2019.
- **Invited Talk** at INRIA, Grenoble, France: "A Personal View of Real-Time Computing," April 2, 2019
- **Invited Talk** at Verimag, Grenoble, France: “Living Digital Beings,” April 1, 2019.
- **Keynote**, “A Fundamental Look at Models and Intelligence,” DATE 2019, special day on “Model-Based Design of Intelligent Systems,” Florence, Italy, March 28, 2019.
- **Keynote**, “Observation and Interaction,” Language and Automata Theory and Applications (LATA), St. Petersburg, Russia, March 26, 2019
- **Invited talk**, ITMO University in St. Petersburg: "Actors Revisited for Timing-Critical Systems," March 25, 2019.
- **Invited talk**, TU Eindhoven, “Actors Revisited for Timing-Critical Systems,” March 21, 2019.
- **Keynote**, ICT.OPEN 2019, "Living Digital Beings," Hilversum, the Netherlands, March 20, 2019.
- **Invited talk** at Dagstuhl Seminar on Analysis, Design, and Control of Predictable Interconnected Systems, Germany, “Actor-Oriented Models of Computation for Predictable Interconnected Systems,” Mar 3-8, 2019.
- **Keynote** at Cognitive Computing, "Is Cognition Digital and Computational?" Herrenhausen Palace, Hannover, Germany, Dec. 18, 2018
- **Invited talk** at New Directions In Software Technology (NDIST), "Is General Intelligence Digital and Computational?" O'ahu, Hawaii, Dec. 11-14, 2018.
- **Invited talk**, Int. Conf. on the Industrial Internet (ICII), Seattle, WA :Deterministic Timing for the Industrial Internet of Things, Oct. 23, 2018.
- **Keynote** at FACS (Formal Aspects of Component Software), Pohang, Korea: “What Good are Models?” Oct. 10, 2018.
- **Invited talk**, Seoul National University, Seoul, Korea: “What Good Are Models? A Focus on Cyber-Physical Systems,” Oct. 8, 2018.
- **Invited talk**, Mälardalen University, Västerås, Sweden: “Models of Timed Systems,” Sep. 26, 2018.
- **Invited talk**, Chalmers University, Gothenburg, Sweden: Actor-based Modeling Patterns for Flow Management (with Marjan Sirjani), Sep. 24, 2018.
- **Invited talk** at Halmstad University, Sweden: “Is Humanity Defining Technology? Or is Technology Defining Humanity?” Sep. 21, 2018.

- **Invited talk**, Northwestern Polytechnic University, Xi'an, China: "A Personal View of Real-Time Computing, School of Computer Science," Sep. 7, 2018.
- **Invited talk**, FORMATS 2018, Beijing, China: Models of Timed Systems, Sep. 4, 2018.
- **Invited talk**, Workshop on Design Automation for Cyber-Physical Systems (DACPS), San Francisco: A Component Architecture for the Internet of Things, June 24, 2018.
- **Invited talk**: What Good Are Formal Models? Summer School on Formal Techniques, Atherton, CA, May 25, 2018.
- **Invited talk**: Symbiosis or Annihilation: A philosophical look at Artificial Intelligence, IDT Open Seminar, Mälardalen University, Västerås, Sweden, May 2, 2018.
- **Invited talk**: TSN as a Game Changer for Cyber-Physical Systems, Workshop on Time-Sensitive Networks, Mälardalen University, Västerås, Sweden, Apr. 27, 2018.
- **Invited talk**: Living Digital Things, DPAC Summit, Mälardalen University, Västerås, Sweden, Apr. 25, 2018.
- **Keynote**: in "Coffee with an Expert" series, KTH, ICES, Stockholm, Sweden, Apr. 19, 2018.
- **Keynote**: Accessors: A Software Architecture for IoT, Global IoT Conference, Santa Clara, CA, Apr. 2, 2018.
- **Invited Talk**: A Personal View of Real-Time Computing, SPIN, Noida, India, Feb. 22, 2018.
- **Invited Talk**: Symbiosis or Annihilation? How Humans and Technology Coevolve, CafeX Series of Fireside Chats with Dean Ishwar Puri, McMaster University, Hamilton, Ontario, Canada, Jan. 30, 2018.
- **Distinguished Lecture**: Resurrecting Laplace's Demon: The Case for Deterministic Models, Department of Computing and Software at McMaster University, Hamilton, Ontario, Canada, Jan. 29, 2018.
- **Radio Interview**: Tech Nation, NPR, on Plato and the Nerd, Dec. 7, 2017.
- **Invited Award Talk**: "A Personal View of Real-Time Computing," Real-Time Systems Symposium (RTSS), Paris, France, Dec. 6, 2017.
- **Invited Talk**: "Plato and the Nerd," Microsoft Tech Talk Series, Sunnyvale, CA, Nov. 8, 2017.
- **Invited Talk**: "Plato and the Nerd, Noblis Technology Speaker Series," In partnership with Hooks Book Events, Reston VA, Oct. 31, 2017.
- **Keynote**: "Living Digital Things," at IEEE Int. Conf. on Collaboration and Internet Computing (CIC), Oct. 15, 2017.
- **Invited talk**: "Symbiosis or Annihilation? How Humans and Technology Coevolve," EECS Department Colloquium, UC Berkeley, Sep. 27, 2017.
- **Invited talk**: "Resurrecting Laplace's Demon: The Case for Deterministic Models," CS Department Colloquium, University of Houston, Sep. 22, 2017.
- **Invited talk**: "Resurrecting Laplace's Demon: The Case for Deterministic Models," CS Department Colloquium, Rice University, Sep. 21, 2017.
- **Keynote talk**: "Resurrecting Laplace's Demon: The Case for Deterministic (Timing) Models," ISPCS, Monterey, CA, Aug. 30, 2017.
- **Invited talk**: "Resurrecting Laplace's Demon: The Case for Deterministic Models," KTH Royal Institute of Technology, Stockholm, Sweden, Apr. 25-26, 2017.
- **Invited Talk**: "Fundamental Limits of Cyber-Physical and Hybrid System Modeling," at Symbolic and Numerical Methods for Reachability Analysis (SNR), collocated with

European Joint Conferences on Theory and Practice of Software (ETAPS) in Uppsala, Sweden, April 22, 2017.

- **Invited talk:** “Resurrecting Laplace's Demon: The Case for Deterministic Models,” Mälardalen University, Västerås, Sweden, Apr. 20, 2017.
- **Invited talk:** “Accessors: An Open Architecture for the Internet of Things,” Google, Mountain View, CA, USA, Mar. 30, 2017.
- **Invited talk:** “Resurrecting Laplace's Demon: The Case for Deterministic Models,” Distinguished Lecture Series, Computer and Information Science Department, University of Pennsylvania, Philadelphia, PA, USA, Jan. 26, 2017.
- **Invited talk:** “Accessors: A Software Architecture for the Internet of Things,” Fortiss - An-Institut of TU Munich, Munich, Germany, Dec. 9, 2016.
- **Keynote:** “Resurrecting Laplace's Demon: The Case for Deterministic Models,” Synchron, Bamberg, Germany, December 8, 2016.
- **Keynote:** “Dependable Cyber-Physical Systems,” Symposium on Dependable Software Engineering (SETTA), Beijing, China, Nov. 9, 2016.
- **Keynote:** “Resurrecting Laplace's Demon: The Case for Deterministic Models,” MODELS, St. Malo, France, Oct. 4, 2016. (video: <https://videos-rennes.inria.fr/video/SypTLsQ1g>)
- **Keynote:** “The Internet of Important Things,” IEEE Sarnoff Symposium, Newark, NJ, Sep. 20, 2016.
- **Plenary talk:** “The Internet of Important Things,” IEEE System-on-Chip Conference (SOCC), Seattle, WA, Sep. 7, 2016.
- **Invited talk,** “Fundamental Limits of Cyber-Physical Systems Modeling,” Symposium honoring Janos Sztipanovits, Nashville, TN, July 29, 2016.
- **Keynote:** “The Internet of Important Things,” International Summer School on Advanced Computer Architecture and Compilation for High-Performance and Embedded Systems (ACACES), Fiuggi, Italy, July 10, 2016.
- **Invited talk,** “What Does ‘Real Time’ Mean?” Workshop on Real-Time Decision Making, Simons Institute, Berkeley, CA, June 28, 2016.
- **Invited talk,** “The Internet of Important Things,” CRESS event - School of Computer Science, Reykjavik University, Iceland, June 16, 2016. (Video: <https://www.youtube.com/watch?v=V2CvSsvDXb4&feature=youtu.be>)
- **Keynote,** “Resurrecting Laplace's Demon: The Case for Deterministic Models,” Workshop on Modelling in Software Engineering (MiSE’2016), Austin, TX, May 17, 2016.
- **Invited Panel,** NXP Influencers Summit- IoT Security Panel, Austin TX. Co-located with ICSE 2016, May 16, 2016.
- **Invited talk,** “The Internet of Important Things,” Airbus Lecture Series, Toulouse, France, Apr. 18, 2016.
- **Invited talk,** “Determinism: Resurrecting Laplace’s Demon,” Workshop on Game Changing and Controversial Topics in Cyber-Physical Systems, Budapest, Hungary, Apr. 15, 2016.
- **Keynote:** “Embedded Intelligent systems,” ARTEMIS Spring Event, Vienna, Apr. 13, 2016.
- **Invited talk,** “The challenges of doing multidisciplinary research, particularly in cyber-physical systems,” IPSN PhD Forum, CPS Week, Vienna, Apr. 11, 2016.

- **Invited talk**, “Resurrecting Laplace's Demon: The Case for Deterministic Models for Cyber-Physical Systems,” USC CPS Lecture Series, Los Angeles, Apr. 4, 2016.
- **Invited Talk**, “The Internet of Important Things,” UC Irvine EECS Lecture Series, Feb. 5, 2016.
- **Keynote**: “The Internet of Important Things,” at Embedded and Real Time Software and Systems (ERTS), Toulouse, Jan. 27, 2016.
- **Invited Talk**, “IoT and CPS: A Focus on Modeling,” US-German Workshop on IoT and CPS, Washington DC, Jan. 20, 2016.
- **Invited Talk**, “Accessors: An Open Architecture for the Internet of Things,” IFIP WG 10.4 Meeting and Workshop on Internet of Things, Aspen, CO, Jan. 11, 2016.
- **Invited Talk**, “Fundamental Limits of Cyber-Physical Systems Modeling,” ECE/CSE Departments, Univ. of Connecticut, Storrs, CT, Nov. 11, 2015.
- **Plenary Talk**, “Better Engineering Through Better Models,” at the Int. Conf. on Complex Systems Engineering (ICCSE), Univ. of Connecticut, Storrs, CT., Nov. 9, 2015.
- **Invited Talk**, “The Internet of Important Things,” U. of Sao Paulo, Brazil, Nov. 6, 2015.
- **Keynote**: “The Internet of Important Things,” at the Int. Embedded Systems Symposium (IESS), Foz do Iguacu, Brazil, Nov. 3, 2015.
- **Invited Talk**, “Modeling and Simulating Cyber-Physical Systems using CyPhySim,” Special Session on Design of Hybrid Systems, EMSOFT, ES Week, October 6, 2015, Amsterdam, The Netherlands.
- **Keynote**: “The Internet of Important Things,” Software Engineering and Formal Methods (SEFM), September 11, 2015, York, England, UK.
- **Keynote**: “Controlling Timing vs. Measuring Timing,” Workshop on Suite of Embedded Applications and Kernels (SEAK) at DAC, June 7, 2015, San Francisco, CA.
- **Keynote**: “The Internet of Important Things,” at Time Sensitive Networks and Applications (TSNA), April 29, 2015, Santa Clara, CA.
- **Keynote**: “Better Engineering Through Better Models,” IEEE Texas Workshop on Integrated System Exploration (TexasWISE), March 27, 2015, Round Top, TX.
- **Keynote**: “Architectural Support for Cyber-Physical Systems,” Architectural Support for Programming Languages and Operating Systems (ASPLOS) March 17, 2015, Istanbul, Turkey.
- **Invited Talk**, “Connecting the Cloud to Things,” IAP Berkeley Workshop on the Future of Cloud Computing, February 27, 2015, Berkeley, CA.
- **Keynote**: “It's About Time,” at Reconfigurable Computing and FPGAs (ReConFig), December 8, 2014, Cancun, Mexico.
- **Keynote**: “Mixing Discrete and Continuous Models,” North America Modelica Users' Group Meeting, Oct. 14, 2014, Atlanta, GA.
- **Invited Wilson Lecture**, “Constructive Models of Discrete and Continuous Physical Phenomena,” ECE Dept, Univ. of Minnesota, Sept. 26, 2014, Minneapolis, MN.
- **Keynote**: Constructive Models of Discrete and Continuous Physical Phenomena, Summer Simulation Multi-Conference (SummerSim), July 6 - 10, 2014, Monterey, CA.
- **Keynote**: It's About Time: Leveraging Clock Synchronization for Distributed Real-Time Programming, IEEE Symposium on Object/Component/Service-oriented Real-Time Distributed Computing (ISORC), Reno, NV, June 12, 2014.
- **Keynote**: Leveraging Synchronized Clocks in Cyber-Physical Systems, Workshop on Synchronization in Telecommunications Systems (WSTS), San Jose, CA, June 11, 2014.



- **Invited Talk**, Swarm Systems, Visioning 2025, NSF and CCC Workshop, Washington DC, May 12-13, 2014.
- **Invited Talk**, It's About Time, Jet Propulsion Laboratory, May 6, 2014, Pasadena, CA.
- **Invited Talks**, Cyber-Physical Systems - Future of Tools, Intellectual Challenges and Opportunities, and Models and Reality, National Instruments, Austin, TX, April 18, 2014.
- **Invited Talk**, Precise and Repeatable Timing in Embedded Software, Texas Instruments, March 3, 2014, Santa Clara, CA, USA.
- **Invited Talk**, Cyber-Physical Systems - A Fundamental Intellectual Challenge, Triangle Computer Science Distinguished Lecturer Series (TCSMLS), CS Depts., U. of North Carolina in Chapel Hill, Duke U., and NC State, January 27, 2014, Chapel Hill, North Carolina.
- **Invited Talk**, Cyber-Physical Systems - A Fundamental Intellectual Challenge, College de France, Paris, France, December 11, 2013. (video: <http://www.college-de-france.fr/site/gerard-berry/guestlecturer-2013-2014.htm>)
- **Invited Talk**, Cyber-Physical Systems - A Rehash or A New Intellectual Challenge? Supelec, Paris, France, December 10, 2013. (video: <http://www.di.supelec.fr/fb/SeminaireLee2013>)
- **Invited Talk**, Systems of Systems Modeling, International Conference on Complex Systems Design & Management (CSD&M), Paris, France, December 4-6, 2013.
- **Invited Talk**, Cyber-Physical Systems - A Rehash or A New Intellectual Challenge? University of Michigan, Ann Arbor, MI, Oct. 16, 2013.
- **Invited Talk**, Cyber-Physical Systems - A Rehash or A New Intellectual Challenge? General Electric Global Research, San Ramon, CA, Oct. 9, 2013.
- **Keynote**: Reliable and Flexible Factory Automation: It's About Time, IEEE International Conference on Emerging Technologies & Factory Automation (ETFA) Cagliari, Italy, September 10-13, 2013.
- **Invited Talk in the Distinguished Speaker Series**, Cyber-Physical Systems A Rehash or A New Intellectual Challenge? Design Automation Conference (DAC), Sponsored by the IEEE Council on Electronic Design Automation (CEDA), Austin, Texas, June 4, 2013.
- **Invited talk**, **UTRC Fellows Innovation Lectures**, The Swarm at the Edge of the Cloud, United Technologies Research Center, East Hartford CT, May 30, 2013.
- **Invited talk**, It's About Time. Universiteit van Amsterdam, Amsterdam, The Netherlands, February 28, 2013.
- **Keynote**: Time for High-Confidence Distributed Embedded Systems. IEEE Real-Time Systems Symposium (RTSS), San Juan, Puerto Rico, Dec. 4-7, 2012.
- **Invited talk**, Leveraging Time Synchronization for Reliable Distributed Real-Time Software. Model-Based Embedded Software Engineering in 2020+, Bosch, Stuttgart, Dec. 3-4, 2012.
- **Plenary Talk**, Verifying Real-Time Software is Not Reasonable (Today). Haifa Verification Conference (HVC), Haifa, Israel, November 6-8, 2012.
- **Invited talk**, Models of Time for a Computational World. National Workshop on The New Clockwork for Time-Critical Systems, October 25, 26, and 27, 2012, Baltimore, Maryland.

- **Keynote:** Teaching Embedded Systems the Berkeley Way, Workshop on Embedded and Cyber-Physical Systems Education (WESE), Tampere, Finland, October 11, 2012.
- **Invited Talk,** Beyond Synchrony to Timed Systems: In honor of Paul Caspi, Invited Talk at EMSOFT: Special Session: An Overview Of The Career of Paul Caspi, Tampere, Finland, Oct 9, 2012.
- **Education Keynote,** Introducing Embedded Systems: A Cyber- Physical Systems Approach, National Science Foundation CPS PI Meeting, National Harbor, Maryland, October 5, 2012.
- **Keynote:** Time for High-Confidence Distributed Embedded Systems, International IEEE Symposium on Precision Clock Synchronization for Measurement, Control and Communication (ISPCS), South San Francisco, September 26, 2012.
- **Invited Talk,** Equations, Synchrony, Time, and Modes, Workshop on System Design meets Equation-based Languages, Department of Automatic Control, Lunds, Sweden, Sept. 18-21.
- **Keynote:** It's About Time, International Conference on Embedded Computer Systems: Architectures, Modeling, and Simulation (SAMOS), Samos, Greece, July 19-21, 2012.
- **Plenary Talk,** Certifying Real-Time Software is Not Reasonable (Today), Software Certification Consortium (SCC) Workshop, at the High Confidence Software and Systems (HCSS) Conference, Annapolis, MD, May 6 and 7, 2012.
- **Invited Talk,** Time for High-Confidence Cyber-Physical Systems, Arizona State University, April 6, 2012.
- **Plenary Talk,** Time for High-Confidence Cyber-Physical Systems, Performance Metrics for Intelligent Systems (PerMIS'12) Workshop, University of Maryland, March 20-22, 2012.
- **Invited Talk,** Time for High-Confidence Cyber-Physical Systems, UC Davis, Davis, CA, March 9, 2012.
- **Distinguished Speaker Series,** Heterogeneous Actor Models, Halmstad University, Sweden, February 10, 2012.
- **Invited Talk,** Time for High-Confidence Cyber-Physical Systems, Lund University, Sweden, February 9, 2012.
- **Keynote:** Heterogeneous Actor Models, MODPROD, Workshop on Model-Based Product Development, Linköping, Sweden, February 8, 2012.
- **Invited Talk,** Time for High-Confidence Cyber-Physical Systems, ICES workshop on Embedded and Cyber-physical Systems - Model-Based Design for Analysis and Synthesis, Stockholm, Sweden, February 6, 2012.
- **Invited Talk,** The Challenges of Embedded System Design, Xilinx Emerging Technology Symposium (ETS), San Jose, CA, February 1, 2012.
- **Keynote:** Heterogeneous Actor Models, IEEE Int. Conf. on Service-Oriented Computing and Applications, (SOCA, with LCPS, KASTLES, RTSOAA), Irvine, CA, December 12, 2011.
- **Keynote:** Time for High-Confidence Networked Embedded Systems, BoCSE 2011, 4th Bosch Conference on Systems and Software Engineering, Stuttgart, Germany, November 14th – 17th, 2011.
- **Invited Talk,** Portable Real-Time Code from PTIDES Models, Workshop on Time Analysis and Model-Based Design, from Functional Models to Distributed Deployments (TiMoBD) ESWeek, Taipei, Taiwan, Oct. 9, 2011.

- **Invited Roadmap Talk**, Heterogeneous Actor Models, EMSOFT, Taipei, Taiwan, October 10, 2011.
- **Invited Talk**, Time for High-Confidence Cyber-Physical Systems, Research Colloquium on the occasion of the retirement of Professor Hermann Kopetz, Time in Cyber-Physical Systems, September 28th, 2011, TU Wien, Vienna, Austria.
- **Keynote**: Foundations of Cyber-Physical Systems, CPS Principal Investigator Meeting, National Science Foundation, National Harbor, Maryland, Aug. 1-2, 2011.
- **Keynote**: Time for High-Confidence Networked Embedded Systems, Network Science Workshop (NSW), West Point, New York, June 22-24, 2011.
- **Invited Talk**, Temporal Isolation on Multiprocessing Architectures, Design Automation Conference (DAC), Special session on: Embedded Multi-Processor Software Synthesis, San Diego, CA, June 7, 2011.
- **Keynote**: Synthesis of Distributed Real-Time Embedded Software, Electronic System Level Synthesis Conference, ESLsyn, June 5-6, 2011, San Diego, California, USA.
- **Keynote**: Time for High-Confidence Software Systems, 11th Annual Conference on High Confidence Software and Systems (HCSS), Annapolis, Maryland, May 1-6, 2011.
- **Distinguished Lecture Series**, Foundations of Cyber-Physical Systems, Iowa State University, March 11, 2011.
- **Distinguished Lecture Series**, Computing Needs Time, Virginia Tech, Dec. 10, 2010.
- **Distinguished Speaker Series**, Computing Needs Time, Purdue University, Dec. 6, 2010.
- **Keynote**: Compositional Timing in Concurrent, Parallel, and Distributed Real-Time Systems, 3rd Workshop on Compositional Theory and Technology for Real-Time Embedded Systems (with RTSS), San Diego, CA, Nov. 30, 2010.
- **Distinguished Lecture Series**, Computing Needs Time, Washington University, St. Louis, Nov. 12, 2010.
- **Invited Talk**, Architecture for Precise and Repeatable Timing, Thales workshop, November 3, 2010, Palaiseau, France.
- **Invited Talk**, Programming Models for Parallel and Distributed Real-Time Systems, November 3, 2010, Palaiseau, France.
- **Keynote**: Computing Needs Time, Working day on time-oriented embedded systems, November 2, 2010, at ENSEEIHT, Toulouse, France
- **Invited Talk**, Predictability, Repeatability, and Models for Cyber-Physical Systems, WFCD (ESWEEK), Scottsdale, AZ, October 24, 2010.
- **Keynote**: Synthesis of Reliable Distributed Real-Time Software, Workshop on Software Synthesis, ESWEEK 2010, Scottsdale, AZ, October 29, 2010.
- **Keynote**: An Introductory Textbook on Cyber-Physical Systems, Workshop on Embedded Systems Education (WESE), Scottsdale, AZ, October 28, 2010.
- **Keynote**: Disciplined Heterogeneous Modeling, MODELS, Oslo, Norway, October 6-8, 2010.
- **Invited Talk**, Embedded Tutorial: CPS Foundations, Special Session: Cyber-Physical Systems Demystified, Design Automation Conference (DAC), Anaheim, CA, Thursday, June 17, 2010.
- **Invited Talk**, Time and Concurrency in Cyber-Physical Systems, Fujitsu Workshop on Secure/Correct Cyber Physical Systems, Sunnyvale, CA, June 10, 2010.

- **Keynote:** Design Challenges for Cyber-Physical Systems, Strategies for Embedded Computing Research International policy conference, Vienna, Austria, March 18-19, 2010.
- **Invited Talk,** Introducing Embedded Systems: A Cyber- Physical Approach, Intel Education Summit, Chandler, Arizona, March 9, 2010.
- **Keynote:** Cyber-Physical Systems: Challenges and Opportunities, IT Convergence Research Project Workshop, KAIST, Daejeon, Korea, February 19, 2010.
- **Keynote:** Introducing Embedded Systems: A Cyber- Physical Approach, Workshop on Embedded Systems Education (WESE) (with ESWEEK), Grenoble, France, October 15, 2009.
- **Invited Talk,** Parallel, Concurrent, and Distributed Software in Cyber-Physical Systems, Int. Workshop on User-Centric Cyber-Physical Systems and Services (UC-CPS), Institute of Information Science, Academia Sinica, Taipei, Taiwan, December 8-9, 2009.
- **Distinguished Lecture Series,** Computing Needs Time, Institute of Information Science, Academia Sinica, Taipei, Taiwan, December 7, 2009.
- **Invited Talk,** Disciplined Message Passing, Microsoft Research, Redmond, WA, Nov. 13, 2009.
- **Invited Talk,** Model-Based Code Generation is not a Replacement for Programming, Workshop on Software Synthesis (ESWEEK), Grenoble, France, October 16, 2009.
- **Keynote:** Architectures with Repeatable Timing for Cyber-Physical Systems, Workshop on Cyber-Physical Systems (ESWEEK), Grenoble, France, October 16, 2009.
- **Keynote:** Model-Based Design for Signal Processing Systems, IEEE Workshop on Signal Processing Systems (SiPS), Tampere, Finland, October 7-9, 2009.
- **Invited Talk,** A Disruptive Computer Design Idea: Architectures with Repeatable Timing, IEEE International Conference on Computer Design (ICCD), Squaw Valley, CA, October 6, 2009.
- **Invited Talk,** Time-Critical Networking, IEEE Photonics Society Summer Topicals, Newport Beach, CA, 20-22 July 2009.
- **Invited Talk,** “The Case for Timing-Centric Distributed Software,” , 2nd International Workshop on Cyber-Physical Systems (WCPS 2009), Montreal, Quebec, Canada, June 22, 2009.
- **Keynote:** “Beyond Embedded Systems: Integrating Computation, Networking, and Physical Dynamics,” ACM SIGPLAN/SIGBED 2009 Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES), Dublin, Ireland, June 19-20, 2009.
- **Keynote:** “Cyber-Physical Systems Research at Berkeley,” Workshop on Embedded Critical Systems: New Perspectives in Engineering and Computing, Thales Research and Technology Center, Palaiseau, France, June 17, 2009.
- **Invited Lecture,** “Beyond Embedded Systems: Challenges to Realizing the Vision of Cyber-Physical Systems,” UC Irvine Department of Computer Science Distinguished Lecture Series Irvine, CA, May 8, 2009.
- **Keynote:** “Beyond Embedded Systems: Challenges to Realizing the Vision of Cyber-Physical Systems,” Innovation Workshop on Convergence of Embedded and IT Systems, Bosch, Stuttgart, Germany, November 12, 2008.

- **Keynote:** Disciplined Concurrent Models of Computation for Parallel Software,” 2008 Summer Institute: The Concurrency Challenge: Can We Make Parallel Programming Popular? Blaine, WA, August 3 to August 7, 2008.
- **Invited Lecture,** “Component Architectures for Time-Sensitive Systems,” The Onassis Foundation Science Lecture Series, The 2008 Lectures in Computer Science, Embedded Networked Systems: Theory and Applications, Heraklion, Crete, July 24-28, 2008.
- **Invited Talk,** “Balancing Expressiveness and Analyzability in Stream Formalisms,” Exploiting Concurrency: Efficiency and Correctness (EC2), A Workshop, in conjunction with the 20th International Conference on Computer Aided Verification (CAV 2008), Princeton, NJ, July 7 and 8, 2008.
- **Invited Talk,** “Cyber-Physical Systems: Design Challenges,” International Symposium on Object/Component/Service-Oriented Real-Time Distributed Computing (ISORC), Orlando, FL, USA, May 6, 2008.
- **Invited Talk,** “Making Time Essential in Computation,” Workshop: From Embedded Systems to Cyber-Physical Systems: a Review of the State-of-the-Art and Research Needs, CPS Week, St. Louis, MO, April 21, 2008.
- **Invited Lecture,** “Is Truly Real-Time Computing Becoming Unachievable?” ECE Distinguished Lecture Series, Carnegie Mellon University, Pittsburgh, PA, April 3, 2008.
- **Keynote:** “Distributed Real-Time Systems: Challenges and Opportunities,” NSF NeTS FIND Initiative PI Meeting (Future Internet Design), Washington DC, November 27, 2007.
- **Invited Lecture,** “Can Concurrent Software Ever Be Quality Software?” Distinguished Lecture Series, Max Planck Institute for Software Systems, Kaiserslautern, Saarbrücken, Germany, November 9, 2007.
- **Keynote:** Can Concurrent Software Ever Be Quality Software?” Seventh International Conference On Quality Software (QSIC), Portland, Oregon, USA, Oct. 11 – 12, 2007.
- **Invited Talk,** “Using the Principles of Synchronous Languages in Discrete-event and Continuous-time Models,” Workshop: Between Control and Software (in honor of Paul Caspi), Grenoble, France, September 28, 2007.
- **Invited Lecture,** “Software Challenges and Opportunities for Real-Time on Multicore Machines,” Real-Time in Sweden, RTiS, SNART, Swedish National Real-Time Association, Västerås, Sweden, August 21, 2007.
- **Invited Tutorial,** “An Overview of Concurrent Models of Computation for Real-Time Systems,” ARTES Summer School, Västerås, Sweden, August 20, 2007.
- **Keynote:** “Cyber-Physical Systems: Challenges and Opportunities in Software Technologies,” ACM SIGPLAN/SIGBED 2007 Conference on Languages, Compilers, and Tools for Embedded Systems (LCTES), San Diego, California, June 13-15, 2007.
- **Keynote:** “Is Truly Real-Time Computing Becoming Unachievable?” Real-Time and Embedded Technology and Applications Symposium (RTAS), Bellevue, WA, April 3 - April 6, 2007.
- **Invited Tutorial,** “The Problem With Threads,” Embedded Systems Conference (ESC), San Jose, CA, Tuesday, 3 April 2007
- **Invited Talk,** “Challenges with Concurrency and Time in Embedded Software,” ODES: Workshop on Optimizations for DSP and Embedded Systems, In conjunction with

IEEE/ACM International Symposium on Code Generation and Optimization (CGO), San Jose, CA, March 11, 2007.

- **Invited Talk**, “Making Concurrency Mainstream,” Microsoft Research, Redmond, WA, Jan. 12, 2007.
- **Keynote**: “Discrete Event Models: Getting the Semantics Right,” *Winter Simulation Conference*, December 4, 2006, Monterey, CA.
- **Plenary Talk**, “Concurrency Demands New Foundations for Computing,” *ARTIST2 Workshop on MoCC – Models of Computation and Communication*, Zurich, Switzerland, November 16-17, 2006.
- **Plenary Talk**, “Actor Networks,” *Workshop Foundations and Applications of Component-based Design*, Seoul, Korea, Oct. 26, 2006
- **Plenary Talk**, “Concurrent Semantics without the Notions of State or State Transitions,” *FORMATS 2006: 4-th International Conference on Formal Modelling and Analysis of Timed Systems*, Paris, France, September 26, 2006.
- **Invited Joint Plenary Talk**, “Making Concurrency Mainstream,” *CONCUR: Concurrency Theory*, and *FMICS: Formal Methods for Industrial Critical Systems*, Bonn, Germany, August 27, 2006.
- **Keynote**: “Graphical Design Platforms for Embedded Systems,” *NI Week*, Austin, TX, August 8, 2006.
- **Invited Talk**, “HyVisual: A Hybrid System Modeling Framework Based on Ptolemy II,” in *IFAC Conference on Analysis and Design of Hybrid Systems (ADHS'06)*, Alghero, Sardinia, June 7-9, 2006.
- **Plenary Talk**, “The Future of Embedded Software,” *ARTEMIS 2006 Annual Conference*, Graz, Austria, May 22-24, 2006.
- **Invited Shannon Lecture**, “Building Unreliable Systems out of Reliable Components: The Real-Time Story,” *IEEE Computer Society*, Nov. 17, 2005, Palo Alto, CA.
- **Keynote**: “Embedded Software: Dealing with Concurrency and Time,” *KESES: Korean Embedded Software Engineering Society*, Daegu, Korea, October 20, 2005.
- **Plenary Talk**, “Building Unreliable Systems out of Reliable Components: The Real Time Story,” *Monterey Workshop*, Laguna Beach, CA, September 23-25, 2005.
- **Plenary Talk**, “The Operational Semantics of Hybrid Systems,” *Hybrid Systems, Computation and Control (HSCC)*, Zurich, Switzerland, March 2005.
- **Distinguished Lecture**, “Concurrent Computational Systems,” University of Arizona, Distinguished Lecture Series, Tuscon, Arizona, January 13, 2005
- **Invited Talk**, “Actor-Oriented Design: Concurrent Models as Programs,” University of Salzburg, Austria, December 14, 2004.
- **Invited Talk**, “Concurrent Models of Computation,” HP Workshop on Advanced Software Technologies, HP Labs, Palo Alto, CA, July 20-22, 2004.
- **Invited Talk**, “Embedded Software: Leveraging Concurrent Models of Computation,” Citris Information Days, June 30 – July 1, 2004, Infineon, Munich, Germany.
- **Plenary Talk**, “Actor-Oriented Design: A focus on domain-specific languages for embedded systems,” *Formal Methods and Models for Codesign (MEMOCODE'2004)*, San Diego, California, June 22-25, 2004.
- **Invited Talk**, “Actor-Oriented Design: Concurrent Models as Programs,” Parc Forum, Palo Alto, CA, May 13, 2004.
- **Invited Talk**, “Hybrid System Modeling: Operational Semantics Issues,” OMG

Technical Meeting, Feb. 4, 2004, Anaheim, CA, USA.

- **Invited Talk**, “An Overview of the Ptolemy Project and Actor-Oriented Design,” OMG Technical Meeting, Feb. 4, 2004, Anaheim, CA, USA.
- **Invited Talk**, “Soft Walls: Preventing the Use of Commercial Aircraft as Weapons,” CITRIS Corporate Sponsor Day, February 26, 2004, University of California at Berkeley.
- **Invited Talk**, “Why we need a “new systems science”,” Asilomar Conference on Signals, Systems, and Computers, Monterey, CA, Nov. 11, 2003.
- **Invited Talk**, “Scaling Up Design,” SRC Workshop on Silicon Nanoelectronics and Beyond, Panel: Tools and Methodologies for Nanoelectronic Design, Portland, OR, October 29, 2003.
- **Invited Talk**, “Behavioral Types as Interface Definitions for Concurrent Components,” *NEXT TTA Workshop on the Specification of Linking Interfaces*, Oct. 12 2003, Philadelphia, PA, USA.
- **Invited Talk**, “Are Embedded Systems Just Systems Made with Small Computers?” Artist International Collaboration Days, Education Day, In conjunction with EMSOFT, Philadelphia, PA, Oct 11, 2003.
- **Plenary Talk**, “Embedded Software Challenges for the Next Ten Years,” *Infineon Embedded Software Days*, Munich, Germany, Sept. 29, 2003.
- **Plenary Talk**, “Model-Driven Development: From Object-Oriented Design to Actor-Oriented Design,” *Workshop on Software Engineering for Embedded Systems (SEES)*, a.k.a. *The Monterey Workshop*, Chicago, IL, Sept. 24, 2003.
- **Invited Talk**, “Streaming Models of Computation in the Ptolemy Project,” *Workshop on Streaming Systems*, Endicott House, Dedham, MA, August 23, 2003.
- **Plenary Talk**, “Behavioral Types for Actor-Oriented Design,” *FMCAD, Fourth International Conferences on Formal Methods in Computer-Aided Design*, Portland, OR, Nov. 6-8, 2002.
- **Invited Talk**, “Integrated Safety Envelopes; Built-in Restrictions of Navigable Airspace,” NSF/OSTP Workshop on Information Technology Research for Critical Infrastructure Protection, Lansdowne, VA, Sept. 19-20, 2002.
- **Invited Talk**, “Preventing the use of Commercial Aircraft as Weapons,” *Transportation Science Seminar*, UC Berkeley Institute of Transportation Studies, Feb. 9, 2002.
- **Invited State-of-the-Art Lecture**, “Computing for Embedded Systems,” *IEEE Instrumentation and Measurement Technology Conference*, Budapest, Hungary, May 21-23, 2001.
- **Plenary Talk**, “Embedded Software from Concurrent Component Models,” ACM SIGPLAN 2001 *Workshop on Languages, Compilers, and Tools for Embedded Systems (LCTES)* Snowbird, Utah, June 22-23, 2001.
- **Plenary Talk**, “Discrete-Event Modeling and Design of Embedded Software,” *Workshop on Discrete Event Systems (WODES)*, Ghent, Belgium, August 21, 2000.
- **Plenary Talk**, “Concurrent Models of Computation in System Level Design,” *Forum on Design Languages, Workshop on System Specification & Design Languages*, Tübingen, Germany, September 4-8, 2000.
- **Plenary Talk**, “Modeling Heterogeneous Systems - Design for Understanding,” *Design for Safety Workshop*, NASA Ames Research Center, Mountain View, CA, 11 October, 2000.
- **Keynote Address**, “Signals and Systems — Moving into the 21st Century,”

- *Microelectronic Systems Education Conference*, Crystal City, Virginia, July 19-21, 1999.
- **Keynote Address**, “System-Level Design Languages: Orthogonalizing the Issues,” *Hardware Design Language Conference (HDL)*, San Jose, CA, March 9, 2000.
- **Invited Terman Award Lecture**, “Future Shock is Here - Ruminations about electrical engineering and its relationship to computer engineering and computer science,” *Frontiers in Education Conference* in Pittsburgh, Pennsylvania, November 1997.
- **Plenary talk**, “Block Diagrams for Modeling and Design,” at *DSP World Spring*, Santa Clara, CA, April 22, 1998.
- **Plenary talk**, “On the Methodology of Design for Electronic Systems,” *Asilomar Conference on Computers and Communication*, Monterey, CA, November 4, 1996.
- **Invited embedded tutorial**, “Comparing Models of Computation,” *ICCAD*, San Jose, November 11, 1996.

## KEY RESEARCH CONTRACTS

- **Principal Investigator**, “CPS: Small: Reconciling Safety with the Internet for Cyber-Physical Systems” NSF, \$499,037, 10/1/2018 – 9/30/2021
- **Principal Investigator**, “CPS: Breakthrough: A Mathematical Theory of Cyber-Physical Systems,” NSF, CNS-1446619, Jan. 2015 – Dec. 2018, \$499,300.
- **Co-Principal Investigator**, “CPS: Breakthrough: Compositional Modeling Modeling with Interfaces (COSMOI),” NSF, CNS-1329759, 10/1/13-9/30/16, \$498,875
- **Principal Investigator and Director**, “The TerraSwarm Research Center,” supported by the STARnet phase of the Focus Center Research Program (FCRP) a Semiconductor Research Corporation program sponsored by MARCO and DARPA, \$27,573,125, January 2013 – October 31, 2017.
- **Co-Principal Investigator**, iCyPhy (Industrial Cyber-Physical Systems), funded by IBM and United Technologies, December 1, 2012 – December 31, 2015, \$1,541,667. ICyPhy is a research consortium formed to identify and develop new engineering techniques that will make it easier to successfully build products and services that combine complex software, hardware and mechanical components. ICyPhy started as a partnership between UC Berkeley, Caltech, and member companies, United Technologies and IBM. It merged with CHES in 2016 (next item).
- **Principal Investigator and Director**, “Center for Hybrid and Embedded Software Systems (CHES),” September 2002 – present, with industrial funding:
  - **Bosch**: Nov. 2006 – Oct. 2013: \$600,000
  - **DGIST**: Aug. 2005 – Aug. 2008: \$225,000
  - **Denso**: August 2014-July 2017: \$450,000
  - **HSBC**: March 2008 – Feb. 2009: \$75,000
  - **Lockheed Martin**: March 2008 – Feb. 2010: \$300,000
  - **National Instruments**: Nov. 2006 – Nov. 2017: \$1,500,000
  - **Thales**: March 2009 – March 2013: \$300,000
  - **Toyota**: August 2005 – July 2017: \$2,263,560
  - **VTT Technical Research Center of Finland**: Oct. 2010 – Sept. 2013: \$110,000
- **Principal Investigator**, “Software Producibility for Systems of Systems,” Naval Research Labs, \$307,854, October 2012 – October 2013.
- **Co-Principal Investigator**, “CPS-Large: Action Webs,” National Science Foundation, \$5,000,000, September 2009-August 2014.



- **Principal Investigator**, “*CPS-Medium: Timing-Centric Software*,” National Science Foundation, \$750,000, September 2010-August 2013.
- **Principal Investigator**, “*Disciplined Design of Systems of Systems*,” Army Research Laboratory, \$989,938, June 2011-June 2014.
- **Principal Investigator**, “*Precision Timed Architecture*,” National Science Foundation, \$819,072, August 2007-December 2013.
- **Co-Principal Investigator**, “*Multi-Scale Systems Center*,” MARCO/FCRP, \$2,139,137, September 2010-August 2013.
- **Principal Investigator**, “*Customizable and Extensible Modeling Framework*,” Air Force Office of Scientific Research DAF AFOSR, \$450,000, February 2008-August 2010
- **Principal Investigator**, “*Collaborative Research CSR-EHS: PRET: Precision Timed Architecture*,” National Science Foundation, \$549,994, August 2007- January 2011
- **Principal Investigator**, “*Timed Distributed Systems*,” UC MICRO Microelectronics Innovation and Computer Research Opportunities 08-061, \$7,156, 08/01/08-12/31/09
- **Principal Investigator**, “*CSR-CPS: Action Webs Seedling*,” National Science Foundation, \$129,998, October 2007 –September 2009
- **Principal Investigator**, “*Concurrent, Parallel, and Distributed Real-Time Software*,” IBM International Business Machines Corp, \$19,000, October 2007-September 2008
- **Principal Investigator**, “*Timed Distributed Systems*,” UC MICRO Microelectronics Innovation and Computer Research Opportunities, \$48,025, July 2007- December 2008
- **Principal Investigator**, “*Graduate Assistance in Areas of National Need*,” Ed Asst Secretary for Postsecondary Education (Work Study), \$383,643, August 2007-August 2010
- **Principal Investigator**, “*Scalable Composition of Subsystems*,” DA ARO Army Research Office 20070039, \$750,000, February 2007 – February 2012
- **Principal Investigator**, “*SUPERB (Summer Undergraduate Program in Engineering Research at Berkeley)*,” National Science Foundation CCF-0453604, \$200,910, February 2005- January 2009
- **Co-Principal Investigator**, “*Foundations of Hybrid and Embedded Software Systems (CHESS)*,” National Science Foundation Cooperative Agreements CCR-0225610, \$13,144,900, September 2002-August 2009
- **Principal Investigator**, “*Intel Undergraduate Research Program*,” Intel Foundation, \$180,000, January 2006- September 2008
- **Principal Investigator**: *CSR-SGER: Cyber-Physical Systems: Are Computing Foundations Adequate?* National Science Foundation (NSF), \$150,000, October 2006 - September 2007.
- **Principal Investigator**: *Customizable and Extensible Modeling Framework*, AFOSR, \$156,000, May 2006 - January 2007.
- **Principal Investigator**: *Timed Distributed Systems*, California State MICRO Program, \$64,181, September 2006 - December 2007.
- **Principal Investigator**: *Timed Distributed Systems*, California State MICRO Program, \$66,690, September 2005 - December 2006.
- **Principal Investigator**: *UC Berkeley/ESCHER Embedded Software*, ESCHER Research Institute (via Vanderbilt University), \$200,000, 2004.
- **Co-Principal Investigator**: *Foundations in Hybrid and Embedded Software Systems*, National Science Foundation (NSF), Information Technology Research (ITR) program,

\$13,000,000, 2002-2007.

- **Co-Principal Investigator:** *From Low-Level Protocols to Models of the National Air-space System - A Hybrid System Approach*, NASA Ames Research Center, Western Joint University Program (JUP), \$243,143, 2002-2004.
- **Principal Investigator:** *Process-Based Software Components for Networked Embedded Systems*, DARPA Mobies, \$2,426,999, 2000-2003.
- **Co-Principal Investigator:** *Integrated Design and Analysis Tools for Software-Based Control Systems*, DARPA SEC, \$3,512,450, 1998-2003.
- **Principal Investigator:** *Design Methodology for DSP*, State of California MICRO Program, at approximately \$150,000 per year, ~1988-2003.
- **Principal Investigator:** *Heterogeneous Modeling and Design*, DARPA Composite CAD, \$2,406,938, 1996-2000.
- **Principal Investigator:** *Algorithm Analysis and Mapping Environment for Adaptive Computing Systems*, Lockheed/Martin \$406,000, 1997-2000.
- **Co-Principal Investigator** (with many others): *Design and Test for Gigascale Integration*, DARPA (with several other PIs), \$5,979,331, 1998-2001
- **Co-Principal Investigator** (with many others): *Focus Research Center for Design and Test of Gigascale Integrated Systems*, MARCO (with several other PIs), \$4,763,099, 1998-2000.
- **Principal Investigator:** *Computer-Aided Design of Heterogeneous Hardware/Software Systems*, SRC, approximately \$80,000 per year, ~1990-1998.
- **Principal Investigator:** *Design of Multidimensional Signal Processing Systems*, Questec, \$148,713, 1997-1998.
- **Principal investigator:** *Integrating Control and Signal Processing*, Lockheed-Martin, \$86,000, 1996-1997.
- **Principal Investigator**, *Design Methodology for Signal Processing*, National Science Foundation, \$250,000, 1992-1995.
- **Principal Investigator**, *System-Level Design Methodology for Embedded Signal Processors*, ARPA and the the United States Air Force, \$2,244,000, 1993-1997.

## KEY SERVICE POSITIONS:

### Key Conference Organization

- Co-organized Vienna Workshop on Digital Humanism (DIGHUM), TU Vienna, Apr 4-5, 2019.
- Eleven Biennial Ptolemy Miniconferences: 1995, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, 2015.
- General Chair, IEEE Workshop on Modeling and Simulation of Cyber-Physical Energy Systems, May 20 2013, Berkeley CA.
- Organizer, DoD Workshop on Software at Scale, Berkeley, August, 2010.
- Organizer, CPS Education Workshop, National Science Foundation, Alexandria, VA, Thursday, August 12, 2010.
- Co-Program-Chair, EOOLT - International Workshop of Object-Oriented Languages and Tools, Oslo, Norway, 2010.
- Co-Organizer, SYNCHRON'09, Dagstuhl Seminar 09481, Schloß Dagstuhl, Germany, November 22-27, 2009.
- Dagstuhl Seminar: Model-based Engineering of Embedded Real-time Systems, Schloss

Dagstuhl, Germany, Nov. 5-9, 2007.

- Topic chair, "Real Time Embedded Systems," DATE 2002
- Joint Workshop on System Level Design Languages, 2000
- DARPA Workshop on Model-Based Methods for Embedded Software, 1999
- Chaired a DARPA ISAT study on "Complex Systems," 1997
- Dagstuhl Workshop on Design Automation for Embedded Systems, 1996
- Application-Specific Array Processors Conference, Berkeley, 1992

### **Steering Committees**

- Second Workshop on Event-based Semantics, held in conjunction with RTAS 2008, 14th IEEE Real-Time and Embedded Technology and Applications Symposium, as part of Cyber-Physical Systems Week (CPSWEEK), April 21-24, 2008
- Real-Time and Embedded Technology and Applications Symposium (RTAS), April 3 - April 6, 2007
- ACM & IEEE Conference on Embedded Software (EMSOFT), 2001 — present.
- International Conference on Compilers, Architectures and Synthesis for Embedded Systems (CASES), 2001 — 2006.

### **Program Committees**

- 2018 IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS)
- Logic and Collaboration in Intelligent Applications Symposium, March 30-31, 2017, Stanford.
- Modelica 2015.
- Modelica 2014, March 10-12, 2014 in Lund, Sweden.
- Second International Workshop on Cyber-Physical Systems (WCPS2009), Montreal, Canada, June 2009.
- Model-driven High-level Programming of Embedded Systems (SLA++P), an ETAPS event, 2008
- Hardware/Software Interaction and Co-design track at RTSS-2007
- Automotive Software Workshop, 2006
- Workshop on Foundations and Applications of Component-Based Design, 2006
- Workshop on Optimization for DSP and Embedded Systems (ODES), 2006
- EMSOFT (2001-2005, 2009-2015)
- ICCPS (2010-2015)
- Hardware/Software Codesign (CODES) 2002
- Signal Processing Systems (SiPS) Design and Implementation, 1998, 1999, 2000, 2001.
- Formal Methods for Open Object-based Distributed Systems (FMOODS), 2000
- High-level Design, Validation and Test Workshop (HLDVT), 1999, 2000.
- Compilers, Architectures and Synthesis for Embedded Systems (CASES), 1999, 2000
- Workshop on Media Processors and DSPs (MP-DSP) 1999
- Application Of Concurrency to System Design, 1998
- Application Specific Array Processors (ASAP) 1990, 1993, 1997
- Workshop on Signal Processing Design and Implementation, 1997.
- Conf. on Parallel Architectures and Compilation Techniques (PACT) 1994.
- High-Level Synthesis Workshop, 1994.
- Hardware/Software Codesign Workshop, 1993.

- Conf. on Arch. and Comp. for Fine and Medium Grain Parallelism, 1993.
- IEEE Workshop on VLSI Signal Processing, 1990, 1992.

### **Editorial**

- Reviewer for National Academies report on Cyber-Physical Systems Education, 2017
- Associate Editor, *Design Automation for Embedded Systems*, 1994-2001
- Editorial Board, *VLSI Signal Processing*, 1993-1999

### **Key University Service**

- Executive Committee, EECS, 2008-15, 2017.
- Tenure and Promotion Committee, EECS, 2014-16.
- Cory Hall Space Committee, 2008-2016.
- Vice chair of EECS for Computer, Network and Instructional Labs (CNIL), 2009-2012
- Chair of the EECS Department, 2006-2008
- External Review Committee, Computer Engineering Dept., UC Santa Cruz, 2008.
- UC Micro Executive Committee, 2006-2008
- Chair of the EE Division, Associate Chair of EECS, 2005-2006
- Executive Committee, COE, 2005-2008
- Co-chair, Graduate Advising/Admissions Committee, EECS, 2003-2005
- Committee on Courses of Instruction, UCB, 2004-2005
- Affirmative Action Committee, COE, 2003-2005
- Co-Chair, EECS Department Faculty Search Committee, 2001-2003
- Research Council member, UC Digital Media Innovation Program (DiMI) 1999-2001
- EECS Department Executive Committee, 1996/97, 1999/2000
- Led curriculum reform in EECS, 1997-2000
- Chair, College/Departmental Affirmative Action Committees, 1994-96.
- Chair, EECS Department Faculty Search Committee, 1994-96.
- Chair, EECS Committee on Computer Needs and Resources, 1994-95
- Chair, EECS Cory Networking, 1994-95

### **Service to government**

- NSF review panel, 2003, 2012, 2014
- DARPA ISAT (Information Science and Technology) board, 1994-1997
- Workshop participant, NSF/White House OSTP Workshop on Information Technology Research for Critical Infrastructure Protection, September, 2002.

### **Service to the profession**

- Member, International Committee for Scientific and Strategic Orientation (COSS) of the College de France, Paris, France, 2017.
- Member, International Advisory Board of the Technical University of Vienna's Faculty of Informatics, 2016 – present.
- Chair, Visiting Committee, *Department of Computer Science, School of Computing, National University of Singapore (NUS)*, Singapore, 2015.
- Visiting Committee, *Department of Computer Science, School of Computing, National University of Singapore (NUS)*, Singapore, 2006.
- Fellow Evaluation Committee, *IEEE Computer Society*, 1999, 2000, 2001.

- Chair, *VLSI Technical Comm.*, *IEEE Signal Processing Society* 1991-1993.
- Chair, *VLSI Technical Comm.*, *IEEE Signal Processing Society* 1991-1993.

#### **Expert witness service**

- Expert witness, National Instruments vs. The Math Works, trial in January 2003, Marshall TX.

#### **External Thesis Evaluation Committee**

- External Reviewer, PhD Thesis, Sidharta Andalam, Univ. of Auckland, New Zeland, 2012
- External Reviewer, PhD Thesis, Hauke Fuhrmann, Univ. of Kiel, Germany, 2011.
- Habilitation of Dr. Martin Schöberl, Technical University of Vienna, Austria, 2010.
- Outside reviewer, PhD Thesis, Patricia Derler, University of Salzburg, Austria, 2010.
- Outside reviewer, PhD Thesis, Hauke Fuhrman, University of Kiel, Germany, 2010.
- Habilitation of Dr. Robert de Simone, INRIA, France, 2008
- Outside reviewer, PhD Thesis, Christian Buckl, TU Munich, Germany, 2008.

#### **Ph.D. STUDENTS GRADUATED:**

- Ben Zhang [2018]  
*Adapting Swarm Applications: A Systematic and Quantitative Approach*
- Hokeun Kim, 2017  
*Securing the Internet of Things via Locally Centralized, Globally Distributed Authentication and Authorization*
- Ilge Akkaya, 2016  
*Data-Driven Cyber-Physical Systems via Real-Time Stream Analytics and Machine Learning*
- Christopher Shaver, 2016  
*On the Representation of Distributed Behavior*
- Michael Zimmer, 2015  
*Predictable Processors for Mixed-Criticality Systems and Precision-Timed I/O*
- Christos Stergiou, 2013  
*Schedulability Analysis and Verification of Real-Time Discrete-Event Systems*
- Dai Bui, 2013  
*Scheduling and Optimizing Stream Programs on Multicore Machines by Exploiting High-Level Abstractions*
- Isaac Liu, 2012  
*Precision Timed Machines*
- Ben Lickly, 2012  
*Static Model Analysis with Lattice-based Ontologies*
- Jia Zou, 2011  
*From Ptides to PtidyOS, Designing Distributed Real-Time Embedded Systems*
- Eleftherios Matsikoudis, 2011  
*Axioms for Asynchronous Processes*
- Yang Zhao, 2009  
*On the Design of Concurrent, Distributed Real-Time Systems*
- Thomas Huining Feng, 2009  
*Model Transformation with Hierarchical Discrete-Event Control*

- Slobodan Matic, 2008  
*Compositionality in Deterministic Real-Time Embedded Systems*
- Gang Zhou, 2008  
*Partial Evaluation for Optimized Compilation of Actor-Oriented Models*
- Elaine Cheong, 2007  
*Actor-Oriented Programming for Wireless Sensor Networks*
- Ye Zhou, 2007  
*Interface Theories for Causality Analysis in Actor Networks*
- Haiyang Zheng, 2007  
*Operational Semantics of Hybrid Systems*
- James Adam Cataldo, 2006  
*The Power of Higher-Order Composition Languages in System Design*
- Xiaojun Liu, 2005  
*Semantic Foundation of the Tagged Signal Model*
- Stephen Neuendorffer, 2004  
*Actor-Oriented Metaprogramming*
- Yuhong Xiong, 2002  
*An Extensible Type System for Component-Based Design*
- Jie Liu, 2001  
*Responsible Frameworks for Heterogeneous Modeling and Design of Embedded Systems*
- John Davis, II, 2000  
*Order and Containment in Concurrent System Design*
- Bilung Lee, 2000  
*Specification and Design of Reactive Systems*
- Michael Williamson, 1998  
*Synthesis of Parallel Hardware Implementations from Synchronous Dataflow Graph Specifications*
- Micheal Goodwin, 1997  
*Adaptive Signal Models: Theory, Algorithms, and Audio Applications*
- Stephen A. Edwards, 1997  
*The Specification and Execution of Heterogeneous Synchronous Reactive Systems*
- Praveen Murthy, 1996  
*Scheduling Techniques for Synchronous And Multidimensional Synchronous Dataflow*
- Thomas M. Parks, 1995  
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