Mark W. Brehob

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Work Address:
Beyster Building
University of Michigan
2260 Hayward Street
Ann Arbor, MI 48109-2121

Phone: (734) 764-0525
Fax: (734) 763-1503
brehob@eecs.umich.edu

Home Address:
3370 Bluett
Ann Arbor MI
48105-1557

Phone: (734) 761-3857
brehob@gmail.com

Current Role

As a lecturer, I teach two engineering classes per semester. Courses recently taught focus on junior and senior level classes in computer architecture and embedded systems. Other courses taught include data structures and discrete mathematics as well as freshman engineering classes. I've acted as the primary academic advisor for all computer engineering undergraduates at the University of Michigan for most of the last 15 years. I am the director of the Michigan Embedded Systems Hub and run the Student Projects Lab located in the Beyster Building. In 2017 I was the ABET PEV for CS and shared that responsibility for CE.

Education

- Ph.D., Computer Science, Michigan State University, December 2003. Thesis Title: *Mathematical Models of Caching*. Advisor: Prof. Richard Enbody
- M.S.E., Computer Science, Michigan State University, December 1995.
- B.S.E., Computer Engineering, Rose-Hulman Institute of Technology, May 1992. Minor in Mathematics.

Employment History

- Kurt Metzger Collegiate Lecturer, 2015—present.
- Lecturer IV, Dept. of Electrical Engineering and Computer Science, University of Michigan, 2005—2015.
- Lecturer, Dept. of Electrical Engineering and Computer Science, University of Michigan, 2000—2005
- Instructor of Record, Dept. of Computer Science, Michigan State University, Fall1997 and Summer 1998.
- Co-op. Microprocessor Research Group, Intel. January 1997—July 1997.
- Intern. Server Chipset Group, Intel. April 1996—August 1996.
- Intern/Co-op. Various groups, Intel, April 1995—December 1995.
- Other experience during 1992—2000:
    - Research assistant, funded by the Office of Naval Research
    - Unix System Administrator for the Computer Science department at Michigan State University.
    - Teaching assistant and lead TA for an introduction to programming class with over 900 students/semester for about three years at Michigan State University.
    - Taught a special section of an introduction to computers class for the residential science program at Michigan State University.

Refereed Journal Publications

- HM Tzeng, A Prakash, M Brehob, David, A Anderson, & CY Yin. *Keeping patient beds in a low position: An exploratory descriptive study to continuously monitor the height of patient beds in an adult acute surgical inpatient care setting*. Contemporary Nurse 41 (2), 184-189, 2012
- M. Brehob, S. Wagner, E. Torng, R. Enbody, *Optimal replacement Is NP-hard for nonstandard caches*, IEEE Transactions on Computers, vol. 53, no. 1, pp. 73-76, January 2004.
- M. Brehob, R. Enbody, E. Torng, and S. Wagner, *On-line restricted caching*, Journal of Scheduling, vol. 6, no. 2, pp. 149-166, March 2003.
- M. Brehob, E. Torng, P. Uthaisombut, *Applying extra-resource analysis to load balancing*, Journal of Scheduling, vol. 3, no. 5, pp. 273-288, August 2000.

Refereed Conference and Workshop Publications

- HM Tzeng, A Prakash, M Brehob, A Anderson, DA Devecsery, CY. Yin, *How Feasible Was a Bed-Height Alert System*? Clinical Nursing Research, 2012
- J. VanLaven, M. Brehob, K. J. Compton, *A computationally feasible SPA attack on AES via optimized search*, International Information Security Conference, pp. 577-588, 2005.
- M. Brehob, R. Enbody, E. Torng, S. Wagner, *On-line restricted caching*, Symposium on Discrete Algorithms, pp. 374-383, 2001.
- M. Brehob, E. Torng, P. Uthaisombut, *Applying extra-resource analysis to load balancing*, Symposium on Discrete Algorithms, pp. 560-561, 2000.
- M. Brehob, R. Enbody, *The potential of carbon-based memory systems*, IEEE International Workshop on Memory Technology, Design, and Testing, pp. 110-114, 1999.

Technical Report of Note

- M. Brehob, T. Doom, R. Enbody, S. Moore, W. Moore, R. Sass R, C. Severance, *Beyond RISC - the post RISC architecture*, Technical Report MSU CPS-96-11 November 1996.
    - This technical report was covered on Ars Technica, Slashdot, and Paul Hsieh's Computer Architecture Blog.

Patent

- "Nanocapsules Containing Charged Particles, Their Uses and Methods of Forming the Same," U.S. Patent with D. Tomanek, Young-Kyun Kwon, and Richard Enbody. United States Patent 6,473,351.

Awards

- *Collegiate Lecturer*. An award/title given to at most three lecturers per year over the entire Ann Arbor campus.
- *Eta Kappa Nu Faculty Award*. Student selected "EECS professor of the year" award. The award is given each year to one of the more than 100 eligible faculty members. (2000-2001, 2001-2002, 2006-2007 , 2008-2009, 2011-2012)
- *College of Engineering Teaching Excellence Award*. A College-wide award for teaching. (2004-2005)
- *EECS Special Teaching Award*. A departmental teaching award given only once. (2002-2003)

Grants and Gifts

- $10,000 from Bosch for EECS 473 (2017)
- ~$20,000 (in kind processors and cameras) from Intel
- ~$50,000 (half cash, half equipment) from Intel for EECS 570 and 578. (2015)
- $10,000 from Boeing for EECS 473 (2015)
- $10,000 from Ford for EECS 473 (2015)
- ~$2,000 from Marvell for EECS 470 (2015)
- ~$2,000 in equipment from Intel (2015)
- $50,000 from State Farm for the Student Project's Lab (2014)
- $20,000 from Lockheed-Martin for undergraduate education in embedded systems (2013)
- $1,900 Lecturer's Professional Grant (2012)
- ~$2,000 in equipment from Texas Instruments (2012)
- $25,000 from Lockheed-Martin for undergraduate education in embedded systems (2012)
- $20,000 from Intel for undergraduate education in embedded systems (2011)
- ~$3,000 in equipment from Texas Instruments (2011)
- $25,000 from Intel for undergraduate education in parallel systems (2007)
    - Co-PIs: Brian Noble, Scott Mahlke.
- $65,000.00 grant from Intel for undergraduate education in parallel systems. (2006)
    - Co-PIs: Scott Mahlke, Chandrasekhar Boyapati
- $84,455.00 equipment grant of servers from Intel for simulation and synthesis of computer architecture projects. (2005)

Courses Taught

- EECS 498, *Special Topics: Advanced Embedded Systems*
    - Fall 2006, Fall 2011, Fall 2012
- EECS 473, *Advanced Embedded Systems*
    - Fall 2014, Fall 2015, Fall 2016, Fall 2017
- EECS 470, *Computer Architecture*
    - Fall 2003, Winter 2004, Fall 2004, Fall 2005, Fall 2006, Winter 2007, Winter 2008, Fall 2008, Fall 2009, Winter 2011, Winter 2012, Fall 2013, Winter 2014, Winter 2015
- EECS 452, *Digital Signal Processing Lab*
    - Winter 2009, Winter 2010, Fall 2010, Fall 2011, Winter 2013
- EECS 373, *Microprocessor-Based Systems*
    - Winter 2002, Fall 2002, Winter 2004, Fall 2005, Winter 2006, Fall 2006, Winter 2007, Fall 2007, Winter 2008, Fall 2008, Winter 2009, Winter 2010, Winter 2011, Winter 2012, Winter 2013, Fall 2013, Winter 2014, Winter 2016
- EECS 370, *Computer Organization*
    - Fall 2000, Winter 2001, Winter 2002, Fall 2002, Fall 2012
- EECS 270, *Introduction to Digital Logic*
    - Fall 2001, Spring 2004, Spring 2005, Spring 2006, Spring 2007, Fall 2009, Spring 2011, Spring 2012, Spring 2013, Spring 2014, Fall 2014
- EECS 281/380, *Data Structures and Algorithms*
    - Winter 2001, Winter 2003
- EECS 203, *Discrete Mathematics*
    - Fall 2000, Spring 2001, Spring 2015, Spring 2016
- ENGR 100, *Microprocessors and Music: An Introduction to Computing Systems*
    - Fall 2007, Fall 2010, Winter 2015
- ENGR 101, *Introduction to Computers and Programming*
    - Winter 2005

Recent Student Projects Supervised

- *Monitoring Medicine for the Elderly*. Two students working on two different schemes for monitoring and reporting on pills being taken. (2017).
- *MDDP project with Pillar Technology* (a local software firm). Group of students are designing a drone to monitor crops and report data in a useful way. (2014-2015)
- *Design of a Real-Time Operating System*. One undergraduate doing an independent study to build an RTOS from scratch (Winter 2015)
- *Study of Real-Time Systems, Real Time Operating Systems and Linux in Embedded Systems:* Three undergraduates (Summer of 2012)
- *Virtual SPI:* Three undergraduates designing and implementing a virtual SPI bus protocol. 2011 & 2012
- *SIDS Detector for Africa*: One undergraduate refined a project from EECS 498.
- *PE-ARP*. One undergraduate developed this system with direction from MERIT. Port Enhanced ARP (Address Resolution Protocol) uses a software modification of end-hosts low in the network stack, to provide the ability to share a single public IP with multiple end-hosts. Winter 2010.
- *RAMPART Medical Data Logger*. Five undergraduates and one masters student designed a device to track information about the usage of anti-seizure medication by emergency medical personnel. This includes the location, temperature, and time-of-arrival as well as acting as a voice recorder to record what the medical personnel are doing. Sponsored by the School of Emergency Medicine, 600+ devices are expected to be deployed at a cost of around $200,000. Summer 2008.
    - Co-supervised with Matt Smith, Darren McKague, and Alexander Ganago.
- *Bed Height Sensor Network.* Three undergraduates designed a device to monitor, log, and report information about bed heights using a dynamic Zigbee-based router. Worked with the School of Nursing (2008+)
- *Xebra Medallion.* One undergraduate worked with an employee of the Environmental Protection Agency on a wireless system for controlling and monitoring a hydraulic/electric car. This was done to allow mechanical engineers to safely work with the hydraulics system. Deployed in the Mechanical Engineering department. Summer 2008.

Service

- Chief program advisor, undergraduate Computer Engineering program at the University of Michigan. 2001-2004 and 2006-2012. 2013-present.
    - Oversee academic advising of 150 to 200 Computer Engineering students. Oversee all graduation related issues. Meet personally with about 75 students a semester and oversee one to three other faculty members who also provide academic advising. Sign-off on any expectations to program requirements. Meet with all students on academic probation. Attend departmental curriculum committee as well as computer engineering program committee. Evaluate transfer credit (~100 classes per year).
- ABET PEV for Computer Science Engineering at Michigan, 2017
- ABET co-PEV for Computer Engineering at Michigan, 2017
- Advisor, undergraduate computer engineering program. 2000-2001, 2004-2006, 2013
    - Meet with undergraduate computer engineers to provide academic advising. See about 50 students per semester.
- Director of Michigan Embedded Systems Hub.
    - "to provide a resource for students, faculty and staff at the University of Michigan to learn about and develop embedded systems"
    - **http://www.eecs.umich.edu/hub/index.html**

- Organize student/faculty matching for summer work (~2012 to present)
- Curriculum committee chair for CE program. 2004—2006
    - Manage discussions about program, call meetings as needed, submit changes to department and college as needed. Attend departmental curriculum committee.
- Head of undergraduate student project lab. 2006—present
    - Oversee student use of embedded systems lab. Manage ordering and installation of nearly everything (tables, computers, instruments, processors, electronics supplies). Manage space allocation, room access. Lab has had about 8-20 intermittent users during the school year and 10-12 fulltime users during the summer.
- Occasional Outside Mentor
    - As part of the Lecturer's Union contract, lecturers who are not meeting their department's goals are required to seek mentors inside and outside of their department. 2011, 2012
- Tech Day speaker 2004—2008
    - Talk to different groups of high school students and their parents about the various EECS programs at the University of Michigan.
- Co-PI (education and outreach) on Engineering Research Center proposal which made it to the site visit/reverse site visit stage.
- Occasional reviewer for ICPP, ISCA, Micro, HPCA, and various other computer architecture conferences, books, and journals.
- Member of a number of awards committees at the department and college level.
- Member of casebook committees in EECS and Technical Communications departments for lecturers.