Curriculum Vitae
Eric P. Kasten

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Biographical Sketch

Eric P. Kasten is a Research Scientist and Information Technologist at Michigan State University. Dr. Kasten has degrees in computer science and mathematics and has earned the Ph.D. degree in Computer Science and Engineering from Michigan State University. His dissertation addressed the integration of mechanisms, state maintenance, and decision making in adaptive and autonomous software systems that strive to self-adapt and self-customize to address changes in the environment or user requirements. In collaboration with ecologists, Dr. Kasten extended his prior work to address processing and analysis of environmental acoustics for census of bioacoustic inhabitants and characterization of the soundscape to support monitoring and interpretation of terrestrial ecosystems. Currently, Dr. Kasten conducts research at the Global Observatory for Ecosystem Services, designing algorithms to support reliable monitoring of terrestrial carbon stores using remotely sensed satellite imagery.

Prior to receiving his Ph.D. degree, Dr. Kasten enjoyed a diverse career designing, implementing and deploying many different types of computer systems and software. His experience includes practical experience using software engineering techniques to design and implement software systems and algorithms for sensor platforms and data acquisition and analysis systems to support nuclear science and environmental research.

Dr. Kasten is a firm believer that computational thinking enables us to conceptualize, modularize and approach discovery and innovation in fundamentally different ways than we might consider without a computing device. His current research interests focus on the design of algorithms for ecological informatics, computational biology, evolutionary computation, autonomous decision making in software, digital image analysis and remote sensing, and automated monitoring of environments and ecosystems. He is an active reviewer of journal and conference papers, and a member of IEEE, ACM, the American Society for Photogrammetry and Remote Sensing, and The Acoustical Society of America.

Education

Ph.D. in Computer Science, Michigan State University, East Lansing, Michigan, 2007
Dissertation: *An Integrated Approach to Autonomous Computation in Data Streaming Applications*
Thesis Advisor: Prof. Philip K. McKinley

M.S. in Computer Science, Michigan State University, East Lansing, Michigan, 1997

B.S. in Mathematics and Computer Science (double major), Central Michigan University, Mount Pleasant, Michigan, 1989

Skill Set Overview

Conducting independent research. Dr. Kasten's research has been published in numerous peer-review conferences and journals, on subjects such as software engineering, autonomic computing, software decision making, bioacoustics, and informatics.

Software engineering, development and programming. During 23 years of professional service Dr. Kasten has designed and developed many software systems in areas such as: distributed signal analysis, data acquisition, machine learning, and web-enabled sensor data processing.

Computer languages. Dr. Kasten has experience with numerous computer and scripting languages, including C, C++, Java, PHP, IDL, and BASH.

Grant proposal preparation. Dr. Kasten has co-authored or been co-PI on nine grant proposals submitted to granting institutions such as the NSF or EPA.

Environmental monitoring and sensor technology. Dr. Kasten has experience with embedded sensor programming, deployment, and data acquisition and analysis. He has in-field experience deploying terrestrial sensors.

Autonomic and complex adaptive systems. Dr. Kasten's dissertation addressed adaptation and decision making in software. His research helped lead to the development of a taxonomy that describes the process of computational adaptation, and the design and implementation of a perceptual memory system. This research produced several peer-review conference and journal articles.

Ecosystem analysis and informatics. Dr. Kasten has experience in ecosystem analysis and informatics, including conducting research on the summarization and classification of acoustic signals to enable cataloging and searching of large acoustic archives (relational databases) to support ecosystem interpretation.

Satellite image analysis and GIS. Dr. Kasten has experience with the ERDAS, ENVI, ARCGIS and IDL software packages, and has experience developing custom object-based analysis and classification software for addressing remote sensing image understanding problems.

Statistical analysis. Dr. Kasten has experience conducting statistical analysis of large data sets, experimental design using population statistics, and application of techniques such as regression and regularization to address interpretation of sensor data. He has experience with the R and MatLab software packages.

Starting and operating a small business. Before receiving the Ph.D., Dr. Kasten was the co-founder of a small software and internet service company.

Professional Experience

Research Scientist and Information Technologist , 2008 - present
Global Observatory for Ecosystem Services, Michigan State University, East Lansing, Michigan.
Responsible for conducting research and developing remote sensing applications related to carbon sequestration and carbon markets using satellite imagery. Manage cyberinfrastructure and systems in a team oriented environment. Author research publications, and collaborate with faculty and staff to complete research and development projects.

Sr. Research Associate, 2007 - 2010
Remote Environmental Assessment Laboratory, Michigan State University, East Lansing, Michigan.
Responsible for conducting research and developing applications on automated processing of sensor data streams to support ecological research. Participate in grant

proposal preparation, author research publications, and collaborate with university faculty and staff to complete research and development projects.

Physicist III/Accelerator Engineer (Data Acquisition Systems Programmer), 1998 - 2008

National Superconducting Cyclotron Laboratory, Michigan State University, East Lansing, Michigan.

Perform duties as a data acquisition systems programmer. Responsible for designing and implementing data acquisition systems to support nuclear physics research. Provide software support to Cyclotron faculty, graduate students and outside users.

Research Assistant, 2001 - 2006

Department of Computer Science and Engineering, Michigan State University, East Lansing, Michigan.

Conducted research in adaptive and autonomic systems and applications as a member of the Software Engineering and Network Systems Laboratory. Collaborated with faculty and students on computer science research projects that are the subject of numerous journal and conference publications.

Director of Technical Operations and Business, 1996 - 1998

ARQ, Inc., East Lansing, Michigan.

Business partner and owner. Directed general business operations, and the acquisition and installation of technology solutions. Provided consultation and support to ARQ clients. Responsibilities included: bid preparation, and design and implementation of network and technology solutions.

Systems Programmer, 1990 - 1996

Computer Laboratory, Michigan State University, East Lansing, Michigan.

Coordinated the activities of personnel and maintained library systems and applications. Projects included the design, implementation and support of large databases, library catalogs, network systems, applications, supporting software, and systems programming for IBM and Unix operating systems.

Systems Programmer, 1989 - 1990

Architecture Support Group, Andersen Consulting, Chicago, Illinois.

Performed systems programming on IBM mainframes, including systems administration, installation of software and trouble shooting.

Systems and Application Programmer, 1988 - 1989

Image Processing Laboratory, Central Michigan University, Mount Pleasant, Michigan.

Duties were to help setup the laboratory, and to code systems and application programs to demonstrate image processing software and hardware.

Refereed Journal and Magazine Articles

W. Joo, S. H. Gage, E. P. Kasten, "Analysis and interpretation of variability in soundscapes along an Urban-rural Gradient," *Landscape and Urban Planning*, vol. 103, issues 3–4, pp. 259–276, 2011.

E. P. Kasten, P. K. McKinley and S. H. Gage, "Ensemble extraction for classification and detection of bird species," *Ecological Informatics*, vol. 5, pp. 153–166, 2010.

E. P. Kasten and P. K. McKinley, "MESO: Supporting online decision making in autonomic computing systems," *IEEE Transactions on Knowledge and Data Engineering*, vol. 19, no. 4, pp. 485–499, April 2007.

S. Sadjadi, P. K. McKinley, E. P. Kasten and Z. Zhou, "MetaSockets: Design and operation of run-time reconfigurable communication services," *Software Practice and Experience*, vol. 36, issue 11-12, pp. 1157–1178, 2006.

P. K. McKinley, S. M. Sadjadi, E. P. Kasten and B. H. C. Cheng, "Composing adaptive software," *IEEE Computer*, vol. 37, no. 7, pp. 56–64, July 2004.

R. Fox, E. P. Kasten, K. Orji, C. Bolen, C. Maurice and J. Venema, "Real-time results without real-time systems," *IEEE Transactions On Nuclear Science*, vol. 51, no. 3, pp. 571–575, June 2004.

Refereed Conference and Workshop Proceedings

E. P. Kasten, P. K. McKinley and S. H. Gage, "Automated ensemble extraction and analysis of acoustic data streams," *Proceedings of the 1st International Workshop on Distributed Event Processing, Systems and Applications (DEPSA), held in conjunction with the 27th IEEE International Conference on Distributed Computing Systems (ICDCS)*, Toronto, Ontario, Canada, June 2007.

E. P. Kasten and P. K. McKinley, "MESO: Perceptual memory to support online learning in adaptive software," *Proceedings of the 3rd International Conference on Development and Learning (ICDL)*, La Jolla, California, October 2004.

E. P. Kasten and P. K. McKinley, "Perimorph: Run-time composition and state management for adaptive systems," *Proceedings of the Workshop on Distributed and Auto-Adaptive and Reconfigurable Systems (DARES'04) held in conjunction with the International Conference on Distributed Computing Systems (ICDCS'04)*, Tokyo, Japan, March 2004.

R. Fox, E. P. Kasten, K. Orji, C. Bolen, C. Maurice and J. Venema, "Real-time results without real-time systems," *Proceedings of the 13th Real Time Computer Applications in Nuclear, Particle and Plasma Physics Conference (RT2003)*, Montreal, Quebec, Canada, May 2003.

S. M. Sadjadi, P. K. McKinley and E. P. Kasten, "Architecture and operation of an adaptable communication substrate," *Proceedings of the 9th International Workshop on Future Trends of Distributed Computing Systems (FTDCS'03)*, San Juan, Puerto Rico, May 2003.

P. K. McKinley, S. M. Sadjadi and E. P. Kasten, "An adaptive software approach to intrusion detection and response," *Proceedings of the 10th International Conference on Telecommunication Systems, Modeling and Analysis*, Monterey, California, October 2002.

P. K. McKinley, S. M. Sadjadi, E. P. Kasten and R. Kalaskar, "Programming language support for adaptable wearable computing," *Proceedings of the 6th International Symposium on Wearable Computers*, Seattle, Washington, October 2002.

P. K. McKinley, E. P. Kasten, S. M. Sadjadi and Z. Zhou, "Realizing multi-dimensional software adaptation," *Proceedings of the ACM Workshop on self-Healing, adaptive and self-managed Systems (SHAMAN), held in conjunction with the 16th Annual ACM International Conference on Supercomputing*, New York, New York, June 2002.

S. M. Sadjadi, P. K. McKinley, and E. P. Kasten, "MetaSockets: Run-time support for adaptive communication services," *Proceedings of the 2002 International Symposium on Distributed Objects and Applications*, Monterey, California, October 2002.

E. P. Kasten, P. K. McKinley, S. Sadjadi and R. Stirewalt, "Separating introspection and intercession to support metamorphic distributed systems," *Proceedings of the 22nd IEEE International Conference on Distributed Computing Systems (ICDCS)*, Vienna, Austria, July 2002.

C. Huang, E. P. Kasten, and P. K. McKinley, "Design and implementation of multicast operations for ATM-based high performance computing," *Proceedings of Supercomputing'94*, Washington, D.C., November 1994.

Abstracts and Posters

S. H. Gage, W. Joo, E. Kasten, and J. Fox "Development of an ecological acoustic sensor observatory," (Poster) *Proceedings of the W. K. Kellogg Biological Station Long Term Ecological Research all Scientists Meeting*, Hickory Corners, Michigan, May 2009.

S. M. Sadjadi, P. K. McKinley and E. P. Kasten, "MetaSockets: Run-time support for adaptive communication services," (Poster Summary) *Addendum to the Proceedings of the 2002 International Symposium on Distributed Objects and Applications*, Irvine, California, October 2002.

Technical Reports and Manuals

S. H. Gage, E. P. Kasten and W. Joo, "Development and application of environmental acoustics for monitoring bird pathways in wind resource areas," Tech. Rep. MSU-REAL-09-1, Remote Environmental Assessment Laboratory, Michigan State University, East Lansing, Michigan, April 2009.

S. H. Gage, E. Kasten, G. Safir, B. Maurer, S. Biswas, G. Habron, W. Joo, J. Fox and E. Bowling, "Carbon regulation research support: Project report year 2," Research Excellence Fund Report, Remote Environmental Assessment Laboratory, Michigan State University, East Lansing, Michigan, September 2008.

E. P. Kasten, P. K. McKinley and S. H. Gage, "Automated ensemble extraction and analysis of acoustic data streams," Tech. Rep. MSU-CSE-06-40, Department of Computer Science and Engineering, Michigan State University, East Lansing, Michigan, December 2006.

E. P. Kasten "DAQ superhighway (DaSH) reference manual," National Superconducting Cyclotron Laboratory, Michigan State University, East Lansing, Michigan, November 2006.

P. K. McKinley, S. M. Sadjadi, E. P. Kasten and H. C. Cheng, "A taxonomy of compositional adaptation," Tech. Rep. MSU-CSE-04-17, Department of Computer Science and Engineering, Michigan State University, East Lansing, Michigan, May 2004.

E. P. Kasten and P. K. McKinley, "MESO: Perceptual memory to support online learning," Tech. Rep. MSU-CSE-04-15, Department of Computer Science and Engineering, Michigan State University, East Lansing, Michigan, April 2004.

E. P. Kasten and P. K. McKinley, "Xnauts: Learning to adapt by imitation," Tech. Rep. MSU-CSE-04-8, Department of Computer Science and Engineering, Michigan State University, East Lansing, Michigan, February 2004.

D. Knoester, E. P. Kasten and P. K. McKinley, "Using developmental learning for network intrusion detection," Tech. Rep. MSU-CSE-04-5, Department of Computer Science and Engineering, Michigan State University, East Lansing, Michigan, February 2004.

E. P. Kasten and P. K. McKinley, "A taxonomy for computational adaptation," Tech. Rep. MSU-CSE-04-4, Department of Computer Science and Engineering, Michigan State University, East Lansing, Michigan, January 2004.

E. P. Kasten and P. K. McKinley, "A framework-based classifier for online learning," Tech. Rep. MSU-CSE-04-1, Department of Computer Science and Engineering, Michigan State University, East Lansing, Michigan, January 2004.

S. M. Sadjadi, P. K. McKinley and E. P. Kasten, "MetaSockets: Run-time support for adaptive communication services," Tech. Rep. MSU-CSE-02-22, Department of Computer Science and Engineering, Michigan State University, East Lansing, Michigan, July 2002.

E. P. Kasten, P. K. McKinley, S. M. Sadjadi and R. Stirewalt, "Separating Introspection and Intercession to Support Metamorphic Distributed Systems," Tech. Rep. MSU-CSE-02-1, Department of Computer Science and Engineering, Michigan State University, East Lansing, Michigan, January 2002.

E. P. Kasten, and P. K. McKinley, "Adaptive Java: Refractive and transmutative support for adaptive software," Tech. Rep. MSU-CSE-01-30, Department of Computer Science and Engineering, Michigan State University, East Lansing, Michigan, December 2001.

E. P. Kasten, and P. K. McKinley, "O2Threads: An object-oriented threads package for internet applications," Tech. Rep. MSU-CPS-97-13, Department of Computer Science, Michigan State University, East Lansing, Michigan, April 1997.

E. P. Kasten, "Design and implementation of a pipelined virtual computer," Tech. Rep. MSU-CPS-96-05, Department of Computer Science, Michigan State University, East Lansing, Michigan, February 1996.

E. P. Kasten, and P. K. McKinley, "The ZWeb gateway system," Tech. Rep. MSU-CPS-95-26, Department of Computer Science, Michigan State University, East Lansing, Michigan, July 1995.

C. Huang, E. P. Kasten, and P. K. McKinley, "Design and Implementation of Multicast Operations for ATM-based High Performance Computing," Tech. Rep. MSU-CPS-94-22, Department of Computer Science, Michigan State University, East Lansing, Michigan, April 1994.

E. P. Kasten, and P. K. McKinley, "An efficient multicast extension to PVM," Tech. Rep. MSU-CPS-94-21, Department of Computer Science, Michigan State University, East Lansing, Michigan, April 1994.

Other Publications

E. Kasten, "HTML forms: Interacting with the net," *Linux Journal*, August 1995.

E. Kasten, "HTML: A gentle introduction," *Linux Journal*, July 1995.

E. Kasten, "Building shared libraries," *Linux Journal*, April 1995.

Teaching Experience and Preparation

Participant at Michigan State University's 2009 STEM Symposium held in East Lansing, Michigan in 2009. Topics focused on advances in STEM education. Sessions facilitated by: Robert J. Gustafson, Director, Engineering Education Innovation Center, Honda Professor for Engineering Education, Professor, Food, Agricultural and Biological Engineering, College of Engineering, Ohio State University; Richard Felder, Hoechst Celanese Professor Emeritus, Chemical Engineering, North Carolina State University; Jack R. Lohmann, Vice Provost and Professor, Georgia Institute of Technology, Editor, Journal of Engineering Education.

Co-instructor of a short course on the design and use of HTML forms at Michigan State University, 1995.

School Instructor for Beaverton Rural Schools. Taught a high school level introductory programming class to adult students pursuing high school completion, 1986 - 1988.

Public Speaking and Presentations

Presenter at many meetings of the Software Engineering and Network Systems Laboratory and of the Remote Environmental Assessment Laboratory at Michigan State University.

Presenter and participant at the Symposium on Climate Change, Forests and Farmers: Global Perspectives and Projects, Michigan State University, May 2010. Presentation title: High-Resolution Object Detection, Extraction and Classification.

Presenter at the The Third International Conference on Development and Learning (ICDL'04), La Jolla, California, October 2004. Presentation title: MESO: Perceptual Memory to Support Online Learning in Adaptive Software.

Presenter and participant at a review of the RAPIDware research project conducted by the Office of Naval Research, Washington, D.C., June, 2003.

Invited speaker at a College and University Systems Exchange/Coalition for Networked Information (CAUSE/CNI) Midwest Regional Conference, Evanston, Illinois, 1995.

Creative and Professional Work

REAL's sensor-to-server framework. Acted as team leader and designer for the Remote Environmental Assessment Laboratory's sensor-to-server framework. This framework extends from the in-field sensor unit hardware and software to cataloging and presentation of observations in the REAL Digital Library. Key components of this framework include: sensor unit system software, a protocol and system to enable early vetting of sensor unit operation, a protocol for cataloging received observations into the digital library, and on-demand signal processing and visualization of sensor data. This sensor-to-server framework has enabled near real-time delivery of sensor observations to REAL servers in Michigan from as far away as Australia.

MESO perceptual memory system. This software leverages pattern classification and clustering techniques to support autonomous decision making in time-sensitive and data-intensive environments. MESO has been used to enable decision making and forecasting in mobile computing environments, and for classification and detection of birds to support automated ecosystem monitoring.

Dynamic River stream processing engine. A stream processing engine that enables distributed, automated data stream analysis and processing while providing fault resiliency and dynamic recomposition among hosts.

DAQ Superhighway (DaSH) data acquisition system. A toolkit and software system that eases the construction and customization of a data acquisition pipeline to support experimental nuclear physics.

Blacktea API. A C++ application programmer's interface that resembles the Java API. In addition, this API provides functionality supporting time series and data stream analysis, and basic computational reflection. Both MESO and Dynamic River are built atop this API.

Perimorph API. A Java application programmer's interface supporting state maintenance in runtime adaptable software. This API enables dynamic software recomposition without loss of data, and provides mechanisms that enable application hand-off between networked hosts.

Adaptive Java. An extension to the Java language that supports the expression and codification of behavioral reflection.

MetaSockets. Java sockets that enable runtime adaptation in Java applications with little modification. Built using Adaptive Java (see above).

SpectroDAQ data acquisition system. A system and API enabling the construction of a distributed data acquisition pipeline. This system is the predecessor of the DaSH data acquisition system (see above).

DEMtools. Software applications for manipulating United States Geological Survey digital elevation maps (DEMs). This package includes a program for displaying DEMs in three dimension.

ZWeb gateway. A z39.50 to HTML gateway. This gateway gives library patrons access to library catalogs using a web browser.

Professional and Synergistic Activities

Program committee member for the Software Engineering and Knowledge Engineering (SEKE 2011) conference.

Participant at the Wind Energy Siting and Policy Issues workshop held in East Lansing, Michigan in 2009. Sponsored by Michigan Farm Bureau and the Land Policy Institute.

Participant at the Bioacoustic Monitoring in the Terrestrial Environment workshop held at the James Reserve in Idyllwild, California in 2008. Sponsored by the National Science Foundation.

Collaborator and consultant on the design and implementation of an acoustic sensor system for ecosystem monitoring with scientists from the Remote Environmental Assessment Laboratory at Michigan State University. This project aims to automate the analysis and processing of acoustic data streams collected in natural environments to enable timely data preservation and support ecological research. As part of this project, Dr. Kasten researched and implemented a technique for automated extraction of events from acoustic data streams to enable classification and detection of bird vocalizations. Dr. Kasten also assisted with preparation of grant proposals.

Participant at a workshop on habitat sensor platforms for ecosystem monitoring held at Michigan State University, 2007.

Participant at a workshop on strategic visioning for cyberinfrastructure, computing, and information held at Michigan State University, 2005.

Aide, IEEE International Conference on Distributed Computing Systems (2003). Provided the program committee support for collection, processing and review of submitted conference publications. Participated in program committee meetings and conference events.

Reviewer for numerous journals and conferences, including: Ecological Informatics, IEEE Internet Computing, IEEE International Conference on Pervasive Computing and Communications, IEEE International Conference on Distributed Computing Systems, IEEE Transactions on Evolutionary Computation, and Software Practice and Experience

Member, IEEE Computer Society, the Association for Computing Machinery (ACM), the American Society for Photogrammetry and Remote Sensing, and The Acoustical Society of America.