

# DAVID B. KNOESTER

Email: dave.knoester@gmail.com

## EDUCATION

---

- Present Ph.D., Computer Science – Michigan State University  
Ph.D., Ecology, Evolutionary Biology, and Behavior – Michigan State University  
Expected graduation date: 2010  
Doctoral Advisor: Prof. Philip K. McKinley
- 2004 M.S., Computer Science, Michigan State University, East Lansing, Michigan
- 2000 B.S., Computer Engineering, University of Michigan, Ann Arbor, Michigan

## PROFESSIONAL EXPERIENCE

---

- **Research Assistant** (Aug. 2005–Present)  
Digital Evolution Laboratory, Michigan State University, East Lansing, Michigan  
Software Engineering and Network Systems Lab, Michigan State University, East Lansing, Michigan
  - Currently conducting research into harnessing digital evolution for the design and development of complex distributed systems.
- **Identity Management Systems Programmer** (2006–Present)  
IdM, Academic Computing and Network Services, Michigan State University, East Lansing, Michigan
  - Lead developer for an identity-brokering middleware to facilitate the distribution and maintenance of identity information for MSU’s multiple user populations.
  - Responsible for design and implementation of a J2EE-based system for identity management using web services and business-process languages (currently in development).
  - Jointly (with IdM team) responsible for maintenance and support of MSU’s current identity management infrastructure, including software updates, end-user support, and inter-departmental coordination.
- **Software Development and Validation Engineer** (2004–2006)  
Software Vehicle Innovation Program, General Motors Corporation, Detroit, Michigan
  - Sole development engineer for validation infrastructure, including hardware- and software-in-the-loop systems, instrumentation interfaces, calibration support, and software build integration.
  - Lead validation engineer for an embedded fuel system controller. Responsible for designing and implementing validation tests of both hardware and software system components, in both vehicle and laboratory environments. Controller was successfully released to production in early 2006, with expected volumes of 300,000 annually.
  - Sole validation and build support engineer for an integrated trailer brake controller. Responsible for software validation and component integration in both vehicle and laboratory environments. Controller was successfully released to production in mid-2006, with expected volumes of 10,000 annually.
- **Research Assistant** (2001–2004)  
Software Engineering and Network Systems Lab, Michigan State University, East Lansing, Michigan
  - Conducted research into the application of developmental learning (a form of machine-learning) to network anomaly detection. This approach is general enough to leverage existing intrusion detection methods, while providing a solid mathematical foundation for identifying anomalies in network traffic. Experimental results have demonstrated that this approach can detect a high percentage of network attacks with low false-positive rate. This research was supported by the MSU Cybersecurity Initiative and a research grant from the U.S. Office of Naval Research.
- **Teaching Assistant** (2002–2003)  
Dept. of Computer Science, Michigan State University, East Lansing, Michigan
  - Teaching assistant for undergraduate-level classes, including introductory databases, operating systems, and networking. Responsibilities included developing laboratory assignments, managing laboratory sessions, lecturing on laboratory-related topics, designing and grading homework assignments, holding office hours and providing assistance to students.

- **Software Engineer** (2000–2002)  
System Architecture Group, FactSet Research Systems, Inc., Stamford, Connecticut
  - Sole developer of a clustered, shared-disk database engine. Currently in use as a state database for a web-services platform for financial research software, used daily by 5,000+ portfolio managers, investment bankers, and analysts. Researched the use of cluster-global memory-mapped files to improve legacy database performance.
  - Introduced the C++ Standard Template Library into a legacy build environment. Developed tools to support the use of the STL in a mainframe environment via static template instantiation.
  - Troubleshoot and debugged OpenVMS TruCluster operating system upgrades that were causing rare database corruption in preparation for the installation of a SAN to replace directly attached RAID storage.
- **Research Assistant** (2000)  
Undergraduate Research Project, University of Michigan, Ann Arbor, Michigan
  - Developed and tested layer-5 (OSI-7) application fingerprinting software. Included traffic statistics aggregation using Cisco routers, NetFlow, and cflowd.
- **Systems Administrator** (1999–Present; part-time)  
Knoester & Berchiatti P.L.C., Grand Rapids, Michigan
  - Designed and installed a law-office computing system supporting automated backups, secure internet access, and networked applications. Provide ongoing support, training, upgrades, and security monitoring. Continue to ensure client confidentiality using access control lists, IP firewalls, and network intrusion detection systems.
- **Systems Administrator** (1995)  
Electronic Data Systems, Southfield, Michigan
  - Provided technical support to over 250 Windows users on a Netware-based network. Installed Netware servers and reconfigured client machines.
- **IT Systems Manager** (1990–2007; part-time)  
Garden Gate Greenhouse, Family-owned Business, Grand Rapids, Michigan
  - Configured and installed a greenhouse automation system composed of temperature, humidity, and wind-speed sensors, HV & HAF controllers, embedded monitoring systems, and a PC-based user interface.
  - Managed shipping and receiving, back-office systems, construction projects, and continuing maintenance.

## REFEREED PUBLICATIONS

---

- Heather J. Goldsby, David B. Knoester, Jeff Clune, Philip K. McKinley, and Charles Ofria. “The Evolution of Division of Labor.” Proceedings of the European Conference on Artificial Life (ECAL), September 2009.
- David B. Knoester and Philip K. McKinley. “Evolution of Probabilistic Consensus in Digital Organisms.” Proceedings of the IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO), September 2009.
- David B. Knoester, Andres J. Ramirez, Philip K. McKinley, and Betty H.C. Cheng. “Evolution of Robust Data Distribution Among Digital Organisms.” Proceedings of the Genetic and Evolutionary Computation Conference (GECCO), July 2009. **Nominated for best paper award, artificial life track.**
- Andres J. Ramirez, David B. Knoester, Betty H.C. Cheng, Philip K. McKinley. “Applying Genetic Algorithms to Decision Making in Autonomic Computing Systems.” Proceedings of the IEEE International Conference on Autonomic Computing (ICAC), June 2009. **Received best student paper award.**
- David B. Knoester, Philip K. McKinley. “Cooperative Network Construction Using Digital Germlines.” Proceedings of the Genetic and Evolutionary Computation Conference (GECCO), July 2008.
- Heather J. Goldsby, Betty H. C. Cheng, Philip K. McKinley, David B. Knoester, and Charles Ofria. “Digital Evolution of Behavioral Models for Autonomic Systems.” Proceedings of the IEEE International Conference on Autonomic Computing (ICAC), June 2008. **Received best student paper award.**
- Philip K. McKinley, Betty H. C. Cheng, Charles Ofria, David Knoester, Benjamin Beckmann, and Heather Goldsby. “Harnessing Digital Evolution.” IEEE Computer, 41(1), January 2008.
- David B. Knoester, Philip K. McKinley, Benjamin Beckmann, and Charles Ofria. “Directed Evolution of Communication and Cooperation in Digital Organisms.” Proceedings of the European Conference on Artificial Life (ECAL), September 2007.

- David B. Knoester, Philip K. McKinley, and Charles Ofria. “Using Group Selection to Evolve Leadership in Populations of Self-Replicating Digital Organisms.” Proceedings of the Genetic and Evolutionary Computation Conference (GECCO), July 2007.
- Benjamin Beckmann, Philip K. McKinley, David B. Knoester, and Charles Ofria. “Evolution of Cooperative Information Gathering in Self-Replicating Digital Organisms.” Proceedings of the IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO), July 2007.
- Heather J. Goldsby, David B. Knoester, Betty H. C. Cheng, Philip K. McKinley, and Charles Ofria. “Digitally Evolving Models for Dynamically Adaptive Systems.” Proceedings of the ICSE Workshop on Software Engineering for Adaptive and Self-Managing Systems (SEAMS), May 2007.

---

## REFEREED POSTERS

- Benjamin E. Beckmann, Philip K. McKinley and David B. Knoester. “Effects of Communication Impairments on Quorum Sensing.” Proceedings of the IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO), September 2009.
- David B. Knoester and Philip K. McKinley. “Evolving Virtual Fireflies.” Proceedings of the European Conference on Artificial Life (ECAL), September 2009.

---

## PRESENTATIONS

- “Cooperative Network Construction Using Digital Germlines.” Genetic and Evolutionary Computation Conference (GECCO), July 2008.
- “Using Group Selection to Evolve Leadership in Populations of Self-Replicating Digital Organisms.” Genetic and Evolutionary Computation Conference (GECCO), July 2007.

---

## GRANT PARTICIPATION

- NSF: EIA-0000433, EIA-0130724, CDA-9700732, CCR-9901017, ITR-0313142, and CCF-0523449.
- Department of the Navy, Office of Naval Research: N00014-01-1-0744.
- Industry partners: Eaton Corporation and Siemens Corporate Research.
- Michigan State University Quality Fund.

---

## TEACHING EXPERIENCE

- “Using Avida to Evolve Distributed Problem Solvers.” Guest lecture, MSU CSE 891, April 2009.
- Teaching assistant for undergraduate-level introductory databases, operating systems, and networking courses; three semesters, August 2002–December 2003.

---

## SERVICE ACTIVITIES

### Reviewing:

- European Conference on Artificial Life (ECAL), 2009.
- European Symposium on Algorithms (ESA), 2007.
- Middleware, 2006.
- International Conference on Distributed Computing Systems (ICDCS), 2006;
- Distributed Objects, Middleware, and Applications (DOA), 2005.
- Future Trends of Distributed Computing Systems (FTDCS), 2004.
- Pervasive Computing and Communication (PerCom), 2004.

---

## MEMBERSHIPS

- DevoLab: The Digital Evolution Laboratory at Michigan State University.
- SENS: The Software Engineering and Network Systems Laboratory at Michigan State University.

- HAS: The Center for High-Assurance Computing Systems at Michigan State University.
- Student member of IEEE, ACM, and SIGEvo.

## SKILLS

---

- Professional experience with identity management challenges, including identity issuance and vetting, authorization, authentication, public key infrastructure, and federated identity (via Shibboleth).
- Professional system administration experience with Mac OS X, Linux, and Solaris, including applications such as Apache, Glassfish (J2EE application server), MIT Kerberos, MySQL, and OpenDS.
- Professional development experience with C, C++, Java (J2SE and J2EE), web services, Python, and Perl. Experience with C#, L<sup>A</sup>T<sub>E</sub>X, HTML, XML, SQL, and JavaScript.
- Professional experience with software development methods and tools, including MatLab (inc. Simulink), I-Logix Rhapsody, UML, XCode, Eclipse, NetBeans, Visual Studio, and the GNU autotools.

References available upon request.