

DR. DAVID M. BRYSON

Qualifications Summary

- Ten years of professional software engineering experience
- Skilled at developing algorithms, APIs, and architectures for complex software systems
- Expert knowledge of performance optimization, debugging, compilers, and machine learning

Education

PhD, Computer Science	August 2012	Michigan State University, East Lansing, MI
BS, Computer Engineering	May 2004	Michigan State University, East Lansing, MI

Professional Experience

Senior Software Engineer – Digital Evolution Laboratory, MSU – 2004 - Present

- Led all software development of Avida (C++), a major open-source research platform utilized in more than 400 science and engineering publications and downloaded 55,000+ times
- Managed developers, version control systems, external contributions, releases, and infrastructure
- Optimized performance (improvement of more than 10x) with improved algorithms, data structures, code organization, and speculative execution
- Substantially enhanced robustness and cross-platform consistency, implemented regression testing
- Designed and implemented modular, extensible APIs and tools for multithreaded analysis, systematics, virtual environments, and cognitive control architectures
- Sole engineer of Apto, the cross-platform C++ tools and template library foundation of Avida
- Re-architected Avida's core into an API for directly hosting Avida-ED's education-focused GUI
- Developed the currently deployed Objective-C++/Cocoa version of Avida-ED
- Managed the development of Avida-ED for Windows
- Designed curriculum and taught MSU C.S.E Dept. "CSE450: Translation of Programming Languages" covering compiler design and construction, language design, and large scale C++
- Designed a custom, parallelized implementation of Fisher's Exact for R x C contingency tables

Digital Evolution Research Specialist – BEACON Center for the Study of Evolution in Action - An NSF Science & Technology Center, Michigan State University, East Lansing, MI – 2012 - Present

- Engineered instruction set architectures for linear genetic programs
- Developed 'bio-informed' control algorithms for intelligent, flexible autonomous robot navigation
- Authored 6 scientific publications in computer science, artificial life, biology, and evolution
- Managed a 320 core (40 node) high performance computing cluster (Linux)
- Designed and deployed an Arduino based robotics test platform and associated control software
- Produced numerous data processing, analysis, and visualization pipelines (Python, Matlab, Perl)
- Planned and organized center-wide data management
- Organized workshops and presented guest lectures teaching digital evolution

Information Technologist I – BEACON Center, MSU – 2010 - 2012

- Managed all center-wide cyberinfrastructure (web, database, email, storage)
- Built the BEACON intranet web-app for coordination, reporting, and budget planning

Embedded Software Consultant – Gentex Corporation, Zeeland, MI – 2004 - 2006

- Sole engineer of a C-based UI and control system for a Bluetooth handsfree system

Information Technology Professional – Libraries, MSU – 2002 - 2010

- Built database web-apps for timecard, payroll, budgeting, project management, cataloging
- Designed and implemented virtualization clusters – servers & desktops
- Built and managed two SANs, each with more than 100 TB online storage
- Implemented a custom SSH suite for increased throughput over high-bandwidth, high-latency

Student Mentoring

- Mentored, trained, and advised three undergraduate students performing research and software development projects
- Principal investigator and advisor of graduate student research projects

Most Recent Grant Awards

BEACON Center for the Study of Evolution in Action: **\$90,785** (2013) BR415 ‘Variability selection, ecological dynamics, and the evolution of adaptive complexity’ • **\$92,107** (2013) BR335 ‘Strategic Planning and Implementation of Responsible Data Management’ (PI) • **\$59,117** (2012) BR179 ‘Making the Avida Software more accessible to researchers.’ (co-PI) • **\$52,141** (2011) BR75 ‘Avida-ED Infrastructure Maintenance and Development’ (engineer)
Pending (NSF): **\$987,761** ‘BCSP: RI: Medium: Evolved Intelligent Behaviors – From Evolutionary Origins to Robotic Deployment’ (co-PI)

Selected Publications

Understanding Evolutionary Potential in Virtual CPU Instruction Set Architectures

Bryson DM and Ofria C (2013).

PLoS ONE 8(12): e83242.

doi:10.1371/journal.pone.0083242

Digital Evolution Exhibits Surprising Robustness to Poor Design Decisions

Bryson DM and Ofria C.

In *Artificial Life 13: Proceedings of the 13th International Conference on the Simulation and Synthesis of Living Systems* by Adami C, **Bryson DM**, Ofria C, and Pennock RT (editors), July 2012, East Lansing, MI, pages 19-26. MIT Press, Cambridge, MA.

doi:10.7551/978-0-262-31050-5-ch003

Professional Activities

- MSU Institute for Cyber-Enabled Research Domain Liaison for HPC resources
- Program Committee – International Conference on Artificial Life (ALIFE)
- Technology Chair, Thirteenth International Conference on Artificial Life (July 2012)
- Invited Participant, NSF BIO Centers Cyberinfrastructure Workshop (2012, 2013)