

CHRISTOPHER CHESS ELLSWORTH

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EDUCATION

Appalachian State University (University of North Carolina), Boone, North Carolina
Master of Science in Computer Science 2007
Thesis: *"Simulation-Based Evolution of Neural Controllers for Embodied Autonomous Agents"*

Appalachian State University (University of North Carolina), Boone, North Carolina
Bachelor of Science in Computer Science 2003
Minor: Physics and Astronomy

ENGINEERING EXPERIENCE

Observe-DOME Laboratories, Inc., Jackson, MS
Embedded Systems Design and Software Development Consultant 2005 – 2007
Designed industrial strength embedded observatory dome automation system for manufacture by Observe-DOME Labs. Implemented PC-based end-user software (in .NET) for wireless interaction with the automation system. Embedded work included the design of custom circuit boards, microcontroller programming, RF integration and wireless protocol design, control of large AC and DC motors, and integration of optical shaft encoders and limit switches. The system is currently manufactured in bulk by Observe-DOME Labs as part of their product line.

Broad Street Advisors, LLC, New York, NY
Business Application Consultant 2005
Developed Windows application for the generation of Excel spreadsheets containing tabulated data from an Internet Information Server web traffic database. Used .NET and Microsoft Office software components to work directly with Excel spreadsheets. Implemented relational logic using SQL. Deployed application using Microsoft ClickOnce smart client framework.

Dark Sky Observatory, Boone, NC
Control Systems Developer 2001 – 2004
Developed Windows-based control solutions for observatory instruments. Implemented software for the control of an RS232-based filter wheel device. Developed software library for reading from an astronomical photometer. Developed a telescope control system using National Instruments compatible digital I/O, counter/timer, and quadrature encoder boards. This interfaced with the telescope's stepper motors, optical shaft encoders, and manual control paddle.

RESEARCH EXPERIENCE

"Simulation-Based Evolution of Neural Controllers for Embodied Autonomous Agents"
Master's Thesis – Evolutionary Robotics 2004 – 2007
Designed and built microcontroller-based mobile robot for experimentation and analysis of autonomous behaviors. Implemented software frameworks for the simulation and evolution of embodied agents that could be wirelessly transferred to the mobile robot. Agents based on recurrent neural networks were evolved in simulation and then downloaded to the mobile robot for final evaluation. The result of this research was the successful evolution of non-trivial behaviors that performed almost identically in the physical robot as they did in simulation.

This work received the following awards:

- Appalachian State University 2007-2008 Outstanding Thesis - Science and Technology Award
- Sigma Xi Appalachian State University 2007-2008 Graduate Student Research Award

CONTINUED

RESEARCH EXPERIENCE (CONTINUED)

A.I. & Bioinformatics Independent Study – Swarm Intelligence / Artificial Evolution 2004
 Researched and developed methods of solving problems using concepts of swarm intelligence and artificial evolution. Implemented agent-based simulation of ant swarm intelligence to find shortest path between nodes in a graph. Developed system for evolving neural-based bipedal locomotion in a simulated 3D environment.

TEACHING RELEATED EXPERIENCE

Department of Computer Science, Appalachian State University, Boone, NC
Pedagogy Consultant 2002 – 2006

Developed course materials for all levels of the undergraduate and graduate curriculum (see *“Using podcasts and tablet PCs in computer science”*, *“Teaching OO methodology in a project-driven CS2 course”*, and *“Beyond objects-first: a project-driven CS2 course”* publications). Worked with teachers to integrate new technologies into existing curriculum. Designed projects and wrote documentation in size from weekly labs to semester long projects. Gave many class and lab lectures regarding projects and specific technologies.

Computer Science, Engineering, and Mathematics Scholarship (CSEMS) Seminar
Mentor 2003 – 2006
 Mentored groups of computer science and math undergraduate students. Designed exercises and semester projects for students to complete as a team. Helped faculty to introduce embedded systems development into the class curriculum.

RESEARCH GRANTS

“Inter-University Software Engineering Education” 2004 – 2006

National Science Foundation, CCLI-EMD, Grant # 0341506, Grant amount: \$309,129
 Principal Investigator: James B. Fenwick, Jr. Co-Investigators: Barry L. Kurtz, Xiaoping Jia, Adam Steele, Xiaohong Yuan
 Developed class projects and teaching materials (tutorials, lectures, and screencasts) for senior and graduate level software engineering classes to enable inter-university collaboration between students (see *“Inter-University software engineering using web services”* publication). Developed large, multi-semester projects based on n-Tier and Service-Oriented architectures with database back ends. Application tiers were separated by Web Services to enable students at different universities to develop a single application. Gave lectures at participating universities regarding software engineering principles and project technologies.

“Intra-Curriculum Software Engineering Education” 2002 – 2003

National Science Foundation, CCLI-EMD, Grant # 0127439, Grant amount: \$74,919
 Principal Investigator: James B. Fenwick, Jr. Co-Investigator: Barry L. Kurtz
 Developed web-based software for automatically evaluating student programming skills (see *“The QUIVER System”* and *“Software Tools to Support Software Engineering Education”* publications). Worked with teachers to develop programming quizzes and run quiz sessions.

PUBLICATIONS AND PAPERS

“Using podcasts and tablet PCs in computer science”, (refereed)
 with Barry L. Kurtz, and James B. Fenwick Jr.
 ACM Southeast Regional Conference, Winston-Salem, North Carolina, USA 2007

“Inter-University software engineering using web services”, (refereed)
 with Barry L. Kurtz, James B. Fenwick Jr., Xiaohong Yuan, Adam Steele, and Xiaoping Jia
 Proceedings of the 38th SIGCSE Technical Symposium on Computer Science Education, Covington, Kentucky, USA 2007

PUBLICATIONS AND PAPERS (CONTINUED)

- “Beyond objects-first: a project-driven CS2 course”***, (refereed)
with E. Frank Barry, Barry L. Kurtz, and James T. Wilkes
ACM Southeast Regional Conference, Melbourne, FL, USA 2006
- “A Data Acquisition Program for an Astronomical Photometer”***, (poster session)
with N. A. Bergey, R. L. Hawkins, and D. B. Caton
207th Meeting of the American Astronomical Society, Washington, DC, USA 2006
- “Teaching OO methodology in a project-driven CS2 course”***, (refereed)
with E. Frank Barry, Barry L. Kurtz, and James T. Wilkes
Conference on Object Oriented Programming Systems Languages and Applications (OOPSLA), San Diego, CA, USA 2005
- “Astronomical Computing & .NET at ASU”***, (presentation)
with D. B. Caton
Microsoft Developers Network (MSDN) Code Camp, Charlotte, NC, USA 2005
- “The QUIVER System”***, (refereed)
with James B. Fenwick and Barry L. Kurtz
SIGCSE Technical Symposium on Computer Science Education, Norfolk, VA, USA 2004
- “Software Tools to Support Software Engineering Education”***, (refereed)
with James B. Fenwick, Barry L. Kurtz, Chetan B. Krishna, Jackie Holland
IASTED Conference on Computers and Advanced Technology in Education, Kauai, Hawaii, USA 2004
- “The Quiver System: A quizzing system for the evaluation of student programming skills”***, (presentation)
Seventh Annual Celebration of Student Research and Creative Endeavors, Boone, NC, USA 2004
- “The RouteSeeker Project: Finding shortest paths from GIS datasets”***, (presentation)
Seventh Annual Celebration of Student Research and Creative Endeavors, Boone, NC, USA 2004
- “Finding Shortest Paths in Large Data Sets”***, (presentation)
Ninth North Carolina Mini-Conference on Graph Theory and Computing, Boone, NC, USA 2004
- “The CMP Compiler Project”***, (presentation)
Fifth Annual Celebration of Student Research and Creative Endeavors, Boone, NC, USA 2002
- “Dark Sky Observatory 18-inch Telescope Control System”***, (poster session)
Fifth Annual Celebration of Student Research and Creative Endeavors, Boone, NC, USA 2002

AWARDS

- Computer Science, Engineering, and Mathematics Scholarship (CSEMS)
\$3,125 yearly 2003 – 2006

MEMBERSHIPS

- Association for Computer Machinery (ACM)
Institute of Electrical and Electronics Engineers (IEEE)
Sigma Xi Scientific Research Society

ATHLETICS

- Ranked 7th overall U.S. IMCO class sailor (IMCO is an Olympic sailing class) 1995
Silver Medal (Juniors class) at IYRU IMCO World Championships in Gimli, Manitoba 1994

SKILLS

Language: English native

Teaching / Demonstration

- Articulate and confident at public speaking; have given many lectures in front of large audiences
- Developed class projects and materials for a wide variety of media (print, web, podcast, screencast)

Engineering Methodology

- Start with structured requirements analysis
- Use iterative design/implementation/test cycles and only add what you need when you need it
- Be flexible to change (agility, refer to Kent Beck's work)
- Simplify everything to its simplest state and dedicate iterations to refactor working subsystems
- "Customer" communication is critical during all project lifecycle phases
- Build modular components that may be independently tested whenever possible (OO concepts apply to EE)
- Test, test, test (unit, subsystem integration, acceptance)

Software Engineering

- Requirements analysis, system modeling, and documentation with UML 2.0 and other conventions
- Software architecture and Object-Oriented (OO) analysis and design
- Fluent in C, C++, Java, .NET (VB, C#, ASP), JVM spec., assembly, XML/XSLT, XHTML/CSS, JavaScript, ...
- Proficient using an IDE (Visual Studio 2005, Eclipse, Visual Age) and source code repository (SourceSafe, CVS, Subversion)
- Experience with Web Services, web application development (.NET and J2EE, AJAX), and n-Tier and Service-Oriented architectures
- Experience with neural networks, artificial evolution, simulated annealing, finite element analysis, and simulation implementation
- Two-years experience with compiler implementation (OO languages -> Java byte-code)
- SQL database development (Microsoft SQL Server, MySQL), also Visual Studio database tools
- Developing Microsoft Office applications

Electrical Engineering

- Experienced with embedded and PC-based system design (including industrial and RoHS requirements)
- Microcontroller programming and JTAG programming/debugging interface
- Proficient at circuit board design (using professional CAD tools for schematic capture, SPICE simulation, and PCB layout) and having PCBs manufactured
- Experienced with wireless RF integration, serial communications (including MAX232), counter/timers (9513, microcontroller-based, etc), motor control (stepper, servo, relay logic), and sensor integration (switches, encoders, range finders, optical emitters/detectors)
- Experienced with National Instruments compatible PCI boards (DIO-24, QUAD-04, CTR-05)
- Soldering (can hand solder small surface mount components) and test tools (multimeter, oscilloscope, etc.)

Mechanical Engineering

- Experience using CAD tools to make mechanical drawings for various parts
- Experience working with a machinist to design and have parts built

Systems, Servers, and Software

- Using Windows XP and Vista workstations and managing NT, 2000 and 2003 servers (Internet Information Server, SharePoint, etc.)
- Unix/Linux as a workstation or server (shell scripting, Apache web server, Tomcat web container)
- Microsoft Office 2007, Outlook, Visio, SharePoint Designer (formerly FrontPage), Adobe CS2 suite

DESIGN PORTFOLIO

Available on request