

# 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.

## ATHLETICS

- Ranked 7<sup>th</sup> 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 (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, Eclipse, Visual Age) and 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 SMT 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 Windows Server (IIS, 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