

Ben Axelrod

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Summary: Computer scientist and mechanical engineer with a lifelong interest in robotics, automation, and intelligent systems; with diverse and relevant experience in simulation, software engineering, embedded systems, CAD, and manufacturing.

Experience: **iRobot Corporation** Bedford, MA

Research Scientist: June 2010 – Present

Autonomous grasping and manipulation, haptic grasping, soft body simulation, Gumstix, AVR XMEGA firmware, human-robot-interaction.

CoroWare, Inc. Redmond, WA (telecommute from Atlanta, GA)

Robotics Software Engineer: August 2007 – May 2010

Created a realistic human avatar for a 3D visualizer / physics simulator. Fully articulated: 63 segments, 54 joints, 93 DOF. Includes walking, rotation, and side-step gaits, inverse kinematics, and lifelike mesh files. High level behaviors include hand, body, and arm gestures, gaze tracking, walking, and grasping.

Ported a highly customized GUI to Linux using Qt for a mainstream video conferencing application.

Project lead using Concurrency and Coordination Runtime (CCR) & Decentralized Software Services (DSS) to parallelize client's sequential legacy code.

Part of a team which created a 3D visualizer / physical simulator tool using OpenGL in C++ for an international Tier 1 client. Highly flexible, it supports user plugins for objects and engines, loose binding, and serialization. Integrates with customer's build system. Responsible for plug-in infrastructure, serialization, inter-thread communication, GUI, graphics, VRML parser, and much of the internals. Required multiple on-site visits to customer in Europe.

Part of a team which created a data visualization and analysis tool in Python. Includes eight plot types that interact with each other through a back-end database.

Responsible for the GUI front-end of system.

Created a simulated CoroBot for the Microsoft Robotics Developer Studio (MRDS)

PhysX simulator. Included 8 entities, 9 services, and 20 contracts. Interfaced with a license manager. I now administer this open source project on SourceForge.

Wrote an automatic MRDS service code generator for .NET Remoting clients. Wrote

automatic WSDL and XSLT generators for MRDS services. Tested on BarrettHand.

Wrote tools to manipulate .OBJ files and automate import to MRDS.

Microsoft Redmond, WA

Intern Software Developer: May – July 2006

Wrote the majority of the Lego NXT, fischertechnik, and text-to-speech services for MRDS. Also contributed heavily to the generic robot data contracts.

Iguana Robotics, Inc. Champaign, IL

Mechanical Engineer / Robotacist: May 2003 – June 2004

Intern Mechanical Engineer: June – August 2002

3D CAD mechanical design for two ¼ scale biped robots and one quadruped. Designed and implemented robot power / sensor systems. Stereo lithography, assistive devices. PIC programming for embedded devices. Educational electronics, PCB design and fabrication.

Education: **Georgia Institute of Technology, College of Computing** Atlanta, GA
MS in Computer Science. May 2007. GPA: 3.72
Specialization: robotics and intelligent systems. Research focus: mobile robots, multi-agent systems, rescue robots, educational robots, and distributed sensor networks.
Master's project: team leader for RoboCupRescue, designed, machined, and competed with a 300 pound, remotely operated, treaded robot.

University of Illinois at Urbana-Champaign Urbana, IL
Non-degree-seeking CS undergraduate student in preparation for graduate work.
September 2004 – May 2005. GPA: 3.51

Syracuse University, L.C. Smith College of Engineering Syracuse, NY
BS in Mechanical Engineering. May 2003. GPA: 3.81 (Summa Cum Laude)
Strong mathematical / theoretical background. Senior design project: team leader, created an award-winning 8-legged hobby servo driven robot

Publications: J. Beal, H. Mostafa, A. Mozeika, B. Axelrod, A. Adler, G. Markiewicz, K. Usbeck. **A Manifold Operator Representation for Adaptive Design**, *Genetic and Evolutionary Computation Conference (GECCO) 2012*, Pages 529-536, July 2012.
B. Axelrod, W. H. Huang. **Improving hand-eye calibration for robotic grasping and manipulation**, *IEEE Technologies for Practical Robot Applications (TePRA) 2012*, Pages 121-126, April 2012.
B. Axelrod. **The Next Big Thing – Service Oriented Architectures**. *Robot Magazine*, September/October, issue 24, 2010, pages 44 – 48.
C. Anderson, B. Axelrod, et al. **Mobile Manipulation – A Challenge in Integration**. *SPIE Defense & Security*, 2008.

Strengths: Converting requirements into implementations, excellent teamwork skills, able to assume both leadership and supportive roles, patient, meticulous, good attention to detail, hard working, fast learner, hands on.

Platforms: Windows, Linux (Ubuntu, Debian), Cygwin

Applications: Visual Studio, Emacs, Eclipse, MS Office, CVS, SVN, make, gdb, SolidWorks, Alibre, VariCAD, AutoCAD, Mastercam, Eagle, Matlab, Maple, Blender, Weka

Languages: C, C++, C#, Python, Java, HTML, CSS, XML, XSLT, PBASIC, Bash script, DOS batch script, some Scheme and Assembly

Libraries: OpenCV, Aware2, OpenSceneGraph, PhysX, .NET, STL, Qt, Xlib, OpenGL, CCR, DSS, Doxygen, WxPython, Matplotlib, Graphviz

Advanced Elective Coursework: Embedded Systems, Real Time Operating Systems, AI, Machine Learning, Genetic Algorithms, Distributed Systems, Computer Vision, Dynamics & Control, Robotics, Finite Element Analysis, Computational Fluid Dynamics

Robot Hardware: 510 Packbot, CoroBot, Segway RMP, KUKA KR5 sixx, BH8 BarrettHand, Schunk PG-70 parallel gripper, PIC, Atmel, Basic Stamp, Scribbler, IPRE Fluke, Lego Mindstorms, fischertechnik, GNATs, Sony Aibo, Johuco Phoenix II, SwissRanger 3000, SICK LMS 291, ultrasonic range finders, IR range finders

Honors: Co-Vice President of Atlanta Hobby Robotics Club January 2009 – May 2010
 3 page profile in book: “Programming Microsoft® Robotics Studio”
 by Sara Morgan. ISBN-10: 0735624321. Pages 81 – 83. 2008
 IPRE Research Fellow December 2006
 ASME George Farnell Senior Design Award May 2003
 Bernard Wood Achievement Award in Mechanical Engineering May 2003
 Harry Blatt Memorial Scholarship in Applied Science Spring 2002
 Kin Nee Tong Award for Outstanding Academic Achievement of a
 First Year Engineering Student May 2000
 Lego Mindstorms Novice Hall of Fame Jul. 1999 and Dec. 2000

Interests: Go, travel, sculpture, claymation & video production, web design, karate (black belt), in-line skating, rock climbing, and scuba diving.