Andrew Begel

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Research Interests: Programming Languages, Human Computer Interaction, Software Engineering, Speech Recognition, Computer Science Education

Education:

University of California at Berkeley

Candidate for a Ph.D. in Computer Science *8/97—present*
Dissertation: *Spoken Language Support for Software Development*
Advisor: Prof. Susan L. Graham

Massachusetts Institute of Technology

Master of Engineering in Electrical Engineering and Computer Science *6/96—6/97*
Master's Thesis*:* *Bongo: a Kids' Programming Environment for Creating Video Games on the Web*
Advisor: Prof. Mitchel Resnick

Bachelor of Science in Computer Science and Engineering *8/92—6/96*
Advanced Undergraduate Project: *LogoBlocks: A Graphical Programming Language for Interacting with the World*
Advisor: Prof. Mitchel Resnick

Employment:

UC Berkeley: Department of Computer Science *12/97—present*
Advisor: Prof. Susan Graham

- **Dissertation:** "Spoken Language Support for Software Development" Enabling programmers (especially those impaired by RSI) to use voice recognition for composing, editing and navigating program code. [1, 2]
- Developed a number of innovative supporting technologies for lexing, parsing and semantic analysis of ambiguous programming languages and modularly composing English-like command languages with programming languages. [3, 5]
- Studied programmers (novices and experts) to see how they verbalize code.
- Designed and implemented cluster-of-SMP-based communications layer for Split-C and Titanium parallel programming languages. Analyzed performance characteristics and identified a design oversight in the VIA communications infrastructure API. [6]
- Designed and implemented global flow optimizations for BPF+, a packet filter compiler. Developed a predicate propagation algorithm to eliminate redundant computation in a binary decision tree. Incorporated a just-in-time assembler to further speed packet filter execution on Sparc processors. [7]
- Designed and implemented NinjaScript, a path-oriented language for programming compositions of distributed services.
- Designed and implemented a continuation-passing (CPS) transformation for Java, as well as a continuation-aware network library to efficiently support massively multithreaded Java programs.

MIT: Teacher Education Program *5/01-present*
Collaborator: Prof. Eric Klopfer

- Architected and designed a new OpenGL-based 3D version of StarLogo in a combination of C and Java. The virtual machine for StarLogo is written in C and runs up to seven times faster than the older Java version. [9, 11]
- Architected and designed StarLogoBlocks, a new graphical programming language for creating complex systems models. The programming environment incorporates dynamic feedback to user actions to indicate program correctness and proper semantics.
- Developed and maintained a Java version of StarLogo. [13]
- Helped run several Adventures in Modeling workshops in Boston and Santa Fe. Each workshop taught secondary school children and secondary school teachers about complex systems, computer modeling, and experimental science using StarLogo. Secondary school teachers also learned how to incorporate complex systems modeling into their curricula.

Xerox PARC: Computer Science Laboratory *6/98—8/98*
Supervisor: Mike Spreitzer

- Designed a new type system for HTTP-NG to support independent, incremental development of persistent, distributed object-oriented programs. Type system supported an efficient RPC protocol negotiation to allow different client and server versions of a system to interoperate with maximum permissible functionality. [8]

MIT Media Laboratory: Epistemology and Learning Group *6/93—5/01*
Advisor: Prof. Mitchel Resnick

- Designed and implemented standalone kiosks illustrating principles of complex systems (traffic, social segregation, and pile-making) for the Virtual Fishtank exhibit at the Boston Computer Museum (subsequently merged with the Boston Museum of Science).
- **Master's Thesis:** "Bongo: A Kids' Programming Environment for Creating Video Games on the Web." Involved networking, GUI, language design and implementation in Bongo and Java on PC, Mac and UNIX platforms.
- Designed and implemented a web page construction kit for children so they can explore the possibilities of using Java in an easy and fun way.
- Designed new dynamic language called Bongo combining features of Logo, JavaScript and Scheme. Implemented this language in Java.
- Designed and implemented Logo interpreter in the Java language. Wrote compiler from Logo to Java VM.
- **Bachelor's Thesis:** "LogoBlocks: A Graphical Programming Language for Interacting with the World." Implemented a graphical language and compiler to control a programmable LEGO brick computer.
- Designed language for StarLogo (a parallel version of Logo used on a Connection Machine 2) and created simulations of self-ordering systems and models of biological systems.
- Created MIMD Macintosh (68K and PPC) version of StarLogo. [13]
- Architected, designed and implemented Java version of StarLogo. [13]
- Implemented software that allows for user-directed evolution of images using genetic programming.

Programming and Systems Publications:

1. Andrew Begel and Susan L. Graham. *Spoken Programs*. To appear in the *IEEE Symposium on Visual Languages and Human-Centric Computing*, Dallas, Texas, September, 2005.

2. Andrew Begel. *Programming by Voice: A Domain-specific Application of Speech Recognition*. In *AVIOS Speech Technology Symposium – SpeechTek West*. February 2005.

3. Andrew Begel, Marat Boshernitsan, and Susan L. Graham. *Transformational Generation of Language Plug-ins in the Harmonia Framework*. Technical Report CSD-05-1370, University of California, Berkeley, January 2005.

4. Michael Toomim, Andrew Begel and Susan L. Graham. *Managing Duplicated Code with Linked Editing*. In the *IEEE Symposium on Visual Languages and Human-Centric Computing*, Rome, Italy, September 2004

5. Andrew Begel and Susan L. Graham. *Language Analysis and Tools for Ambiguous Input Streams*. In the *Fourth Workshop on Language Descriptions, Tools and Applications (LDTA)*, Barcelona, Spain, April 2004.

6. Andrew Begel, Philip Buonadonna, David Culler, David Gay. *An Analysis of VI Architecture Primitives in Support of Parallel and Distributed Communication*. Concurrency and Computation: Practice and Experience (14)1. January 2002.

7. Andrew Begel, Steven McCanne, Susan Graham. *BPF+: Exploiting Global Data-flow Optimization in a Generalized Packet Filter Architecture*. In Proceedings of ACM SIGCOMM '99.

8. Mike Spreitzer and Andrew Begel. *More Flexible Data Types*. In Proceedings of The Eighth IEEE International Workshops on Enabling Technologies: Infrastructure for Collaborative Enterprises (WET-ICE'99).

Education Publications:

9. Andrew Begel, Eric Klopfer. *StarLogo TNG. An Introduction to Game Development*. In the Journal of E-Learning. *In Press*.

10. Andrew Begel, Daniel D. Garcia, Steven A. Wolfman. *Kinesthetic Learning in the Classroom*. Held at the Technical Symposium on Computer Science Education (SIGCSE) 2005. Workshop.

11. Eric Klopfer, Mitchel Resnick, John Maloney, Brian Silverman, Andrea diSessa, Andrew Begel and Chris Hancock. *Programming Revisited - The Educational Value of Computer Programming*. In the International Conference on Learning Sciences (ICLS). Los Angeles, California, June 2004. Panel.

12. Andrew Begel, Daniel D. Garcia, Steven A. Wolfman. *Kinesthetic Learning in the Classroom*. In Proceedings of the Technical Symposium on Computer Science Education (SIGCSE) 2004. Special Session.

13. Eric Klopfer and Andrew Begel. *StarLogo in the Classroom and Under the Hood*. Kybernetes, (32)1/2. February 2003.

Paper Talks:

Programming by Voice: A Domain-Specific Application of Speech Recognition *2/22/05*
AVIOS at SpeechTek West Paper Presentation — San Francisco, CA

Language Analysis and Tools for Ambiguous Input Streams *4/3/04*
Language Descriptions, Tools and Analysis Workshop Paper Presentation — Barcelona, Spain

BPF+: Exploiting Global Data-Flow Optimization in a Generalized Packet Filter Architecture *9/2/99*
ACM SIGCOMM Conference Paper Presentation — Cambridge, MA

Panels:

Programming Revisited - The Educational Value of Computer Programming *6/25/04*
International Conference on Learning Sciences Panel — Los Angeles, CA

Workshops:

Kinesthetic Learning in the Classroom *2/25/05*
Technical Symposium on Computer Science Education Workshop — St. Louis, MO

Kinesthetic Learning in the Classroom *3/5/04*
Technical Symposium on Computer Science Education Special Session — Norfolk, VA

Invited Talks:

Kinesthetic Learning in the Classroom *2/26/05*
ISTE Computer Science and Information Technology Symposium — St. Louis, MO

StarLogo: Building a Modeling Construction Kit for Kids *10/16/99*
Agent Simulation: Applications, Models and Tools Conference — Chicago, IL

StarLogo: Massive Parallelism for the Masses *3/20/98*
Workshop on GIS Systems and Modeling Santa Fe, NM

Doctoral Consortia:

Spoken Language Support for Software Development *9/28/04*
Visual Languages/Human-Centric Computing Graduate Student Consortium Rome, Italy

Spoken Language Support for Software Development *2/27/02*
Technical Symposium on Computer Science Education Doctoral Consortium Covington, KY

Professional Activities:

Conference Reviews: POPL, SIGCOMM, UIST, SC
Journal Reviews: SPE, ACM CCR, IEEE TPDS, COMNET, JFP
Association of Computing Machinery, Member
Computer Science Graduate Student Association
Orientation Committee 1999-2000, Social Committee 2000

Software Published:

Harmonia-Mode for XEmacs - *http://harmonia.cs.berkeley.edu*
MacStarLogo, StarLogo – *http://education.mit.edu/starlogo*
LogoBlocks – *http://cricket.media.mit.edu*
Bongo, YoYo – *http://gig.media.mit.edu/projects/yoyo*

Classes Taught:

Teaching Techniques for Computer Science *1/01—4/01*
Instructors: Lecturer Daniel D. Garcia and Andrew Begel
UC Berkeley: Department of Computer Science
- Co-designed and co-taught course with Garcia.
- Received grant from GSI Teaching and Resource Center to revise and redesign course to teach teaching assistants how to be great teaching assistants.

Introduction to Compilers *1/00—5/00*
Instructors: Professor Alex Aiken and Professor George Necula
UC Berkeley: Department of Computer Science
- Graduate Student Instructor

Introduction to Computer Science *8/97—12/97*
Instructor: Lecturer Brian Harvey
UC Berkeley: Department of Computer Science
- Graduate Student Instructor

Teaching Seminars Taught:

TAing EECS Courses *1/14/05*
Spring 2005 Orientation and Teaching Conference for Graduate Student Instructors Berkeley, CA

What Makes a Great TA *9/13/04*
Teaching Techniques for Computer Science Talk Berkeley, CA

TAing EECS Courses *8/27/04*
Fall 2004 Orientation and Teaching Conference for Graduate Student Instructors Berkeley, CA

How to Be a Great TA *2/8/02*
Teaching Techniques for Computer Science Talk Berkeley, CA

TAing Quantitative Science Courses *1/17/02*
Spring 2002 Orientation and Teaching Conference for Graduate Student Instructors Berkeley, CA

TAing EECS Courses *8/24/01*
Fall 2001 Orientation and Teaching Conference for Graduate Student Instructors Berkeley, CA

How to Be a Good TA *11/3/00*
Teaching Techniques for Computer Science Talk Berkeley, CA

TAing EECS Courses *8/25/00*
Fall 2000 Orientation and Teaching Conference for Graduate Student Instructors Berkeley, CA

How to Be a Good TA *10/22/99*
Teaching Techniques for Computer Science Talk Berkeley, CA

Awards: Demetri Angelakos Memorial Award 2005

Undergraduate Advising:

Stan Sprogis	Profiling Harmonia, Speech Recognition in Eclipse	
John Jordan	Shorthand Editing in Eclipse	
John Firebaugh	Blender Parser Generator Bootstrapping	
Tom Wang	Blender Parser Generator v2, VisGraph Type Checking	
Tim Lee	OpenGL-based Parse Graph Viewer	
Jeremy Schiff	Windows port of Harmonia, Blender Code Gen Validation	
Michael Toomim	Harmonia-mode, CodeLink	
Dmitriy Ayrapetov	XML Parsing	
Sean Howarth	Control Flow Analysis	
Erwin Vedar	VisGraph Name Resolution	(now at UCSD in CS Grad School)
Brian Chin	Blender Parser Generator	(now at UCLA in CS Grad School)
Duy Lam	Cobol Parsing	(went to UCLA for a Master's in CS)
Stephen McCamant	C Parsing and Semantic Analysis	(now at MIT in CS Grad School)
John Nguyen	Control Flow Graph Generator	(now at UCLA in Mol. Bio Grad School)
Gruia Pitigoi-Aron	Pretty Printing	(now at UCLA in CS Grad School)
Alan Shieh	XML Serialization	(now at Cornell in CS Grad School)

References:

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2. **Jennifer Mankoff**
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Carnegie Mellon University
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