

FRANKLYN ALBIN TURBAK
Curriculum Vita
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Work address: Wellesley College
Computer Science Department
106 Central Street
Wellesley, MA 02481
Phone: (781) 283-3049
FAX: (781) 283-3642
Email: fturbak@wellesley.edu
Web: <http://cs.wellesley.edu/~fturbak>

Home address: 8 Norfolk Terrace, #5
Wellesley, MA 02181
Phone: (781) 237-2624

Degrees

S.B. May 1986, Massachusetts Institute of Technology.
S.M. May 1986, Massachusetts Institute of Technology.
Ph.D. February 1994, Massachusetts Institute of Technology.

Experience

Xerox Palo Alto Research Center. Summer intern. Advisors: D. Austin Henderson, Daniel H. H. Ingalls, Tom Moran. 1982-1984, 1986.
MIT Sloan School of Management. Programmer for *Lens* project (with Kenneth Grant under the supervision of Thomas Malone). Summer 1985.
MIT Artificial Intelligence Laboratory and Laboratory for Computer Science. Research assistant in computer science. Member of the Mathematics and Computation Group (led by Harold Abelson and Gerald Jay Sussman) and the Programming Systems Research Group (led by David K. Gifford). 1987 – 1993.
NYU. Educational Technologies Laboratory. Designer and implementer for *Creatures of Habit* project (with Michael Eisenberg and Roy Pea). Summer 1988.
MIT Laboratory for Computer Science. Developed course notes for MIT's graduate programming languages course (with David K. Gifford and Jonathan Rees). Summers 1989 – 1991.
MIT EECS Department, Programming Systems Research Group. Postdoctoral Associate. 1994.
Oregon Graduate Institute, Pacific Software Research Center. Visiting Research Scientist. Summer 1999.
Wellesley College, Department of Computer Science. Assistant Professor. 1995 – present
Boston University, Computer Science Department. Research Associate. 1996 – present

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Honors and Awards

- Rensselaer Polytechnic Institute Science Medal, 1979.
- ITT Rayonier Scholarship, 1980.
- Carleton E. Tucker Award, 1986. (MIT EECS teaching award.)
- Instructorship-G Award, 1986. (Special teaching rank awarded by MIT EECS Dept. for recognition of excellence in teaching.)
- Goodwin Medal, 1990. (MIT institute-wide graduate student teaching award for “conspicuously effective teaching”.)
- Sigma Xi, 1993.
- Pinanski Prize, 2001. (Wellesley College faculty teaching award.)

Grants (External to Wellesley)

- National Science Foundation Instrumentation and Laboratory Improvement Grant DUE 9650969 (with Robbie Berg), 1996–1998. *Robot-Based Explorations in a Liberal Arts Environment*. Amount: \$7500 (+ \$7500 in matching funds from Wellesley).
- National Science Foundation Software Engineering and Languages Grant CCR-9804053, 9/1/98–8/31/01. *Predictable Deforestation: A Type-Based Approach to Eliminating Virtual Aggregates*. Amount: \$50,637.
- National Science Foundation Experimental Software Systems Grant EIA-9806747, 8/15/98–8/14/02. *Collaborative Research: Applications of Flow Types in the Efficient, Modular, and Reliable Compilation of Higher-Order Typed Languages*. Amount: \$93,626. (Part of a \$979,794 multi-institution grant with Boston College, Boston University, and Stevens Institute of Technology.)

Grants (Internal to Wellesley)

- Educational Research and Development Instructional Technology Grant (with Robbie Berg), 1995. *A Robot Design Course for Wintersession*. Amount: \$2500.
- Hughes Grant (with Robbie Berg), 1996 – 1998. Support for *Robotic Design Studio* course. Amount: \$11,000.
- Hughes Curriculum Development Grant (with Robbie Berg), 1997. *Student-Assisted Curriculum Development of a Robotic Design Studio*. Amount: \$2500.
- Faculty Awards Scholarly Activity Grant, 2000. *Student Research on Deforestation*. Amount: \$3000.
- Educational Research and Development Pedagogy Improvement Grant, 2000. *Code Warrior Development for CS111*. Amount: \$1000.
- Educational Research and Development Pedagogy Improvement Grant (with Robbie Berg), 2000. *Robot Design Studio Museum*. Amount: \$800.

Journal Papers

- Thomas Malone, Kenneth Grant, Franklyn Turbak, Stephen Brobst, and Michael Cohen. Intelligent Information-Sharing Systems. *Communications of the ACM*, May 1987.
- Franklyn Turbak, Constance Royden, Jennifer Stephan, and Jean Herbst. Teaching Recursion Before Iteration in CS1. *The Journal of Computing in Small Colleges* 14(4), May 1999.
- J. B. Wells, Allyn Dimock, Robert Muller, and Franklyn Turbak. A Calculus for Polymorphic and Polyvariant Flow Types. *Journal of Functional Programming*. Accepted. (To appear.)
- Patricia Johann and Franklyn Turbak, Lumberjack Summer Camp: A Cross-Institutional Undergraduate Research Experience in Computer Science, *Computer Science Education* 11(4), Dec. 2001. (To appear.)

Journal Papers (in submission)

- Franklyn Turbak and Robert Berg, Robotic Design Studio: Exploring the Big Ideas of Engineering in a Liberal Arts Environment. This is an expanded version of Turbak and Berg's AAAI 2001 workshop paper.

Refereed Conference Papers

- Thomas Malone, Kenneth Grant, and Franklyn Turbak. The Information Lens: An Intelligent System for Information Sharing in Organizations. In *Proceedings of the CHI'86 Human Factors in Computing Conference*. ACM, 1986.
- Roy Pea, Michael Eisenberg, and Franklyn Turbak. Creatures of Habit: A Computational System to Enhance and Illuminate the Development of Scientific Thinking. In *Tenth Annual Conference of the Cognitive Science Society*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1988.
- Franklyn Turbak. First-Class Synchronization Barriers. In *Proceedings of the International Conference on Functional Programming (ICFP '96)*. ACM, 1996.
- J. B. Wells, Allyn Dimock, Robert Muller, and Franklyn Turbak. A Typed Intermediate Language for Flow-Directed Compilation. In *7th International Joint Conference on the Theory and Practice of Software Development (TAPSOFT '97)*. Springer Verlag Lecture Notes in Computer Science, 1997.
- Allyn Dimock, Robert Muller, Franklyn Turbak, and J. B. Wells. Strongly Typed Flow-Directed Representation Transformations. In *International Conference on Functional Programming (ICFP '97)*. ACM, 1997.
- Assaf Kfoury, Harry Mairson, Franklyn Turbak, and J.B. Wells. Relating Typability and Expressiveness in Finite-Rank Intersection Type Systems. *International Conference on Functional Programming (ICFP '99)*. ACM, 1999.
- Torben Amtoft and Franklyn Turbak. Faithful Translations between Polyvariant Flows and Polymorphic Types. *Programming Languages and Systems: 9th European Symposium on Programming, ESOP 2000*. Published as *Lecture Notes in Computer Science 1782*, Gert Smolka (Ed.)

Refereed Conference Papers (continued)

- Elena Machkasova and Franklyn Turbak. A Calculus for Link-Time Compilation. *Programming Languages and Systems: 9th European Symposium on Programming, ESOP 2000*. Published as *Lecture Notes in Computer Science 1782*, Gert Smolka (Ed.)
- Allyn Dimock, Ian Westmacott, Robert Muller, Franklyn Turbak, J. B. Wells. Functioning without Closure: Type-Safe Customized Function Representations for Standard ML. To appear in *International Conference on Functional Programming (ICFP '01)*. ACM, 2001.
- Franklyn Turbak and J. B. Wells. Cycle Therapy: A Prescription for Fold and Unfold on Regular Trees. To appear in *Third International Conference on Principles and Practice of Declarative Programming*. ACM, 2001.

Refereed Workshop Papers

- Michael Eisenberg, Mitchel Resnick, and Franklyn Turbak. Understanding Procedures as Objects. In Gary M. Olson, Sylvia Sheppard, and Elliot Soloway, *Empirical Studies of Programmers: Second Workshop*. Norwood, New Jersey: Ablex, 1987.
- Allyn Dimock, Ian Westmacott, Robert Muller, Franklyn Turbak, J. B. Wells, and Jeffrey Considine. Program Representation Size in an Intermediate Language with Intersection and Union Types. *Third Workshop on Types in Compilation (TIC'2000)*, Published as *Lecture Notes in Computer Science 2071*, Robert Harper (Ed.)

Unrefereed Workshop Papers

- Franklyn Turbak, Allyn Dimock, Robert Muller, and J. B. Wells. Compiling with Polymorphic and Polyvariant Flow Types. *ACM SIGPLAN Workshop on Types in Compilation (TIC '97)*, June, 1997.
- Franklyn Turbak and Robert Berg. Robotic Design Studio: Exploring the Big Ideas of Engineering in a Liberal Arts Environment. *AAAI Spring Symposium on Robotics and Education*, Stanford University, 26-28 March 2001.

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Technical Reports

Allyn Dimock, Ian Westmacott, Robert Muller, Franklyn Turbak, J. B. Wells, and Jeffrey Considine. Program Representation Size in an Intermediate Language with Intersection and Union Types. Boston University Technical Report BUCS-TR-2001-02, July 2001. (A version of the TIC'00 paper with an appendix describing the CIL intermediate language.)

Technical Reports (in preparation)

Torben Amtoft and Franklyn Turbak. Faithful Translations between Polyvariant Flows and Polymorphic Types. Draft of a Boston University technical report that expands on Amtoft and Turbak's ESOP'00 paper.

Elena Machkasova and Franklyn Turbak. A Computationally Sound Call-By-Value Module Calculus. Draft of a Boston University technical report that expands on Machkasova and Turbak's ESOP'00 paper.

Unpublished Work

Franklyn Turbak. *Grasp: A Visible and Manipulable Model for Procedural Programs*. S.M. Thesis, Massachusetts Institute of Technology, May 1986. Advisors: Andrea diSessa and D. Austin Henderson.

Franklyn Turbak. *Slivers: Computational Modularity via Synchronized Lazy Aggregates*. Ph.D. dissertation, Massachusetts Institute of Technology, January 1994. Advisors: Gerald J. Sussman and David K. Gifford.

Franklyn Turbak and David Gifford and Brian Reistad, *Applied Semantics of Programming Languages*. Course notes for 6.821, MIT's graduate programming languages course.

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Paper Presentations

- Creatures of Habit. Paper presentation at the Tenth Annual Conference of the Cognitive Science Society. Montreal, Quebec, Canada. 18 August 1988.
- First-class Synchronization Barriers. Paper presented at the 1996 ACM SIGPLAN International Conference on Functional Programming (ICFP '96). Philadelphia, PA. 25 May 1996.
- Compiling with Polymorphic and Polyvariant Flow Types. Paper presented at the Types in Compilation Workshop, Amsterdam, The Netherlands. 8 June 1997.
- Teaching Recursion Before Iteration in CS1. Consortium for Computing in Small Colleges Northeastern Conference, Providence, Rhode Island, May 23, 1999.
- Relating Typability and Expressiveness in Finite-Rank Intersection Type Systems. Paper presented at the International Conference on Functional Programming, Paris, France, September 27, 1999.

Talks

- Grasp: A Visible and Manipulable Model for Procedural Programs. Talk and demonstration at Xerox Palo Alto Research Center. December 1984.
- Grasp: A Visible and Manipulable Model for Procedural Programs. Talk to Education in Math, Science, and Technology group at University of California at Berkeley. July 1986.
- Understanding Procedures as Objects. MIT AI Laboratory Colloquium. 2 December 1987.
- Slivers: Computational Modularity via Synchronized Lazy Aggregates. Open MIT PhD defense. 7 January 1994.
- Microworlds Meet MUDs. Talk given at ARPA Workshop on MUDs and Schools, Dedham, MA. 14 December 1994.
- Hands-on Robotics. Computer Science Colloquium talk and demonstration, University of Hartford, March 24, 1998.
- How to teach Java in CS1. Panelist. Consortium for Computing in Small Colleges Third Annual Northeastern Conference (CCSCNE-98). Sacred Heart University. April 24, 1998.
- Hands-on Robotics. After-school talk. Loomis-Chaffee School, Windsor Locks, CT, March 24, 1998.
- Towards Better Deforestation Techniques. Middlebury College Computer Science Department, October 27, 1998.
- Towards Better Deforestation Techniques. Bates College Computer Science Department, November 12, 1998.
- All You Need is Lambda. Bates College Computer Science Department, November 13, 1998.

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Conferences Program Committees

Types in Compilation Workshop (TIC 2000). Program committee member.

Conference/Workshop/Panel Organization

Local coordinator for Forum on Parallel Computing Curricula. Wellesley College. 31 March – 1 April, 1995.

Vendors chair for the Consortium for Computing in Small Colleges Second Annual Northeastern Conference (CCSCNE-97). Northeastern University. 25 – 26 April, 1997.

Robotic Design Studio Workshop. Two-day NECUSE-sponsored workshop (led with Robbie Berg). Colby College. October 24-25, 1997

Robotics Workshop. Three-hour workshop (led with Robbie Berg) as part of the Consortium for Computing in Small Colleges Third Annual Northeastern Conference (CCSCNE-98). Sacred Heart University. April 24, 1998

How to teach Java in CS1. Panel organizer (with Michael Berman). Consortium for Computing in Small Colleges Third Annual Northeastern Conference (CCSCNE-98). Sacred Heart University. April 24, 1998.

Professional Activities

Boston Computer Museum. Designer and implementer for *Haymarket* project (with Mitchel Resnick). 1987.

Coach for Wellesley's ACM programming contest team. 1995-2000

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Teaching

- MIT EECS Department. Seven terms of teaching experience as recitation instructor and teaching assistant, 1984 – 1992. Courses taught include Programming Languages (a graduate core course), Structure and Interpretation of Computer Programs (SICP, an undergraduate core course), and Signals and Systems.
- MIT Lincoln Laboratory, lab assistant for accelerated version of MIT’s SICP course. October 1985.
- MIT Summer Program. Teaching assistant for two-week version of SICP presented to professors and professional engineers. Summers 1987 – 1991.
- Stoneham School District. Led after-school Lego/LOGO course for elementary school students. Fall 1990.
- Hogeschool Utrecht, The Netherlands. Invited to lead one-week version of SICP course. October 1991.
- Hewlett Packard, Palo Alto, CA. Invited to lead two-week version of SICP course. June, 1992.
- Wellesley College. Courses taught include Introduction to Programming and Problem Solving, Data Structures, Fundamental, Algorithms, Theory of Programming Languages, Compiler Design, and Robotic Design Studio. February 1995 – present.

Graduate Students Advised

- Elena Machkasova, Boston University doctoral dissertation. Tentative Title *A Computationally Sound Call-by-value Module Calculus*. Expected, fall 2001. Advised 1996–2001.

Graduate Examinations

- Raymie Stata. Member of MIT Area Exam committee. Raymie’s paper: *Two Approaches to Subtyping in Object-Oriented Languages*. 13 May 1994.
- David Espinosa. External reader for Columbia University doctoral dissertation: *Semantic Lego*. May, 1995.
- Santiago Pericas-Geersten. Reader for Boston University Master’s Thesis: *Type Inference with Recursive Types and Object Types*. May, 1999.

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Undergraduate Students Advised

- Michael B. Parker. MIT bachelor's thesis: *Memoized Evaluation as the basis for a Stateless Programming Language*. Spring 1989.
- Daniel Winship. MIT Undergraduate Research Opportunities Program project: *MUSEME: A Scheme-based Multi-User Simulation Environment*. Summer 1994.
- Ramona Filipi. (Co-advisor with Matthew Merzbacher.) Wellesley senior project: *Cooperative Query Answering on Musical Data*. 1995–1996 academic year.
- Ruth Chuang. (Co-advisor with Robbie Berg.) Wellesley senior project: *LEGO Robot Projects: An Innovative Way of Learning Science and Technology*. 1995–1996 academic year.
- Crystal Ellsworth. CS350 independent study project: *Databases*. Spring, 1996.
- Laura Diao. Wellesley summer research project: *Visual Robot Programming*. Summer 1996.
- Anna Mitelman. Wellesley senior honors thesis: *Visual Graph Abstraction*. 1996 – 1997 academic year.
- Elena Konstantinova. CS350 independent study project: *Term Rewriting. Visual Robot Programming*. Summer 1996.
- Yan Zhang. Wellesley summer research project: *Visual Term Rewriting*. Summer 1997.
- Cynthia Jones. CS350 independent study project: *Databases*. Spring, 1997.
- Yan Zhang. Wellesley senior honors thesis: *Experiments with Shortcut Deforestation*. 1998 – 1999 academic year.
- Ann Hintzman. CS350 independent study project: *Popeye: The Design and Implementation of a Fire-Seeking Robot*. Spring 1999.
- Emily Horton. CS350 independent study project: *Extensions to LogoBlocks, A Visual Programming Language*. Spring 2000.
- Lisa Hazel and Merideth Shotwell. (Co-advisor with Robbie Berg.) CS350 independent study project: *A Fire-Fighting Robot*. Spring 2000.
- Erika Symmonds. (Co-advisor with Robbie Berg) CS250H independent study project: *BandeBot: A Fire-Fighting Robot*. Spring 2000.
- Kirsten Chevalier, Nausheen Eusuf, Kate Golder, Holly Muenchow, P. Chris Staecker (Bates) and Aaron Wheeler (Bates). (Co-supervisor with Patty Johann) Undergraduate summer research experience: *Lumberjack Summer Camp*. Summer 2000.
- Kirsten Chevalier, Wellesley senior honors thesis: *Exploring the Type Inference Approach to Deforestation*. 2000 – 2001 academic year.
- Yukari Wada. Advisor for CS350 independent study project: *Cross-language Comparison of Data Structures*. Spring 2001.
- Laura Hwang. Advisor for CS350 independent study project: *An ACM Programming Problem Archive*. Spring 2001.

References

Professor Harold Abelson
MIT Laboratory for Computer Science
545 Technology Square
Cambridge, MA 02139
(617) 253-5856
Email: hal@zurich.ai.mit.edu

Professor Robert S. Berg
Department of Physics
Wellesley College
106 Central Street
Wellesley, MA 02181-8289
(617) 283-3110
Email: rberg@wellesley.edu

Professor David K. Gifford
MIT Laboratory for Computer Science
545 Technology Square
Cambridge, MA 02139
(617) 253-6039
Email: gifford@lcs.mit.edu

Professor Assaf Kfoury
Boston University Computer Science Department
111 Cummington Street
Department of Computer Science
Boston University
Boston, MA 02215 (617) 353-8911
Email: kfoury@cs.bu.edu

Professor Ellen Hildreth
Department of Computer Science
Wellesley College
106 Central Street
Wellesley, MA 02481
(781) 283-3025
Email: ehildreth@wellesley.edu

Professor Gerald Jay Sussman
MIT Artificial Intelligence Laboratory
545 Technology Square
Cambridge, MA 02139
(617) 253-5874
Email: gjs@zurich.ai.mit.edu