

Gillian Smith

PhD Candidate, Center for Games and Playable Media, UC Santa Cruz

348 Younglove Ave Apt. C
Santa Cruz, CA 95060
USA

Email: gsmith@soe.ucsc.edu
Phone: (434) 242-5448
Web: <http://www.soe.ucsc.edu/~gsmith>

Research Interests

My primary research interest is in procedural content generation and how it can impact game design, both in terms of assisting human designers during the design process and how it can enable new playable experiences. I am also interested in AI-assisted design for a variety of domains, and constructing playful design tools.

Education

- June 2012
(anticipated) **Ph.D. Computer Science.** University of California, Santa Cruz.
Dissertation: *Expressive Design Tools: Procedural Generation for Game Designers*
Advisor: Jim Whitehead
- March 2009 **M.S. Computer Science.** University of California, Santa Cruz.
Project: *Rhythm-Based Level Generation for 2D Platformers*
Advisor: Jim Whitehead
- May 2006 **B.S. Computer Science.** University of Virginia.
Thesis: *Automation of Image Abstraction and Stylization Using Human Perception Data*
Advisor: Greg Humphreys
Minor: Russian and East European Studies

Teaching Experience

- 2008-2011 **Lead Instructor.** COSMOS at UC Santa Cruz.
California State Summer School for Mathematics and Science.
Cluster 5 - Technologies of Fun: Game Graphics, AI, and Network in Code
Taught introductory programming and game design to 18-20 high school students in a month-long intensive program for students interested in math and science. Mentored students creating games.
- 2008-2009 **Teaching Assistant.** University of California, Santa Cruz.
CMPS 11: Intermediate Programming (Spring 2009)
Led lab sessions in an introductory course in Java programming, graded homework and exams. Approximately 30 students.
CMPE 220: Advanced Parallel Processing (Winter 2009)
Led lab sessions for a graduate course in parallel programming, covering SIMD architectures and CUDA programming. Supervised individual student projects. Graded homework. Approximately 10 students.
CMPS 80k: Foundations of Interactive Game Design (Winter 2008)
Helped students, both CS and non-CS majors, make games using GameMaker and RPGMaker. Managed 10 undergraduate graders. Approximately 320 students.
- 2007 **Teaching Assistant.** COSMOS at UC Santa Cruz.
California State Summer School for Mathematics and Science.
Cluster 5 - Technologies of Fun: Game Graphics, AI, and Network in Code
Worked closely with 16 high school students to help them learn programming and create games in a month-long intensive program for students interested in math and science.

2006 **Teaching Assistant.** University of Virginia.
CS 100: Computer Science from Ada and Euclid to Quantum Computing and the World Wide Web
Led lab sessions in an introductory course in computer science, using Scheme. Graded homework and final project. Approximately 25 students.

Employment History

2006 **Graduate Intern.** AOL.
Dulles, VA
Summer intern in the Open Services Quality Assurance department. Responsible for writing, improving, and maintaining scripts used in the test lab. Worked with Perl, PHP, and SQL.

2002 – 2006 **Support Consultant.** ITC User Support Services, University of Virginia.
Charlottesville, VA
Responsible for phone computer support for all members of the University of Virginia community. Assisted with common software issues, email problems, reporting network outages. Trained new student employees.

2005 **Intern.** AOL.
Dulles, VA
Responsible for testing software and spam filter for the server-side of AOL's email system.

Peer-Reviewed Journal Publications

1. Noor Shaker, Julian Togelius, Georgios N. Yannakakis, Ben Weber, Tomoyuki Shimizu, Tomonori Hashiyama, Nathan Sorenson, Philippe Pasquier, Peter Mawhorter, Glen Takahashi, Gillian Smith, Robin Baumgarten. The 2010 Mario AI Championship: Level Generation Track. To appear in *IEEE Transactions on Computational Intelligence and AI in Games (TCIAIG)*, 2011.
2. Gillian Smith, Jim Whitehead, Michael Mateas. Tanagra: Reactive Planning and Constraint Solving for Mixed-Initiative Level Design. *IEEE Transactions on Computational Intelligence and AI in Games (TCIAIG), Special Issue on Procedural Content Generation in Games*, vol. 3, iss. 3, September 2011.
3. Gillian Smith, Jim Whitehead, Michael Mateas, Mike Treanor, Jameka March, Mee Cha. Launchpad: A Rhythm-Based Level Generator for 2D Platformers. *IEEE Transactions on Computational Intelligence and AI in Games (TCIAIG)*, vol. 3, iss. 1, March 2011.

Peer-Reviewed Conference Publications

1. Gillian Smith, Alexei Othenin-Girard, Jim Whitehead, Noah Wardrip-Fruin. PCG-Based Game Design: Creating *Endless Web*. *Proceedings of the 2012 International Conference on the Foundations of Digital Games (FDG 2012)*. Raleigh, NC, May 30 – June 1, 2012.
2. Gillian Smith, Anne Sullivan. The Five Year Evolution of a Game Programming Course. *Proceedings of the 43rd ACM Technical Symposium on Computer Science Education (SIGCSE 2012)*, Raleigh, NC, February 29 - March 3, 2012.
3. Gillian Smith, Ryan Anderson, Brian Kopleck, Zach Lindblad, Lauren Scott, Adam Wardell, Jim Whitehead, Michael Mateas. Situating Quests: Design Patterns for Quest and Level Design in Role-Playing Games. *Proceedings of the 4th International Conference on Interactive Digital Storytelling (ICIDS 2011)*, Vancouver,

Canada, November 28 – December 1, 2011.

4. Adam Smith, Chris Lewis, Kenneth Hullett, Gillian Smith, Anne Sullivan. An Inclusive View of Player Modeling. In *Proceedings of the 2011 International Conference on the Foundations of Digital Games (FDG 2011)*. Bordeaux, France. June 29 – July 1, 2011.
5. Anne Sullivan, Gillian Smith. Lessons in Teaching Game Design. In *Proceedings of the 2011 International Conference on the Foundations of Digital Games (FDG 2011)*. Bordeaux, France. June 29 – July 1, 2011.
6. Martin Jennings-Teats, Gillian Smith, Noah Wardrip-Fruin. Polymorph: A Model For Dynamic Level Generation. In *Proceedings of the 6th Artificial Intelligence and Interactive Digital Entertainment Conference (AIIDE 2010)*, Palo Alto, California, USA. October 2010.
7. Gillian Smith, Jim Whitehead, Michael Mateas. Tanagra: A Mixed-Initiative Level Design Tool. In *Proceedings of the 2010 International Conference on the Foundations of Digital Games (FDG 2010)*. Monterey, CA, USA. June 19-21, 2010.
8. Gillian Smith, Mike Treanor, Jim Whitehead, Michael Mateas. Rhythm-Based Level Generation for 2D Platformers. In *Proceedings of the 2009 International Conference on the Foundations of Digital Games (FDG 2009)*. Orlando, FL, USA. April 26-30, 2009.

Peer-Reviewed Workshop and Symposium Publications

1. Gillian Smith, Elaine Gan, Alexei Othenin-Girard, Jim Whitehead. PCG-Based Game Design: Enabling New Play Experiences through Procedural Content Generation. In *Proceedings of the Second International Workshop on the Foundations of Digital Games (PCGames 2011)*, co-located with the 2011 Foundations of Digital Games Conference. Bordeaux, France. June 28, 2011.
2. Gillian Smith, Jim Whitehead. Evaluating the Expressivity of a Level Generator. In *Proceedings of the Workshop on Procedural Content Generation in Games (PCGames 211)*, co-located with the 2010 Foundations of Digital Games Conference. Monterey, CA, USA. June 18, 2010.
3. Martin Jennings-Teats, Gillian Smith, Noah Wardrip-Fruin. Polymorph: Dynamic Difficulty Adjustment through Level Generation. In *Proceedings of the Workshop on Procedural Content Generation in Games (PCGames 211)*, co-located with the 2010 Foundations of Digital Games Conference. Monterey, CA, USA. June 18, 2010.
4. Gillian Smith, Mee Cha, Jim Whitehead. A Framework for Analysis of 2D Platformer Levels. In *Proceedings of ACM SIGGRAPH Sandbox Symposium 2008*. Los Angeles, CA, USA. August 9-10, 2008.

Peer-Reviewed Demos

1. Gillian Smith, Jim Whitehead, Michael Mateas. Tanagra: An Intelligent Level Design Assistant for 2D Platformers. In *Proceedings of the 6th Artificial Intelligence and Interactive Digital Entertainment Conference (AIIDE 2010)*, Palo Alto, California, USA. October 2010.

Conference Panel Participation

1. Caitlin Sadowski, Gillian Smith, Gail Carmichael. Girls, Games, and Getting to the First Day. Birds of a Feather Session at the *2010 Grace Hopper Celebration of Women in Computing 2010*. Atlanta, GA, September 28 – October 10, 2010.
[Served on a panel discussing using games to encourage women to enter computer science. Also appears in the conference proceedings in long-form as a Birds of a Feather session, and short-form as a poster.]

Non Peer-Reviewed Publications and Posters

1. Gillian Smith. Human-Computer Collaboration in Level Design for Computer Games. *2011 Grace Hopper Celebration of Women in Computing*. Portland, OR, November 9 – 11, 2011.
[Portions of this poster were first published in the Tanagra TCIAIG journal article. Poster was reviewed and accepted to the ACM Student Research Competition with an acceptance rate of 23%.]
2. Gillian Smith, Jim Whitehead, Michael Mateas. Computers as Design Collaborators: Interacting with Mixed-Initiative Tools. *Workshop on Semi-Automated Creativity*, co-located with ACM Creativity & Cognition 2011. Atlanta, GA. November 3, 2011.
[Peer selected, but no peer reviews.]
3. Caitlin Sadowski, Gillian Smith, Gail Carmichael. Girls, Games, and Getting to the First Day. *2010 Grace Hopper Celebration of Women in Computing*. Atlanta, GA, September 28 – October 10, 2010.
[Appears in the conference proceedings in the short-form as a poster, and long-form as a Birds of a Feather session.]
4. Gillian Smith, Jim Whitehead, Charlie McDowell. Using Game Technology in an Introductory Programming Course. Poster at the *IGDA Educational Special Interest Group, GDC 2008*. San Francisco, CA, March 2008.

Invited Talks

1. Keynote Speaker, IEEE Conference on Computational Intelligence and Games (CIG 2012), Granada, Spain, September 2012.

Research Projects

Endless Web

Endless Web is a game that tightly integrates procedural content generation into its mechanics and aesthetics. The focus is on adapting the Launchpad level generator for use in an experimental game which provides a playable experience that would be impossible without PCG. This also helps us understand the generator's capabilities, how it must be changed due to requirements imposed on it by a playable game, and how AI systems influence game design. Endless Web was submitted to the 2012 Independent Games Festival competition, and will be released publicly at the end of Fall 2011. More information about the game is available at <http://endlessweb.soe.ucsc.edu>

Tanagra

Tanagra is a prototype mixed-initiative design tool for 2D platformer level design, in which a human and computer work together to produce a level. The human designer can place constraints on a continuously running level generator, in the form of exact geometry placement and manipulation of the level's pacing. The computer can fill in the rest of the level with geometry that guarantees playability, alter existing geometry to meet the new constraints, or inform the designer that there is no level that meets their requirements. Tanagra represents one of my core research interests: how computers can meaningfully assist novices during the design process.

Expressivity Evaluation for PCG Systems

This project focuses on how to meaningfully evaluate a procedural content generator: instead of examining the quantity or quality of artifacts alone, we define measures for how the content will be experienced and use these metrics to create a visualization of the generator's *expressivity*. This helps a designer wanting to use one of these systems better understand the qualities of the artifacts that will be generated as a whole, and be able to view a representative sample of generated artifacts. We addressed this through a visualization of the generative space of Launchpad's level generator.

Launchpad

Launchpad is a procedural level generator for 2D platformer games that provides a designer with control over the levels it can create through tunable parameters. It uses a grammar-based method for automatically generating levels for *Mario*-style platformers based on rhythms that the player feels with his hands. Designer input to the generator involves specifying the general path that the level should follow and the frequency at which different level components should occur. This generation technique is based on a framework we had previously developed for the analysis of 2D platformer levels, which includes a common vocabulary and structure for level components. Launchpad was my master's project at UCSC.

Conference and Workshop Organization

1. Organizing Committee, Workshop on Design Patterns in Games (DPG 2012). Co-located with the Foundations of Digital Games conference. May 29, 2012. Raleigh, NC, USA.
2. Program Committee, Third International Workshop on Procedural Content Generation in Games (PCGames 2012). Co-located with the Foundations of Digital Games conference. May 29, 2012. Raleigh, NC, USA.
3. Co-chair, Workshop on AI in the Game Design Process (IDP11), co-located with AIIDE 2011. October 11, 2011.
4. Program Committee, 2011 IEEE Conference on Computational Intelligence in Games (CIG '11). August 31 – September 3 2011, Seoul, South Korea.
5. Program Committee, Think Design Play: 5th DiGRA Conference. 14 – 17 September 2011, Utrecht, The Netherlands.
6. Reviewer, 38th International Conference and Exhibition on Computer Graphics and Interactive Techniques (SIGGRAPH 2011). 7-10 August 2011, Vancouver, BC, Canada.
7. Program Chair, Second International Workshop on Procedural Content Generation in Games (PCGames 2011). Co-located with the Foundations of Digital Games conference. June 28 2011, Bordeaux, France.
8. Program Committee, 23rd International Conference of the Florida Artificial Intelligence Research Society (FLAIRS), Games & Entertainment Track (FLAIRS '10). Daytona Beach, FL, USA.
9. Program Committee, 2010 IEEE Conference on Computational Intelligence in Games (CIG '10). Copenhagen, Denmark.

Journal Reviewing

I have reviewed one or more articles in the following journals:

IEEE Transactions on Multimedia Computing Communications and Applications (TOMCCAP)
IEEE Transactions on Computational Intelligence and Artificial Intelligence in Games (TCIAIG)
ACM Computers in Entertainment

Other Service

1. Member of the Games Technical Committee of the IEEE Computational Intelligence Society.
2. Reviewer for the National Center for Women & Information Technology (NCWIT) Aspirations in Computing Award, 2010-2011.

Professional Societies

Association for Computing Machinery (ACM)

Association for the Advancement of Artificial Intelligence (AAAI)

International Game Developers Association (IGDA)

IEEE and IEEE Women in Engineering