

Curriculum Vitae

Amy K. Hoover
Playable Innovative Technologies Lab
College of Arts, Media, and Design
Northeastern University

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EDUCATION

- Ph.D. Computer Science** University of Central Florida, August 2014
Dissertation: Functional Scaffolding for Musical Composition: A New Approach in Computer-Assisted Music Composition
Advisor: Kenneth O. Stanley, Department of Electrical Engineering and Computer Science.
- M.S. Computer Science** University of Central Florida, May 2014
Advisor: Kenneth O. Stanley, Department of Electrical Engineering and Computer Science.
- B.S. Computer Science, with University Honors** University of Central Florida, May 2009
Honors Thesis: NEAT Drummer: Computer-Generated Drum Tracks
Advisor: Kenneth O. Stanley, Department of Electrical Engineering and Computer Science.
- B.S. Mathematics, with University Honors** University of Central Florida, May 2009

EMPLOYMENT

- Postdoctoral Researcher** Playable Innovative Technologies Lab, Northeastern University
Since: October, 2015
Supervising Professors: Gillian Smith, Casper Hartevelde
- Postdoctoral Researcher** Institute of Digital Games, University of Malta
September 2014 to October 2015
Supervising Professor: Georgios N. Yannakakis
- National Science Foundation Graduate Research Fellow** Evolutionary Complexity Research Group,
University of Central Florida
January 2011 to August 2014
Supervising Professor: Kenneth O. Stanley
- Graduate Research Fellow** Evolutionary Complexity Research Group, University of Central Florida
August 2009 to December 2011
Supervising Professor: Kenneth O. Stanley

FELLOWSHIPS

- National Science Foundation** Graduate Research Fellowship
Awarded: \$90,000, April 2010
- University of Central Florida** Trustees Doctoral Fellowship
Awarded: \$36,000, May 2009

GRANTS AND FUNDING

- Significant Contribution to Funded Proposal.** PI Kenneth O. Stanley. National Science Foundation (NSF), CreativeIT Program, "Pilot: Assisted Musical Composition through Functional Scaffolding"
Awarded: \$295,229, August 2010 to August 2013

PUBLICATIONS

- Adam Summerville, Sam Snodgrass, Matthew Guzdial, Christoffer Holmgård, Amy K. Hoover, Aaron Isaksen, Andy Nealen, and Julian Togelius. “Procedural Content Generation via Machine Learning (PCGML).” *ArXiv e-prints* (2017). 1702.00539.
- Amy K. Hoover, Jackie Barnes, Borna Fatehi, Jesús Moreno-León, Casper Hartevelde, Gillian Puttick, and Eli Tucker-Raymond. “Assessing Computational Thinking in Students’ Game Designs.” In *CHI PLAY ’16 Extended Abstracts of the ACM SIGCHI Annual Symposium on Computer-Human Interaction in Play* (2016).
- Britton Horn, Amy K. Hoover, Jackie Barnes, Yetunde Folajimi, Gillian Smith, and Casper Hartevelde. “Opening the Black Box of Play: Strategy Analysis of an Educational Game.” In *Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play* (2016).
- Yetunde Folajimi, Britton Horn, Jackie Barnes, Amy K. Hoover, Gillian Smith, and Casper Hartevelde. “A Cross-Cultural Evaluation of a Computer Science Teaching Game.” In *Games Learning and Society 12 Conference Proceedings* (2016).
- Amy K. Hoover, Julian Togelius, and Georgios N. Yannakakis. “Composing Video Game Levels with Music Metaphors through Functional Scaffolding.” In *Proceedings of the Computational Creativity & Games Workshop at the Sixth International Conference on Computational Creativity (ICCC 2015)* (2015).
- Björn Þór Jónsson, Amy K. Hoover, and Sebastian Risi. “Interactively Evolving Compositional Sound Synthesis Networks.” In *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO 2015)* (2015).
- Antonios Liapis, Amy K. Hoover, Georgios N. Yannakakis, Constantine Alexopoulos, and Evangelia V. Dimaraki. “Motivating Visual Interpretations in Iconoscope: Designing a Game for Fostering Creativity.” In *Proceedings of the Foundations of Digital Games (FDG 2015)* (2015).
- Amy K. Hoover, William Cachia, Antonis Liapis, and Georgios N. Yannakakis. “Towards Orchestrating Game Creativity Facets: Fusing Audio, Visuals and Gameplay.” In Adrian Carballal, Colin Johnson, and Jo ao Nuno (Editors), *Proceedings of the Fifth Conference on Evolutionary and Biologically Inspired Music, Sound, Art and Design (EvoMUSART 2015)* (Springer, 2015).
- Amy K. Hoover, Paul A. Szerlip, and Kenneth O. Stanley. “Functional Scaffolding for Composing Additional Musical Voices.” *Computer Music Journal* **38**, 80–99 (2014).
- Amy K. Hoover, Paul A. Szerlip, and Kenneth O. Stanley. “Implications from Music Generation for Music Appreciation.” In *Proceedings of the Fourth International Conference on Computational Creativity (ICCC 2013)* (2013).
- Amy K. Hoover, Paul A. Szerlip, Marie E. Norton, Trevor A. Brindle, Zachary Merritt, and Kenneth O. Stanley. “Generating a Complete Multipart Musical Composition from a Single Monophonic Melody with Functional Scaffolding.” In *Proceedings of the Third International Conference on Computational Creativity (ICCC 2012)* (2012). This paper is accompanied with a set of musical samples at <http://eplex.cs.ucf.edu/fsmc/iccc2012/>.
- Amy K. Hoover, Paul A. Szerlip, and Kenneth O. Stanley. “Interactively Evolving Harmonies through Functional Scaffolding.” In *Proceedings of the Genetic and Evolutionary Computation Conference (GECCO 2011)* (The Association for Computing Machinery, New York, NY, 2011). This paper is accompanied with a set of musical samples at <http://eplex.cs.ucf.edu/fsmc/gecco2011/>. **Winner of the Best Paper Award in the Digital Entertainment Technologies and Arts (out of 22 submissions).**
- Amy K. Hoover, Paul A. Szerlip, and Kenneth O. Stanley. “Generating Musical Accompaniment through Functional Scaffolding.” In *Proceedings of the Eighth Sound and Music Computing Conference (SMC 2011)* (2011). This paper is accompanied with a set of musical samples at <http://eplex.cs.ucf.edu/fsmc/smc2011/>.

Amy K. Hoover and Kenneth O. Stanley. “Exploiting Functional Relationships in Musical Composition.” *Connection Science Special Issue on Music, Brain, & Cognition* **21**, 227–251 (2009). This paper is accompanied with a set of musical samples at <http://eplex.cs.ucf.edu/neatmusic>.

Amy K. Hoover, Michael P. Rosario, and Kenneth O. Stanley. “Scaffolding for Interactively Evolving Novel Drum Tracks for Existing Songs.” In Mario Giacobini et. al. (Editor), *Proceedings of the Sixth European Workshop on Evolutionary and Biologically Inspired Music, Sound, Art and Design (EvoMUSART 2008)*, pp. 412–422 (Springer, 2008). This paper is accompanied with a set of musical samples at <http://eplex.cs.ucf.edu/neatdrummer>. **Winner of the Best Paper Award. (out of 31 submissions).**

HONORS AND AWARDS

Best Paper Awards:

Best Paper Award in Digital Entertainment Technologies and Arts (out of 21). *Genetic and Evolutionary Computation Conference (GECCO-2011, Dublin, Ireland)* for Interactively Evolving Harmonies through Functional Scaffolding

Best Paper Award in Evolutionary Music and Art (out of 31). *Sixth European Workshop on Evolutionary and Biologically Inspired Music, Sound, Art and Design (EvoMUSART-2008, Naples, Italy)*, for Scaffolding for Interactively Evolving Novel Drum Tracks for Existing Songs

University Awards:

Best Undergraduate Student Award in Computer Science University of Central Florida, School of Electrical Engineering and Computer Science, May 2009.

First Place at the Showcase of Undergraduate Research Excellence University of Central Florida in the Physical Sciences, Mathematics, Computer Science and Engineering category (out of 30), April 2008.

Dean’s Presentation Award University of Central Florida, Graduate Studies, for outstanding accomplishments and exemplary contribution to the graduate fellowship community, April 2011.

Nominated for Order of the Pegasus University of Central Florida, School of Electrical Engineering and Computer Science, November 2008.

Scholarship Awards:

Scholarship Funded by AmazonLab 126, Grace Hopper Celebration of Women in Computing (2013, Minneapolis, MN)

Scholarship Funded by the National Science Foundation, Grace Hopper Celebration of Women in Computing (2010, Atlanta, GA)

Scholarship Funded By Upsilon Pi Epsilon, Jim Nolen Scholarship (2009)

WORKSHOPS AND INVITED PRESENTATIONS

Invited Workshops

Dagstuhl Seminar Invited Participant at the Schloss Dagstuhl-Leibniz-Zentrum für Informatik Seminar on Artificial and Computational Intelligence in Games: AI-Driven Game Design (17471), Saarland, Germany, November 19-24, 2017.

Banff International Research Station Seminar Invited Participant at Banff International Research Station Seminar on Computational Modeling in Games (16w5160), Banff, Canada, May 15-20, 2016.

Exploring the Mind through Music Conference Functional Scaffolding: A New Principle for Enabling Computational Creativity in Music. Invited Fellow at the Exploring the Mind through Music Conference (EMM-2011). Houston, TX, June 16, 2011.

Workshops

Toward Procedural Music in Digital Games. Phil Lopes, Amy K. Hoover, Antonis Liapis, and Georgios Yannakakis. Learning from Videogame Music. Ludomusicology Conference, Utrecht University, Utrecht, The Netherlands, April 9, 2015.

Exploring Musical Creativity with Functional Scaffolding. Amy K. Hoover, Paul A. Szerlip, and Kenneth O. Stanley. Ph.D. Forum and New Investigators at the Grace Hopper Celebration of Women in Computing, Minneapolis, MN, October 3, 2013.

NextProf Future Faculty Workshop. Competitively accepted at the University of Michigan NextProf workshop to encourage talented women in engineering and science to consider academia as a career, University of Michigan, College of Engineering, Ann Arbor, MI, September 25-27, 2013.

Exploring Musical Creativity with Functional Scaffolding. Amy K. Hoover, Paul A. Szerlip, and Kenneth O. Stanley. Creativity & Cognition 2013 Graduate Student Symposium, Sydney, Australia, June 17, 2013.

Functional Scaffolding for Musical Composition. Workshop in Algorithmic Music Composition (WACM-2010), Santa Cruz, CA, July 5, 2010.

Invited Presentations

Generating Music and Sound for Video Games. Invited Speaker in the Computer Science Annual Workshop (CSAW-2014) at the University of Malta, Malta, November 6, 2014.

Functional Scaffolding for Musical Composition: A New Approach in Computer-Assisted Musical Composition. Invited Speaker at the IT University of Copenhagen, Copenhagen, Denmark, October 14, 2014.

Functional Scaffolding for Musical Composition. Invited Speaker in the Department of Computing Science, University of Alberta, Edmonton, Alberta, Canada, May 20, 2014.

Introduction to Artificial Intelligence and Computational Creativity. Distinguished Speaker at the Summer Institute (SI-2014), University of Central Florida, Orlando, FL, July 21, 2014.

Music to My Ears: Creativity/Technology Discussion. Invited Speaker in the Diversify/Engage Talk Series run by the Student Government Association at the University of Central Florida, Orlando, FL, October 30, 2013.

Music and Artificial Intelligence. Invited Speaker at the Processing Orlando Music Technology Group, Orlando, FL, October 29, 2013.

Uncovering an Implicit Mathematical Property of Music Composition and Appreciation. Invited Speaker at the University of Arizona School of Information: Science, Technology, and Arts, Tuscon, AZ, May 16, 2013.

Exploring Music Artificial Intelligence. Invited Speaker in the LEARN Academic Series, University of Central Florida, Orlando, FL, January 24, 2013.

Exploring Music Artificial Intelligence. Distinguished Speaker at the Burnett Honors College Summer Institute (BHCSI-2012), University of Central Florida, Orlando, FL, July 24, 2012.

Composing Music with Functional Scaffolding. Invited Speaker in the LEARN Academic Series, University of Central Florida, Orlando, FL, January 26, 2012.

Interactive Evolution, Creativity, and You: Exploring Creativity through Computer Science. Distinguished Speaker at the Burnett Honors College Summer Institute (BHCSI-2011), University of Central Florida, Orlando, FL, July 20, 2011.

NEAT Drummer: Computer-Generated Drum Tracks. Invited Speaker for the University of Central Florida daMusic Forum, University of Central Florida, Orlando, FL, February 19, 2009.

PATENTS

Granted. David D'Ambrosio, Sebastian Risi, Joel Lehman, Amy Hoover and Kenneth Stanley. *Means of Representing, Generating, and Incrementally Modifying Aesthetically Pleasing Digital Images of Flowers*. University of Central Florida, April 4, 2013.

Pending. Amy K. Hoover, Michael Rosario, and Kenneth O. Stanley (Patent Pending since July, 2008). *System and Method for Evolving Music Tracks*. University of Central Florida

SOFTWARE

MaestroGenesis helps users compose additional musical voices for existing MIDI compositions through a process similar to animal breeding. Results show that amateur musicians can create polyphonic compositions without any musical expertise. Inside MaestroGenesis is an algorithm that I co-invented called functional scaffolding for musical composition (FSMC), which builds on an approach for generating drum patterns, called NEAT Drummer. MaestroGenesis is publicly available at: <http://maestrogenesis.org>.

STUDENTS SUPERVISED

Graduate Students Co-Supervised

Vaishnaviben Shah and Prasad Raut, Analyzing GrACE Playtraces, Northeastern University
Since: January 2017

Suhas Murthy, Madscience and Augmented Reality, Northeastern University
Since: January 2017

Rathi Sowumya, Captchas and Natural Language Processing, Northeastern University
September 2015 to December 2015

Björn Þór Jónsson, Sound Generation Project, IT University of Copenhagen
November 2014 to July 2015
Main Supervisor: Sebastian Risi

Mark Spiteri, Master's Thesis, Institute of Digital Games, University of Malta
September 2014 to September 2015
Main Supervisor: Georgios N. Yannakakis

Phil Lopes, Doctoral Candidate, Institute of Digital Games, University of Malta
Main Supervisor: Georgios N. Yannakakis

Undergraduates

Jack Davis and Isaac Schutz, Sound Generation Game, Northeastern University
September 2015 to December 2015

Xavier Banks, Generating Chord Progressions with Markov Models, University of Central Florida
October 2013 to April 2014

Javon Walton, Exploring Generating Chord Progressions with Computational Assistance, University of Central Florida
October 2013 to April 2014

Bre'Ona Williams, Generating Musical Lyrics with Functional Scaffolding, University of Central Florida
October 2012 to October 2013

Ricardo Angeli, Examining the Structure and Rigidity of a Neural Network Generated by MaestroGenesis, University of Central Florida
October 2011 to April 2012

Undergraduates Co-Supervised

Jessica Sprague (August 2012 to May 2013), Trevor Brindle (August 2011 to May 2013), Doug Gifford (August 2012 to April 2013), Marie E. Norton (August 2011 to April 2012), Zachary Merrit (August 2011 to August 2012), Emily Judd (August 2012 to December 2012)

Main Supervisor: Kenneth O. Stanley

TEACHING EXPERIENCE

Instructor of Record. Northeastern University, Spring 2016

Course: Foundations of Artificial Intelligence

Designed and taught the course taken by both undergraduates and graduate students

Graduate Instructor of Record. University of Central Florida, Summer 2010

Course: Introduction to Artificial Intelligence and Neuroevolution

Designed and taught the course taken by specially selected high school students in the Burnett Honors College Summer Institute

Undergraduate Instructor of Record. University of Central Florida, Summer 2008

Course: Introduction to Artificial Intelligence and Neuroevolution

Designed and taught the course taken by specially selected high school students in the Burnett Honors College Summer Institute

Teaching Assistant University of Central Florida, Summer 2007

Course: Intermediate Java

Main Instructor: Arup Guha, Department of Electrical Engineering and Computer Science.

Mathlab Tutor University of Central Florida, 2004-2006

Tutored students in the following subjects: Finite Mathematics, Trigonometry, Geometry, College Algebra, Calculus, Differential Equations

WORKSHOPS AND COMPETITIONS ORGANIZED:

Co-Chair of the Computational Creativity in Games Workshop at the International Conference on Computational Creativity 2017, Atlanta, Georgia.

Co-Chair of Workshops at the Foundations of Digital Games 2017 (FDG2017), Cape Cod, MA, August 14-17, 2017.

Co-Chair of the 7th Workshop on Procedural Content Generation hosted by the 1ST Joint International Conference of DiGRA AND FDG (DiGRA-FDG 2016), Dundee, Scotland,

Co-Chair of the Digital Entertainment Technologies and Arts Track (DETA) at the Genetic and Evolutionary Computation Conference (GECCO- 2015), Madrid, Spain, July 11-15, 2015.

Chair of Competitions at GECCO-2014. Vancouver, British Columbia, Canada, July 12-16, 2014.

Co-Chair of the Evolutionary Art, Design, and Creativity Competition at GECCO-2014. Vancouver, British Columbia, Canada, July 12-16, 2014.

Co-Chair of the Evolutionary Art, Design, and Creativity Competition at GECCO-2013. Amsterdam, The Netherlands, July 06-10, 2013.

Co-Chair of the Evolutionary Art, Design, and Creativity Competition at GECCO-2012. Philadelphia, PA, July 07-11, 2012.

PROFESSIONAL SERVICE

PC Member and Reviewer for:

- IEEE Congress on Evolutionary Computation (IEEE CEC 2017).
- 5th Computer Games Workshop at the International Joint Conference on Artificial Intelligence (CGW at IJCAI 2017).
- 1ST Joint International Conference of DiGRA and FDG (DiGRA-FDG 2016).
- Experimental AI in Games (EXAG) Workshop at the Annual AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (EXAG at AIIDE 2016, 2015)
- Computational Creativity and Games Workshop at the International Conference on Computational Creativity (CCGW at ICC 2015, 2016)
- Foundations of Digital Games (FDG 2017, 2016, 2015)
- International Symposium for Electronic Art (ISEA 2017, 2015)
- Fifth International Conference on Computational Creativity (ICCC 2017, 2016, 2015, 2014)
- Genetic and Evolutionary Computation Conference (GECCO 2017, 2016, 2014, 2013, 2012, 2011)
- International Conference on Evolutionary and Biologically Inspired Music, Sound, Art and Design (EvoMUSART 2017, 2016, 2015, 2014, 2013, 2012)
- European Event on Evolutionary and Biologically Inspired Music, Sound, Art and Design (EvoMUSART 2010, 2009)

Reviewer for:

- AI and the Arts Track at International Joint Conference on Artificial Intelligence (IJCAI 2015)
- 16th International Society for Music Information Retrieval Conference (ISMIR 2015)

Panelist for:

- Women in AI Workshop* International Joint Conference on Artificial Intelligence, July 12, 2016.
- You're Graduating - Now What?* Women in Electrical Engineering and Computer Science, University of Central Florida, April 12, 2013.
- Internship and Undergraduate Research Workshop*, Women in Electrical Engineering and Computer Science, University of Central Florida, March 28, 2013.
- CRA-W/CDC Alliance Distinguished Lecture Series Graduate School Information Panel*, University of Central Florida, Florida Institute of Technology, and Rollins College, March 26, 2013.

POSTERS AND DEMONSTRATIONS

- Demo: A Computer-Assisted Approach to Composing with MaestroGenesis** at the First International Workshop on Musical Metacreation (MUME 2012). Palo Alto, CA 2012.
Paul A. Szerlip, Amy K. Hoover, Kenneth O. Stanley
- MaestroGenesis: Computer-Assisted Musical Accompaniment Generation** at the Third International Conference on Computational Creativity. Dublin, Ireland 2012.
Paul A. Szerlip, Amy K. Hoover, Kenneth O. Stanley
- Facilitating Musical Creativity with Artificial Intelligence** at the Computer Research Association-Women Grad Cohort. Seattle, WA 2012.
Amy K. Hoover, Paul A. Szerlip, Kenneth O. Stanley

Automatically Generating Drum Tracks for Existing Songs with a Computer at the Showcase of Undergraduate Research Excellence, University of Central Florida, 2008
Advisor: Kenneth O. Stanley, Department of Electrical Engineering and Computer Science.
1st place in Physical Sciences, Mathematics, Computer Science and Engineering (out of 30 submissions).

Snake Mitochondrial Genomics at the Showcase of Undergraduate Research Excellence, University of Central Florida, 2005.
Advisor: Christopher L. Parkinson, Department of Biology.

UNDERGRADUATE LEADERSHIP POSITIONS

Women in Electrical Engineering and Computer Science. University of Central Florida, 2008 - 2014
Position: Secretary 2011

Association of Computing Machinery at the University of Central Florida. University of Central Florida, 2007 - 2009
Position: UCF President 2007

Upsilon Pi Epsilon: International Honor Society for the Computing and Information Disciplines
University of Central Florida, 2007 - present
Chapter President 2013
Chapter President 2012
Chapter Vice President 2011
Chapter Secretary 2009, 2010