Stephen G. Ware, Ph.D.

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Biography

Stephen G. Ware, Ph.D. is an Associate Professor with tenure in the Department of Computer Science at the University of Kentucky, where he directs the Narrative Intelligence Lab and teaches courses on artificial intelligence and game development.

Prof. Ware's research uses AI to model interactive stories in virtual environments like video games and training simulations. Virtual reality experiences are more effective when the behavior of characters and the environment adapt to accommodate the player's choices. Prof. Ware works on *strong story narrative planning systems* (contrasted with emergent story systems) which quickly consider millions of hypothetical futures to find optimal stories given the experience designer's aesthetic and pedagogic goals.

His work has earned three best paper awards and been nominated for two more. Since 2014, he has participated in over $2.5 million in sponsored federal, state, and local research, including a CAREER award from the U.S. National Science Foundation. He has published 8 peer-reviewed articles in scientific journals, 24 peer-reviewed conferences papers, and assorted peer-reviewed workshop papers, posters, and book chapters. According to Google Scholar, his *h-index* is 14, his *i10-index* is 21, and his work receives between 75 and 100 citations a year.

Prof. Ware has served as a referee for the *IEEE Transactions on Games* journal since 2013 and the *Autonomous Agents and Multi-Agent Systems* journal since 2019. He has served as General Chair and Program Chair for the AAAI international conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE), and serves on the program committee for many other conferences and workshops, including the international conference on Intelligent Virtual Agents (IVA), International Conference on Interactive Digital Storytelling (ICIDS), IEEE Conference on Games (CoG), Foundations of Digital Games (FDG), Intelligent Narrative Technologies (INT), Computational Models of Narrative (CMN), Association for the Advancement of Artificial Intelligence (AAAI), and the International Joint Conference on Artificial Intelligence (IJCAI).

Research Interests

- fast multi-agent planning
- computational models of narrative
- plan recognition
- entertaining and educational games
- human computer interaction
- agent beliefs, desires, and intentions

Professional Experience

Summer 2023 to Present	Associate Professor with tenure and Director of the Narrative Intelligence Lab University of Kentucky, Department of Computer Science
Fall 2019 to Summer 2023	Assistant Professor and Director of the Narrative Intelligence Lab University of Kentucky, Department of Computer Science
Summer 2022 to Present	Consultant Disney Research | Studios, Zürich, Switzerland
Fall 2014 to Summer 2019	Assistant Professor and Director of the Narrative Intelligence Lab University of New Orleans, Department of Computer Science
Summer 2009 & Summer 2013	Instructor North Carolina State University, Department of Computer Science
Fall 2009 to Summer 2014	Research Assistant North Carolina State University, Department of Computer Science
Fall 2008 to Spring 2009	Teaching Assistant North Carolina State University, Department of Computer Science
Summer 2007	Software Engineer, Intern DAXCO Inc. Birmingham AL, USA

Education

North Carolina State University   Raleigh NC, USA

June 2014	Doctor of Philosophy in Computer Science Thesis: *A Plan-Based Model of Conflict for Narrative Reasoning and Generation* Advisor: Professor R. Michael Young
May 2011	Master of Science in Computer Science, GPA 4.0 / 4.0

Loyola University New Orleans   New Orleans LA, USA

May 2008	Bachelor of Science, Summa Cum Laude with University Honors, GPA 4.0 / 4.0 Majors in Computer Science and Philosophy Thesis: *Merlin's Beard and Odin's Eye: A Survey of the Wizard Archetype in Literature, Opera, and Cinema.* Advisor: Professor William T. Cotton, English Department

Awards and Honors

October, 2023   *Best Program Committee Member*
19th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment

October, 2021   *Nomination for Best Paper*
17th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment

October, 2020   *Nomination for Best Student Paper* (Cory Siler, student)
16th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment

October, 2020   *Nomination for Best Artifact*
16th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment

January, 2019   *Early Career Creativity, Research, and Scholarship Award*
University of New Orleans

October, 2017   *Best Program Committee Member*
13th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment

April, 2017   *Faculty Distinguished Research Award*
University of New Orleans Honors Program

December, 2016   *Region 1 Postsecondary Teacher of the Year*
Louisiana Association of Computer Using Educators

October 2014   *Best Student Paper*
10th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment

July 2012   *Best Paper*
International Conference on Interactive Digital Storytelling

May 2012   *Best Student Paper on a Cognitive Science Topic*
Computational Models of Narrative Workshop

April 2010   *Honorable Mention, Graduate Research Fellowship*
U.S. National Science Foundation

March 2010   *Outstanding Teaching Assistant*
North Carolina State University Graduate Student Association

August 2009	*Dean's Fellowship*
	North Carolina State University, Department of Computer Science
May 2008	*William T. Cotton Service Award*
	Loyola University New Orleans
May 2008	*Percy A. Roy S.J. Award for Highest Grade Point Average*
	Loyola University New Orleans, College of Humanities and Natural Sciences
May 2008	*Outstanding Computer Science Major*
	Loyola University New Orleans, Dept. of Mathematics and Computer Science
May 2008	*Guy Lemieux S.J. Award for Excellence in Philosophy*
	Loyola University New Orleans, Department of Philosophy
May 2004	*Ignatian Scholarship*
	Loyola University New Orleans

Sponsored Research

Grants Awarded

January 2023 to May 2024	*Inferring Domain Models to help Analysts with Belief and Intention Recognition* Role: Co-Principal Investigator Laboratory for Analytic Science, Department of Defense $224,993 total / $101,000 my share
April 2022 to April 2027	*CAREER: Structured High-Agency Interactive Narratives for Virtual Environments* Role: Principal Investigator US National Science Foundation $530,369.00
January 2022 to December 2023	*Visualizing and Assisting the Analytic Process* Role: Co-Principal Investigator Laboratory for Analytic Science, Department of Defense $186,208 total / $93,104 my share
January 2021 to December 2021	*Hierarchical Abstract Process Modeling for Analyst Workflow* Role: Co-Principal Investigator Laboratory for Analytic Science, Department of Defense $182,453 total / $91,227 my share

January 2020 to December 2020	*Explainable Interventions for Analyst Workflow* Role: Co-Principal Investigator Laboratory for Analytic Science, Department of Defense $182,438 total / $91,219 my share
October 2019 to Present	*CHS: Small: Strong Story Narrative Planning for Authoring Proactive Intelligent Virtual Environments* Role: Principal Investigator US National Science Foundation $493,256
January 2019 to July 2019	*Recognizing the Beliefs and Intentions of Agents Using Narrative Planning* Role: Principal Investigator University of New Orleans Office of Research and Sponsored Programs $15,000
January 2019 to July 2019	*Early Career Creativity, Research, and Scholarship Award* Role: Principal Investigator University of New Orleans Office of Research and Sponsored Programs $7,500
January 2019 to December 2019	*Foreseeing, Recognizing, and Influencing Possible Futures Using Multi-Agent Planning Algorithms* Role: Principal Investigator Laboratory for Analytic Science, Department of Defense $80,543
January 2018 to December 2018	*Fast, Strong-Story BDI Planning for Intelligent Virtual Narratives* Role: Principal Investigator University of New Orleans Office of Research and Sponsored Programs $14,765
July 2017 to July 2019	*CC* Network Design: ARCHES (Advanced Research Computing in the Humanities Engineering and Sciences) Network at the Univ. of New Orleans* Role: Co-Principal Investigator US National Science Foundation $335,000
August 2016 to July 2017	*EAGER: Planning Believable Narratives by Modeling Agent Beliefs* Role: Principal Investigator US National Science Foundation $156,969
May 2017 to June 2017	*Salience-Based Drama Management: A Pilot Study* Role: Principle Investigator University of New Orleans College of Sciences $10,051

July 2016 to June 2017	*Bringing Use-of-Force Training Simulations into Virtual Reality* Role: Principal Investigator University of New Orleans Office of Research and Sponsored Programs $14,982
November 2015 to June 2016	*Intelligent Planning of Interactive Narratives to Teach Best Practices* Role: Principal Investigator University of New Orleans Office of Research and Sponsored Programs $20,000
May 2015 to April 2019	*CRII: CHS: Structuring Narratives in Interactive Virtual Environments Using Computational Models of Possible Worlds* Role: Principal Investigator US National Science Foundation $138,436
May 2015 to May 2016	*Creating an Interdisciplinary Digital Media Laboratory* Role: Principal Investigator Louisiana Board of Regents, Enhancement Program $110,042
May 2015 to August 2015	*Reading Rocket: A Game-Based Reading Level Test for Children Based on Stealth Assessment* Role: Principal Investigator University of New Orleans Office of Research and Sponsored Programs $11,800

Publications

Manuscripts of all publications can be found at `http://cs.uky.edu/~sgware`.

Refereed Journal Articles

[1]   Alireza Shirvani, Stephen G. Ware, and Lewis Baker, "Personality and Emotion in Strong-Story Narrative Planning," *IEEE Transactions on Games*, vol. 15, num. 4, pp. 669-682, 2023.

[2]   Stephen G. Ware, Edward Garcia, Mira Fisher, Alireza Shirvani, and Rachelyn Farrell, "Multi-Agent Narrative Experience Management as Story Graph Pruning," *IEEE Transactions on Games*, vol. 15, num. 3, pp. 378-387, 2022.

[3]   Cory Siler and Stephen G. Ware, "Solution density and search strategy in narrative generation," *IEEE Transactions on Games*, vol. 14, num. 4, pp. 715-724, 2022.

[4]   Rachelyn Farrell and Stephen G. Ware, "Manipulating narrative salience in interactive stories using Indexter's Pairwise Event Salience Hypothesis," *IEEE Transactions on Games*, vol. 12, num. 1, pp. 74-85, 2019.

[5]   Stephen G. Ware, R. Michael Young, "Intentionality and conflict in *The Best Laid Plans* interactive narrative virtual environment," *IEEE Transactions on Computational Intelligence and Artificial Intelligence in Games*, vol. 8, num. 4, pp. 402-411, 2015.

[6]   Brent Harrison, Stephen G. Ware, Matthew William Fendt, and David L. Roberts, "A survey and analysis of techniques for player behavior prediction in massively multiplayer online games," *IEEE Transactions on Emerging Topics in Computing Special Issue on MMO Technologies*, vol. 3, num. 2, pp. 260-274, 2014.

[7]   Stephen G. Ware, R. Michael Young, Brent Harrison, and David L. Roberts, "A computational model of narrative conflict at the fabula level," *IEEE Transactions on Computational Intelligence and Artificial Intelligence in Games*, vol. 6, num. 3, pp. 271-288, 2014.

[8]   R. Michael Young, Stephen G. Ware, Bradly A. Cassell, and Justus Robertson, "Plans and planning in narrative generation: a review of plan-based approaches to the generation of story, discourse, and interactivity in narratives," *SDV. Sprache und Datenverarbeitung, Special Issue on Formal and Computational Models of Narrative,* vol. 37, num. 1-2, pp. 41-64, 2013.

Refereed Journal Articles in Preparation and Under Review

[9]   Rachelyn Farrell, Alireza Shirvani, and Stephen G. Ware, "Narrative planning with theory of mind: a knowledge representation for generating stories with believable characters," in *Journal of Artificial Intelligence Research*, 2022.

Refereed Conference Papers

[1]   Stephen G. Ware, Lasantha Senanayake, and Rachelyn Farrell, "Causal necessity as a narrative planning step cost function," in *Proceedings of the 19th AAAI international conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 155-164, 2023. 29% acceptance rate

[2]   Rachelyn Farrell, Mira Fisher, and Stephen G. Ware, "Salience vectors for measuring distance between stories," in *Proceedings of the 18th AAAI international conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 95-104, 2022. (full paper presented as poster) 62% acceptance rate

[3]   Rachelyn Farrell and Stephen G. Ware, "Salience as a narrative planning step cost function," in *Proceedings of the IEEE Conference on Games*, pp. 433-440, 2022. 44% acceptance rate

[4]   Stephen G. Ware and Cory Siler, "Sabre: a narrative planner supporting intention and deep theory of mind," in *Proceedings of the 17th AAAI International Conference of Artificial Intelligence and Interactive Digital Entertainment*, pp. 99-106, 2021 (nominated for Best Paper). 29% acceptance rate

[5]   Rachelyn Farrell and Stephen G. Ware, "Narrative planning for belief and intention recognition," in *Proceedings of the 16th AAAI International Conference of Artificial Intelligence and Interactive Digital Entertainment*, pp. 52-58, 2020. 25% acceptance rate

[6]   Cory Siler and Stephen G. Ware, "A good story is one in a million: solution density in narrative generation problems," in *Proceedings of the 16th AAAI International Conference of Artificial Intelligence and Interactive Digital Entertainment*, pp. 123-129, 2020 (nominated for Best Student Paper). 25% acceptance rate

[7]   Alireza Shirvani and Stephen G. Ware, "A formalization of emotional planning for strong-story systems," in *Proceedings of the 16th AAAI International Conference of Artificial Intelligence and Interactive Digital Entertainment*, pp. 116-122, 2020. 25% acceptance rate

[8]   Stephen G. Ware, Edward T. Garcia, Alireza Shirvani, and Rachelyn Farrell, "Multi-agent narrative experience management as story graph pruning," in *Proceedings of the 15th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 87-93, 2019. 25% acceptance rate

[9]   Alireza Shirvani and Stephen G. Ware, "A plan-based personality model for story characters," in *Proceedings of the 15th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 188-194, 2018. (full paper presented as poster) 49% acceptance rate

[10]   Edward T. Garcia, Stephen G. Ware, and Lewis J. Baker. "Measuring presence and performance in an intelligent virtual reality police use of force training simulation prototype," in *Proceedings of the 32nd AAAI International Conference of the Florida Artificial Intelligence Research Society*, pp. 276-281, 2019. 52% acceptance rate

[11]   Alireza Shirvani, Rachelyn Farrell, and Stephen G. Ware, "Combining intentionality and belief: revisiting believable character plans," in *Proceedings of the 14th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 222-228, 2018. (full paper presented as poster) 50% acceptance rate

[12]   Alireza Shirvani, Stephen G. Ware, and Rachelyn Farrell. "A possible worlds model of belief for state-space narrative planning," in *Proceedings of the 13th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 101-107, 2017. 25% acceptance rate

[13]   Rachelyn Farrell, Stephen G. Ware. "Causal link semantics for narrative planning using numeric fluents," in *Proceedings of the 13th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 193-199, 2017. (full paper presented as poster) 50% acceptance rate

[14]   Rachelyn Farrell and Stephen G. Ware. "Influencing user choices in interactive narratives using Indexter's Pairwise Event Salience Hypothesis," in *Proceedings of the 13th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, 2017. 25% acceptance rate

[15]   Rachelyn Farrell and Stephen G. Ware, "Predicting user choices in interactive narratives using Indexter's pairwise event salience hypothesis," in *Proceedings of the 9th International Conference of Interactive Digital Storytelling*, pp. 147-155, 2016. 36% acceptance rate

[16] Rachelyn Farrell, Scott Robertson, and Stephen G. Ware, "Asking hypothetical questions about stories using QUEST," in *Proceedings of the 9th International Conference of Interactive Digital Storytelling*, pp. 136-146, 2016. 36% acceptance rate

[17] Rachelyn Farrell and Stephen G. Ware, "Fast and diverse narrative planning through novelty pruning," in *Proceedings of the 12th AAAI International Conference of Artificial Intelligence and Interactive Digital Entertainment*, pp. 37-43, 2016. 28% acceptance rate

[18] Christopher Kives, Stephen G. Ware, and Lewis J. Baker, "Evaluating the Pairwise Event Salience Hypothesis in *Indexter*," in *Proceedings of the 11th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 30-36, 2015. 28% acceptance rate

[19] Stephen G. Ware and R. Michael Young, "Glaive: a state-space narrative planner supporting intentionality and conflict," in *Proceedings of the 10th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 80-86, 2014 (awarded Best Student Paper). 26% acceptance rate

[20] Rogelio E. Cardona-Rivera, Justus Robertson, Stephen G. Ware, Brent Harrison, David L. Roberts, and R. Michael Young, "Foreseeing meaningful choices," in *Proceedings of the 10th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 9-15, 2014. 26% acceptance rate

[21] Stephen G. Ware, R. Michael Young, Brent Harrison, and David L. Roberts, "Four quantitative metrics describing narrative conflict," in *Proceedings of the 5th International Conference on Interactive Digital Storytelling*, pp. 18-29, 2012. 29% acceptance rate

[22] Matthew William Fendt, Brent Harrison, Stephen G. Ware, Rogelio E. Cardona-Rivera, and David L. Roberts, "Achieving the illusion of agency," in *Proceedings of the 5th International Conference on Interactive Digital Storytelling*, pp. 114-125, 2012 (awarded Best Paper). 29% acceptance rate

[23] Stephen G. Ware and R Michael Young, "Validating a plan-based model of narrative conflict," in *Proceedings of the International Conference on the Foundations of Digital Games*, pp. 220-227, 2012. 29% acceptance rate

[24] Stephen G. Ware and R. Michael Young, "CPOCL: a narrative planner supporting conflict," in *Proceedings of the 7th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 97-102, 2011. 35% acceptance rate

[25] Stephen G. Ware and R. Michael Young, "Modeling narrative conflict to generate interesting stories," in *Proceedings of the 6th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 210-215, 2010. (full paper presented as poster) 33% acceptance rate

Refereed Workshop and Consortium Papers

[1] Mira Fisher, Core Siler, and Stephen G. Ware, "Intelligent de-escalation training via emotion-inspired narrative planning," in *Proceedings of the 13th Intelligent Narrative Technologies workshop at the 18th AAAI international conference on Artificial Intelligence and Interactive Digital Entertainment*, 2022. (forthcoming)

[2]   Stephen G. Ware and Orion Fisher, "Exploring regression-based narrative planning," in *Proceedings of the 12th Intelligent Narrative Technologies workshop at the 16th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, 2020.

[3]   Alireza Shirvani and Stephen G. Ware, "*Camelot*: a modular customizable sandbox for visualizing interactive narratives," in *Proceedings of the 12th Intelligent Narrative Technologies workshop at the 16th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, 2020.

[4]   Alireza Shirvani and Stephen G. Ware, "On automatically motivating story characters," in *Proceedings of the Experimental Artificial Intelligence in Games workshop at the 15th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, 2019.

[5]   Stephen G. Ware, "Mutual Implicit Question Answering for shared authorship: a pilot study on player expectations," in *Proceedings of the 10th Intelligent Narrative Technologies Workshop at the 13th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 259-265, 2017.

[6]   Stephen G. Ware, "The Intentional Fast-Forward narrative planner," in *Proceedings of the 5th Intelligent Narrative Technologies Workshop at the 8th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 57-62, 2012.

[7]   Rogelio E. Cardona-Rivera, Bradley A. Cassell, Stephen G. Ware and R. Michael Young, "Indexter: a computational model of the Event-Indexing Situation Model for characterizing narratives," in *Proceedings of the 3rd Workshop on Computational Models of Narrative at the Language Resources and Evaluation Conference*, pp. 34-43, 2012 (awarded Best Student Paper on a Cognitive Science Topic).

[8]   Stephen G. Ware, Brent Harrison, R. Michael Young, and David L. Roberts, "Initial results for measuring four dimensions of narrative conflict," in *Proceedings of the 4th Workshop on Intelligent Narrative Technologies at the 7th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 115-122, 2011.

[9]   Stephen G Ware, "A computational model of narrative conflict," Doctoral Consortium at the *International Conference on the Foundations of Digital Games*, 2011.

[10]   Stephen G. Ware and R. Michael Young, "Rethinking traditional planning assumptions to facilitate narrative generation," in *Proceedings of the AAAI Fall Symposium on Computational Models of Narrative*, pp. 71-72, 2010.

Refereed Posters and Extended Abstracts

[1]   Stephen G. Ware and Cory Siler, "The Sabre narrative planner: multi-agent coordination with intentions and beliefs," in *Proceedings of the 20th International Conference on Autonomous Agents and Multi-Agent Systems,* pp. 1698-1700, 2020. 40% acceptance rate

Refereed Book Chapters

[1]   Stephen G. Ware, "An introduction to Graph Theory," *Practical Graph Mining with R.* CRC Press, pp. 9-26, 2012.

[2]   Brent Harrison, Jason Smith, Stephen G. Ware, "Frequent subgraph mining," *Practical Graph Mining with R.* CRC Press, pp. 181-221, 2013.

Refereed Demonstrations

[1]   Ben Samuel, Aaron Reed, Emily Short, Samantha Heck, Barrie Robison, Landon Wright, Terence Soule, Mike Treanor, Joshua McCoy, Anne Sullivan, Alireza Shirvani, Edward Garcia, Rachelyn Farrell, Stephen Ware, Katherine Compton, "Playable experiences at AIIDE 2018," in *Proceedings of the 14th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 275-280, 2018.

[2]   Nathan R. Sturtevant, Jeff Orkin, Robert Zubek, Michael Cook, Stephen G. Ware, Christian Stith, R. Michael Young, Phillip Wright, Squirrel Eiserloh, Alejandro Ramirez-Sanabria, Vadim Bulitko, Kieran Lord, "Playable experiences at AIIDE 2014," in *Proceedings of the 10th AAAI International Conference on Artificial Intelligence and Interactive Digital Entertainment*, pp. 203-209, 2014.

Non-Refereed Publications

[1]   Stephen G. Ware and Rush Sanghrajka, "Workshop Report: Intelligent Narrative Technologies: The 16th AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment," *Interactive AI Magazine*, 2021.

[2]   Stephen G. Ware, R. Michael Young, Christian Stith, Phillip Wright, "Interactive Narrative Planning in *The Best Laid Plans*," in *Proceedings of the AI Open House at the 29th Conference of the Association for the Advancement of Artificial Intelligence*, pp. 4313-4314, 2015.

[3]   Oliver Gown, Arne Eigenfeldt, Rania Hodhod, Philippe Pasquier, Reid Swanson, Stephen G. Ware, and Jichen Zhu, "Reports on the 2012 AIIDE workshops," *AI Magazine*, vol. 34:1, pp. 90, 2012.

[4]   Stephen G. Ware, "Crossed swords and broken hearts: a computational model of narrative conflict." Poster, North Carolina State University Graduate Research Symposium, 2012.

Non-Computer Science Publications

[1]   Stephen G. Ware, "The Wise Old Man as the archetype of the spirit," *Reader's Response*, Loyola University Press, 2009.

[2]   Stephen G. Ware, "Nobody's problem: a response to Thomas Metzinger's *Being No One*," *Elenchos: The Loyola Undergraduate Journal of Philosophy*, 2008.

Invited Talks

Invited talks associated with conference papers are not listed.

Keynote Addresses

March 2021   "Learning from Mis-Spun Tales"
              Immersive Stories Workshop
              Virginia Tech Center for Human-Computer Interaction, Blacksburg, VA, USA

Invited Research Talks

April 2021   "Learning from Mis-Spun Tales"
                 Disney Research | Studios, Zürich, Switzerland

February 2019   "Intelligent Structured Storytelling in Virtual Worlds"
                 University of Kentucky, Lexington, KY, USA

May 2018   "Computing Stories"
                 Charles River Analytics, Boston, MS, USA

January 2014   "Modeling and Generating Stories with Conflict: A Case Study in Narrative AI"
                 Villanova University, Villanova, PA, USA
                 University of New Orleans, New Orleans, LA, USA

February 2014   "Modeling and Generating Stories with Conflict: A Case Study in Narrative AI"
                 American University, Washington DC, USA
                 Middle Tennessee State University, Murfreesboro, TN, USA
                 Southwestern University, Georgetown, TX, USA
                 Xerox PARC, Palo Alto, CA, USA

Invited Panels

November 2019   Panelist, *Benchmarking Interactive Narrative Systems*
                 12th International Conference on Interactive Digital Storytelling
                 Snowbird, UT, USA

June 2019   Panelist, *Narrative Intelligence in Interactive Storytelling*
                 1st NarraScope Conference
                 Massachusetts Institute of Technology, Boston, MA, USA

November 2012   Panelist, *Expert Panel*
                 5th International Conference on Interactive Digital Storytelling
                 Technological Park, San Sebastián, Spain

October 2012	Moderator, *The Near Future of Intelligent Narrative Technologies*
	5th Workshop on Intelligent Narrative Technologies
	Stanford University, Palo Alto, CA, USA
February 2012	Panelist, *Two Cultures: Crossing the Divide*
	Collaborations: Humanities and Technology Festival
	Duke University, Durham, NC, USA

Professional Organizations

- Association for the Advancement of Artificial Intelligence (member #53757)
- Association for Computing Machinery (member #2211285)
- Institute of Electrical and Electronics Engineers (member #92209981)
- International Game Developers Association (member #22066812)
- Association for Research on Digital Interactive Narratives

Professional Service

Funding Panels and Reviews

May 2015	National Science Foundation, CISE Directorate
	Arlington, VA, USA

External Grant Evaluation

December 2020	Dutch Research Council
	The Hague, The Netherlands
January 2019	National Sciences and Engineering Research Council of Canada
	Ottawa, Canada
October 2019	University of Costa Rica
	San José, Costa Rica

Journal Referee

October 2013 to Present	*IEEE Transactions on Games* (previously *IEEE Transactions of Computational Intelligence and Artificial Intelligence in Games*)
	6 articles reviewed

December 2019   *Autonomous Agents and Multi-Agent Systems*
to Present   1 article reviewed

Conference, Workshop, and Tutorial Organization

October 2024   Local Arrangements Chair, 19th AAAI international conference on Artificial
                Intelligence and Interactive Digital Entertainment
                University of Kentucky, Lexington KY, USA

October 2022   General Chair, 18th AAAI international conference on Artificial Intelligence
                and Interactive Digital Entertainment
                California State Polytechnic University, Pomona CA, USA

October 2021   Program Chair, 17th AAAI international conference on Artificial Intelligence
                and Interactive Digital Entertainment
                Held online due to COVID-19 epidemic

October 2020   Organizer, 12th Workshop on Intelligent Narrative Technologies
                Co-Located with the 16h[th] AAAI international conference on Artificial
                Intelligence and Interactive Digital Entertainment
                Held online due to COVID-19 epidemic

October 2019   Organizer, CamJam: Using the Camelot Virtual Environment
                Co-Located with the 15th AAAI international conference on Artificial
                Intelligence and Interactive Digital Entertainment
                Georgia Institute of Technology, Atlanta GA, USA

October 2018   Doctoral Consortium Chair, 14th AAAI international conference on Artificial
                Intelligence and Interactive Digital Entertainment
                University of Alberta, Edmonton, Canada

July 2016   Organizer, 7th Workshop on Computational Models of Narrative
                Co-Located with the 2016 Digital Humanities Conference
                Kraków, Poland

October 2012   Organizer, 5th Workshop on Intelligent Narrative Technologies
                Co-Located with the 8th AAAI international conference on Artificial
                Intelligence and Interactive Digital Entertainment
                Stanford University, Palo Alto CA, USA

Conference and Workshop Program Committees

AAAI intl. conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)
- 20th Conference, University of Kentucky, Lexington, KY, USA, October 2024

- 19th Conference, University of Utah, Salk Lake City, UT, USA, October 2023
- 18th Conference, California State Polytechnic Univ., Pomona, CA, USA, October 2022
- 17th Conference, held virtually due to COVID-19 pandemic, October 2021
- 16th Conference, held virtually due to COVID-19 pandemic, October 2020
- 15th Conference, Georgia Institute of Technology, Atlanta, GA, USA, October 2019
- 14th Conference, Edmonton, Canada 2018
- 13th Conference, Snowbird, UT, USA, October 2017
- 12th Conference, Burlingame, CA, USA, October 2016
- 11th Conference, Univ. of California Santa Cruz, Santa Cruz, CA, USA, November 2015
- 10th Conference, North Carolina State University, Raleigh, NC, USA, October 2014

International Conference on Interactive Digital Storytelling (ICIDS)
- 13th Conference, Bournemouth University, Bournemouth, UK, November 2020
- 12th Conference, Snowbird, UT, USA, November 2019
- 10th Conference, Funchal, Madeira, Portugal, November 2017
- 9th Conference, Institute for Creative Technologies, Los Angeles, CA, USA, November 2016
- 5th Conference, Technological Park, San Sebastián, Spain, November 2012

International Conference of the Association for the Advancement of Artificial Intelligence (AAAI)
- 36th Conference, Vancouver, Canada, February 2022
- 35th Conference, held virtually due to COVID-19 pandemic, February 2021
- 32nd Conference, New Orleans, LA, USA, February 2018

International Joint Conference on Artificial Intelligence (IJCAI)
- 33rd Conference, Special Track on AI, the Arts, and Creativity, Jeju, South Korea, 2024
- 29th Conference, Yokohama, Japan, July 2020
- 26th Conference, Melbourne, Australia, August 2017

International Conference on Intelligent Virtual Agents (IVA)
- 15th Conference, Delft University of Technology, Delft, The Netherlands, August 2015

IEEE international Conference on Games (CoG)
- 1st Conference, London, UK, August, 2019

Foundations of Digital Games Conference (FDG)
- Royal Caribbean Liberty of the Seas, April 2014
- Raleigh, North Carolina, USA, May 2012

Intelligent Narrative Technologies Workshop (INT)
- 13th Workshop, California State Polytechnic Univ., Pomona, CA, USA, October 2022
- 12th Workshop, held online due to COVID-19 epidemic, October 2020

- 11th Workshop, held jointly with Workshop on Intelligent Cinematography and Editing, University of Alberta, Edmonton, AB, Canada, November 2018
- 10th Workshop, Snowbird, UT, USA, October 2017
- 9th Workshop, special track of the 9th International Conference on Interactive Digital Storytelling, Los Angeles, CA, USA, November 2016
- 8th Workshop, University of California Santa Cruz, Santa Cruz, CA, USA, November 2015
- 7th Workshop, University of Wisconsin-Milwaukee, Milwaukee WI, USA, June 2014
- 6th Workshop, Northeastern University, Boston MA, USA, October 2013
- 5th Workshop, Stanford University, Palo Alto CA, USA, October 2012

Computational Models of Narrative Workshop (CMN)
- 7th Workshop, Kraków, Poland, July 2016
- 4th Workshop, University of Hamburg, Berlin, Germany, August 2013

Experimental AI in Games Workshop (EXAG)
- 2022 Workshop, California State Polytechnic Univ., Pomona, CA, USA, October 2022
- 2019 Workshop, Georgia Institute of Technology, Atlanta, GA, USA, October 2019

Teaching

Independent studies and similar courses are listed under advising.

Classes Taught at the University of Kentucky

CS 660: Topics in Artificial Intelligence (AI for Interactive Narrative)
    Spring 2023: 6 graduate
    Spring 2021: 5 graduate

CS 660 / 585: Topics in Artificial Intelligence (Planning Algorithms)
    Spring 2024: 10 graduate
    Spring 2022: 8 graduate
    Spring 2020: 6 graduate, 1 undergraduate

CS 463G: Introduction to Artificial Intelligence
    Spring 2024: 60 undergraduate
    Spring 2023: 65 undergraduate
    Spring 2022: 54 undergraduate
    Fall 2021: 55 undergraduate
    Spring 2021: 45 undergraduate

CS 410G: Introduction to Game Development

Fall 2023: 40 undergraduate
Fall 2022: 56 undergraduate
Fall 2020: 34 undergraduate (taught as *CS 485G: Special Topics*)
Fall 2019: 55 undergraduate (taught as *CS 485G: Special Topics*)

Classes Taught at the University of New Orleans

CSCI 6645: *Planning Algorithms in Artificial Intelligence*
Fall 2017: 5 graduate
Fall 2016: 7 graduate
Fall 2015: 14 graduate (taught as *CSCI 6990: Special Topics*)

CSCI 4525 / 5525: *Introduction to Artificial Intelligence*
Spring 2019: 12 undergraduate, 9 graduate
Spring 2018: 18 undergraduate, 7 graduate
Spring 2017: 11 undergraduate, 6 graduate
Spring 2016: 17 undergraduate, 3 graduate
Spring 2015: 19 undergraduate, 14 graduate

CSCI 4675 / 5675: *Advanced Game Development*
Spring 2018: 5 undergraduate, 4 graduate
Spring 2017: 9 undergraduate
Spring 2016: 7 undergraduate, 3 graduate

CSCI 4670 / 5670: *Fundamentals of Game Development*
Fall 2018: 17 undergraduate, 2 graduate
Fall 2017: 20 undergraduate, 7 graduate
Fall 2016: 13 undergraduate, 2 graduate
Fall 2015: 10 undergraduate, 10 graduate
Fall 2014: 11 undergraduate, 2 graduate

CSCI 1583: Software Design and Development I
Spring 2019: 14 undergraduate
Fall 2018: 32 undergraduate

Classes Taught at North Carolina State University

CSC 316: *Data Structures for Computer Scientists*
Summer 2013: 21 undergraduate

CSC 216: *Programming Concepts – Java*
Summer 2009: 12 undergraduate

Teaching Assistantships and Guest Lectures at North Carolina State University

CSC 522: Automated Learning and Data Analysis (Data Mining)
CSC 565: Graph Theory
CSC 326: Software Engineering
CSC 281: Foundations of Interactive Game Design
CSC 295: Foundations of Game Design

Research Supervised

Doctor of Philosophy, as Advisor
- Rachelyn Farrell, Spring 2015 to Fall 2022, University of Kentucky
  Thesis: *Don't Give Me That Story! Human-Centered Narrative Generation and Summarization of Possible Stories*
- Alireza Shirvani, Spring 2017 to Summer 2021, University of Kentucky
  Thesis: *Personality and Emotion for Virtual Characters in Strong-Story Narrative Planning*
- Cory Siler, Spring 2020 to Present, University of Kentucky (degree in progress)
- Mira Fisher, Summer 2020 to Present, University of Kentucky (degree in progress)
- Lasantha Senanayake, Spring 2023, University of Kentucky (degree in progress)
- Alexander Barrera, Summer 2023, University of Kentucky (degree in progress)

Doctor of Philosophy, as Committee Member
- Luke Elmore, Spring 2023 to Present, University of Kentucky (degree in progress)
- Nathan Arnold, Fall 2021 to Present, University of Kentucky (degree in progress)
- Anton Vinogradov, Spring 2021 to Present, University of Kentucky (degree in progress)
- Giulio Mori, Spring 2020 to Summer 2023, University of Reykjavík
  Thesis: *Platform for Decoupling Experience Managers and Environments*
- Tasmia Tasrin, Spring 2020 to Present, University of Kentucky (degree in progress)
- Md. Sultan Al Nahian, Fall 2019 to Present, University of Kentucky (degree in progress)

Master of Science, as Advisor
- Jacob Finerty, Fall 2022, University of Kentucky
  Project: *Implementing Iterated Width Search into the Sabre Narrative Planner*
- Habarakadage Thilina Madhusanka Perera, Spring 2020 to Spring 2021, University of Kentucky (degree not completed)
- Dustin Peabody, Spring 2016 to Spring 2018, University of New Orleans
  Thesis: *Detecting Metagame Shifts in League of Legends Using Unsupervised Learning*
- Edward T. Garcia, Fall 2015 to Summer 2019, University of New Orleans
  Thesis: *Multi-Agent Narrative Experience Management as Story Graph Pruning*

- Dharmesh Desai, Fall 2015 to Spring 2017, University of New Orleans
  Thesis: *Measuring Presence in a Police Use of Force Simulation*
- Rachelyn Farrell, Summer 2015 to Spring 2017, University of New Orleans
  Thesis: *Predicting User Choices in Interactive Narratives using Indexter's Pairwise Event Salience Hypothesis*

Master of Science, as Committee Member
- Vincent Liu, Spring 2023, University of Kentucky
  Thesis: *Language Controlled Interfaces for Game Environments*
- Jonathan Moore, Spring 2023, Air Force Institute of Technology
  Thesis: *Designing an Adaptable Game Framework to Teach Joint All-Domain Concepts in a Variety of Training Environments*
- Ryan Lindsey, Fall 2022, University of Kentucky
  Project: *Novel 3D Environment for Reinforcement Learning*
- Michael Probst, Fall 2021, University of Kentucky
  Thesis: *Maintaining Game Event Sequences in Procedurally Generated Levels*
- Ryan Bowles, Spring 2021, University of Kentucky
  Project: *Penumbral Passage: A Single Player Digital Board Game*
- Devi Kavya Sri Regati, Spring 2020, University of Kentucky
  Project: *Implementing Preference Reasoning over Answer Set Optimization Problems*
- Dheeraj Betha, Fall 2019, University of Kentucky
  Project: *Using Omiotis for Software Tracing*
- Shyla Clark, Spring 2019, University of New Orleans
  Thesis: *Remote Monitoring of Cherry Wetness Using a Leaf Wetness Sensor and Wireless Sensor Network*

Bachelor of Science, as Advisor or Independent Study Instructor, etc.
- Matthew Melton, Spring 2023, University of Kentucky, Independent Study
- Travis Nilest, Spring 2023, University of Kentucky, Independent Study
- Joseph Alverson, Spring 2023, University of Kentucky
  Thesis: *Desktop Drummer: Creating a Rhythm-Based Video Game with a Custom Controller*
- Zachary Coleman, Spring 2022, University of Kentucky, Independent Study
- Alexa Griffin, Spring 2022, University of Kentucky, Independent Study
- Matthew Mitchell, Fall 2021, University of Kentucky, Independent Study
- Gareth Walker, Fall 2021, University of Kentucky, Independent Study
- Gareth Walker, Fall 2021, University of Kentucky, Independent Study
- Ethan Hall, Fall 2021 – Spring 2022, University of Kentucky, Independent Study
- Alexander Dingus, Spring 2021, University of Kentucky, Independent Study

- Evan Shepherd, Spring 2021, University of Kentucky, Independent Study
- John Colfer, Spring 2020, University of Kentucky, Independent Study
- Zachary Foster, Spring 2020 and 2021, University of Kentucky, Independent Study
- Jacob Hayden, Spring 2020, University of Kentucky, Independent Study
- Mac McNerney, Spring 2020, University of Kentucky, Independent Study
- Jean-Paul Jeunesse, Fall 2018 to Spring 2019, University of New Orleans
  Thesis: *Measuring Interactive Narrative Quality with Experience Management as Story Graph Pruning*
- Rishav Rajendra, Spring 2018 to Fall 2018, University of New Orleans College of Sciences Undergraduate Research Program
- Lee Lagarde, Spring 2018 to Fall 2018, University of New Orleans Privateer Undergraduate Research and Scholarly UNO Experience
- Ted Mader, Fall 2016 to Spring 2017, University of New Orleans
  Thesis: *Integrating Virtual Reality with Use-of-Force Training Simulations*
- Nichola Martin, Spring 2017, University of New Orleans College of Sciences Undergraduate Research Program
- Nishan Rayamajhee, Spring 2017, University of New Orleans Privateer Undergraduate Research and Scholarly UNO Experience
- Ashim Sitoula, Spring 2016, University of New Orleans Privateer Undergraduate Research and Scholarly UNO Experience
- Pujan Pokhrel, Spring 2016, University of New Orleans Collage of Sciences Undergraduate Research Program
- Scott Robertson, Spring 2016, University of New Orleans, Independent Study
- Hung Le, Spring 2016, University of New Orleans, Independent Study
- Abhishek Sapkota, Fall 2015 to Spring 2016, University of New Orleans Collage of Sciences Undergraduate Research Program
- Rodrigo Rodrigues do Carmo, Spring 2015 to Summer 2015, University of New Orleans, Independent Study
- Maurice Robert III, Summer 2015, University of New Orleans, Independent Study
- Thiago Vieira, Summer 2015, University of New Orleans, Independent Study
- Gabriel Miranda, Summer 2015, University of New Orleans, Independent Study
- Gabriel Queiroz, Spring 2015, University of New Orleans, Independent Study
- Christopher Toups, Spring 2015, University of New Orleans, Independent Study
- Christian Stith, Fall 2013, North Carolina State University, Project Supervisor
- Phillip Wright, Fall 2013, North Carolina State University, Project Supervisor
- Eric Lang, Fall 2012, North Carolina State University, Project Supervisor
- Zack Litzsinger, Fall 2012, North Carolina State University, Project Supervisor
- Evan Kochuk, Spring 2011, North Carolina State University, Project Supervisor

- Courtney Harrison, Spring 2011, North Carolina State University, Project Supervisor

Institutional Service

University of Kentucky

Spring 2023   Hiring Committee
to Present   Department of Computer Science

Fall 2021   Committee on Higher Degrees
to Present   Department of Computer Science

Summer 2019   Media and Outreach Committee
to Present   Department of Computer Science

University of New Orleans

Fall 2015 to   Faculty Advisor
Spring 2019   International Game Developers Association, Student Chapter

Fall 2015 to   Undergraduate Studies Committee
Spring 2019   Department of Computer Science

Fall 2015   Action Team for the Recruitment and Retention of Active Military & Veterans

North Carolina State University

Spring 2009 to   Tutoring Coordinator for CSC 116: Introduction to Programming
Fall 2010   STARS Alliance: Students and Technology in Academia, Research, and Service

Loyola University New Orleans

Fall 2006 to   Founder and President
Spring 2008   Loyola University Gaming Society

Fall 2006 to   President
Spring 2007   Philosophy Club

Research Software

[1] Project Lead, *Sabre Narrative Planner*
The successor to Glaive, a fast multi-agent planner that coordinates a virtual environments based on the beliefs and intentions of its agents.
http://cs.uky.edu/~sgware/projects/sabre

[2] Project Lead, *Traffic Stop*
An intelligent virtual reality de-escalation training simulation for police officers made in consultation with the University of Kentucky Police Department's de-escalation training expert and using the HTC Vive room-scale VR platform.
(forthcoming)

[3] Project Lead, *Camelot Sandbox Environment*
A highly customizable 3D narrative virtual environment that can be controlled by many different experience management techniques to facilitate scientific evaluation.
http://cs.uky.edu/~sgware/projects/camelot

[4] Project Lead, *Reading Rocket*
A data-driven game-based assessment tool for measuring reading level in middle school children.
http:// cs.uky.edu/~sgware/projects/readingrocket

[5] Author, *Glaive Narrative Planner*
A fast multi-agent planner that coordinates cooperative and conflicting agents toward a single goal using only actions consistent with each individual's goals. Integrates intentional domain graphs into Hoffmann's Fast-Forward heuristic for significant speedups on intentional planning problems.
http:// cs.uky.edu/~sgware/projects/glaive

[6] Project Lead and AI Programmer, *The Best Laid Plans*
An adventure game created with the Unity 3D engine in which the story is generated and adapted entirely at run time by multi-agent narrative planning technology.
https://cs.uky.edu/~sgware/projects/blp

[7] Author, *simple-SAT*
An education-focused classical planner which reduces planning problems to satisfiability axioms similar to the BlackBox planner.
http://www4.ncsu.edu/~stamant/simple-planners/simple-planners.html

Publicity

12 July, 2022	"Stephen Ware's NSF-funded Research Trains Police in De-escalation," UKNow: University of Kentucky News, uknow.uky.edu [Link]
8 November, 2019	"Stephen Ware Receives NSF Grant for Computational Storytelling Research," University of Kentucky College of Engineering News, engr.uky.edu. [Link]
24 January, 2019	"University of New Orleans Awards Over $400,000 for Research and Scholarly Endeavors," University of New Orleans Campus News, uno.edu. [Link]
16 November, 2016	"UNO's Stephen Ware Recognized as Post-Secondary Teacher of the Year by Louisiana Association of Computer Using Educators," University of New Orleans Campus News, uno.edu. [Link]
26 July, 2016	"Computer Science Professor Wins $157,000 NSF Grant to Study Narrative Intelligence," University of New Orleans Campus News, uno.edu. [Link]
31 May, 2016	"Game On: UNO's Video Game Development Concentration Simulates Real World Experience," University of New Orleans Campus News, uno.edu. [Link]
13 May, 2015	"University of New Orleans to get new digital media lab," by Jed Lipinski, NOLA.com. [Link]
26 February, 2015	Guest on *All Things Considered*, WWNO National Public Radio, New Orleans, LA. Discussed computer science at the University of New Orleans, narrative intelligence, and the future of AI. [Link]
12 February, 2015	Guest on *Think Tank* with Garland Robinette, WWL Radio, New Orleans, LA. Discussed narrative intelligence, the future of AI, and higher education in New Orleans. [Link]
10 February, 2015	"UNO professor gets grant to study artificial intelligence," by Maria Clark, neworleanscitybusiness.com. [Link]
9 February, 2015	"UNO professor wins National Science Foundation grant for artificial intelligence research," by Jed Lipinski, NOLA.com. [Link]

Miscellaneous

- Sang Sea Shanties for Janelle Shane's AI Illustrated Shanties, 2021 [Link]
- Erdős Number: 4