

# CURRICULUM VITAE

Stephen J. Guy

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## Education

- Ph.D., Computer Science, University of North Carolina at Chapel Hill, 2012  
Thesis: *Geometric Collision Avoidance for Heterogeneous Crowd Simulation*  
Advisors: Ming Lin and Dinesh Manocha
- M.S., Computer Science, University of North Carolina at Chapel Hill, 2009
- B.S., Computer Engineering, University of Virginia, 2006  
Minor: Physics

## Employment

- Assistant Professor - University of Minnesota, Twin Cities; 2012 – Present
- Graduate Researcher - University of North Carolina at Chapel Hill; 2006 – 2012
- Undergraduate Researcher - University of Virginia; 2005 – 2006

## Awards and Honors

- Google/UNCF Fellowship (2010)
- Intel/GEM Fellowship (2009)
- NSF AGEP Fellowship (2007)
- Tau Beta Pi - Engineering Honor Society (2006)
- 1st Place, Fairfax Country Science Fair, Computer Science (2000)

## Membership in Professional Societies

ACM, ACM SIGGRAPH, IEEE, IEEE Computer Society, IEEE Robotics and Automation Society, AI Game Developers Guild, Game Developers Award Voter

## Selected Press Coverage

- *Future Tense (ABC Public Radio)*, [Crowds and motion](#) [Radio broadcast: [mp3](#)], March, 2015
- *Ars Technica*, [Collision avoidance predicts pedestrians' behavior](#), January, 2015
- *The Boston Globe*, [In crowds, human 'particles' follow laws of movement](#), December, 2014
- *Science News*, [Math to match pedestrian behavior is all about timing](#), December, 2014.
- *Scientific American*, [Mathematical Time Law Governs Crowd Flow](#), November, 2014

## Contributions to Teaching and Mentoring

### Advising of Graduate and Undergraduate Students

#### Post-doctoral Fellows Supervised

Former Postdoctoral Researchers:

Ioannis Karamouzas, 2012 - 2016 (Currently, Assistant Professor at Clemson University)

#### Graduate Students

Current Ph.D. Students (full-time):

Bobby Davis, 4th year

Nick Sohre, 3rd year

Tiannan Chen, 3rd year

Moses Adeagbo, 1st year

Graduated Ph.D. Students:

Julio Godoy, 2016 (First Job - University of Concepción)

Bilal Kartal, 2016

Master's Student Advisees (Graduated):

John Koenig, Current Job: Postmates

Ran Hu, Current Job: Facebook

Jessica McMillan, First Job: Adobe Systems

#### Undergraduate Students

Undergraduate researchers:

Marta Marko, Lab Participant, 2017 – Present

Justine “Charlie” Mackin, Lab Participant, 2017

Devin Lange, UROP and Lab Participant, 2012 – 2016

Moses Adeagbo, Lab Participant, 2014 - 2016

Jane Benson, Directed Research, 2015 - 2016

Philip Homan, Directed Research, 2014

Kurtis Holme, Directed Research, 2013

Undergraduate summa theses or honors projects directed:

Thomas Hvizdos, “A Monte Carlo Tree Search Based Approach to Producing Stories with Excitement Curves”, *Summa Cum Laude thesis*, 2016

Nathaniel Buck, “Procedural Content Generation in Strategy/Role-Playing Games”, *Summa Cum Laude thesis*, 2013

Summer Researchers:

- Martine Cartier, Carleton College
- Rochelle Widmer, Gustavus Adolphus College
- David Cherry, Morehouse College
- Jassiem Iffil, Morehouse College

High School Mentees:

- Ashwin Chetty, Woodbury High School
- Rustam Kosherbay, Breck High School

Ph.D. Committee Member for:

- Sujeong Kim (UNC - Chapel Hill)
- Narges Noori
- Michael Ludwig
- Volcano Kim
- Peng Liu
- Zhihang Deng
- Nicholas Walczak

## Classroom Teaching

### Courses Taught

CSCI 5611 - Animation and Planning in Games - Spring, 2017  
 CSCI 1133H - Introduction to Programming Concepts (Honors) - Fall, 2016  
 CSCI 8980 - Experimental Game Technologies - Spring, 2016  
 CSCI 5611 - Animation and Planning in Games - Fall, 2015  
 CSCI 5607 - Fundamentals of Computer Graphics I - Fall, 2014  
 CSCI 1133 - Introduction to Programming Concepts - Spring, 2014  
 CSCI 5980 - Animation and Planning in Games - Fall, 2013  
 CSCI 5980 - Special Topics: Motion in Games - Fall, 2012  
 Comp 575 - Introduction to Computer Graphics (UNC) - Fall, 2010

### New Courses Developed

- I lead the development of my special topics course to become *CSCI 5611 - Animation and Planning in Games*, which has become a regularly taught course in the CS department.

### Course Evaluations

*Recent Evaluations (Score range 1-6)*

Course	When	Num. of Students	Well Prepared	Clear Presentation	Provided Feedback	Treated Me Respectfully	Recommend Instructor?
CSCI 1133H	Fall 2016	38	5.7	5.6	5.0	5.8	92%
CSCI 8980	Spring 2016	19	5.9	5.8	5.6	5.9	94%
CSCI 5611	Fall 2015	53	5.9	5.8	5.6	5.9	100%
CSCI 5607	Fall 2014	35	5.8	5.5	5.6	5.9	95%
CSCI 1133	Spring 2014	200	5.6	5.5	5.3	5.7	98%

*Older Evaluations*

- CSCI 5980 - Fall 2013 (26 Students), Instructor Rating: 5.7/6, Overall Course Rating: 5.9/6
- CSCI 5980 - Fall 2012 (15 Students), Instructor Rating: 5.8/6, Overall Course Rating: 5.9/6
- Comp 575 - Fall 2010 [UNC] (20 Students), Instructor Rating: 4.3/5, Overall Course Rating: 4.6/5

## Contributions to Research

### External Grants

*Awarded:*

- *NSF* CHS: Small: Transforming the Architectural Design Review Process through Collaborative Embodiment in HMD-based Immersive Virtual Environments, PI: Victoria Interrante; Co-PIs: Stephen J. Guy, Lee Anderson, \$499,410 (Sept. 2015 – Aug 2018)
- *NSF* CPS: TTP Option: Synergy: Collaborative Research: Dynamic Methods of Traffic Control that Impact Quality of Life in Smart Cities, PI: Nikolaos Papanikolopoulos; Co-PIs: Brian Scott, John Hourdos, Stephen J. Guy, Mihailo Jovanovic \$1,398,795 (Sept. 2015 – Aug 2018)
- *NSF* I/UCRC Phase I: Robots and Sensors for the Human Well-being, PI: Vassilios Morellas; Co-PIs: Stephen J. Guy, Demoz Gebre-Egziabher, Maria Gini, \$156,920 (Sept. 2014 – Aug 2019)

### Internal Grants

*Awarded:*

- *MnDrive Exploratory Grant* Spectral-based Nitrogen Detection for Unmanned Aerial Vehicles, PI: Stephen J. Guy, \$40,000 (June 2014 – June 2015)

### Publications

*Starred\* names are researchers from my lab. Underlined names are the presenting authors.*

### Refereed Journals

- J1 Ioannis Karamouzas\*, Nick Sohre\*, Rahul Narain, and Stephen J. Guy. “Implicit Crowds: Optimization Integrator for Robust Crowd Simulation.” *ACM Transactions on Graphics (Siggraph)*, 2017. [**To Appear**]  
Impact Factor: 4.10.
- J2 Bobby Davis\*, Ioannis Karamouzas\*, and Stephen J. Guy. “C-OPT: Coverage-Aware Trajectory Optimization Under Uncertainty.” *Robotics and Automation Letters (RA-L) / ICRA*, IEEE, 2016. [doi:10.1109/LRA.2016.2530302](https://doi.org/10.1109/LRA.2016.2530302)
- J3 Brian Skinner and Stephen J. Guy. “A Method for Using Player Tracking Data in Basketball to Learn Player Skills and Predict Team Performance.” *PLoS ONE*, PLOS, 2015. [doi:10.1371/journal.pone.0136393](https://doi.org/10.1371/journal.pone.0136393)  
Impact Factor: 3.24
- J4 Ioannis Karamouzas\*, Brian Skinner, and Stephen J. Guy. “Universal power law governing pedestrian interactions.” *Physical Review Letters (PRL)*, 113(23). 238701, APS, 2014. [doi:10.1103/PhysRevLett.113.238701](https://doi.org/10.1103/PhysRevLett.113.238701)  
**Editor’s Selection, APS Focus Piece, and Cover Image**  
Impact Factor: 7.73.
- J5 Sujeong Kim, Stephen J. Guy, Wenxi Liu, David Wilkie, Rynson Lau, Ming C. Lin, and Dinesh Manocha. “BRVO: Predicting pedestrian trajectories using velocity-space reasoning.” *The International Journal of Robotics Research (IJRR)*, 0278364914555543, Sage, 2014. [doi:10.1177/0278364914555543](https://doi.org/10.1177/0278364914555543)  
Impact Factor: 2.50.
- J6 Panayiotis Charalambous, Ioannis Karamouzas\*, Stephen J. Guy, and Yiorgos Chrysanthou. “A data-driven framework for visual crowd analysis.” *Pacific Graphics / Computer Graphics Forum (CGF)*, 33(7), pp. 41-50. EG, 2014. [doi:10.1111/cgf.12472](https://doi.org/10.1111/cgf.12472)  
Impact Factor: 1.60.

- J7 Sujeong Kim, Stephen J. Guy, Karl Hillesland, Basim Zafar, Adnan Gutub, and Dinesh Manocha. “Velocity-Based modeling of physical Interactions in dense crowds.” *The Visual Computer*, Springer Berlin, 2014. doi:10.1007/s00371-014-0946-1  
Impact Factor: 0.91.
- J8 David Wolinski, Stephen J. Guy, Anne Hellen Olivier, Ming C. Lin, Dinesh Manocha, and Julien Pettre. “Parameter estimation and comparative evaluation of crowd simulations.” *Computer Graphics Forum (Eurographics)*, 33(2), May 2014.  
Impact Factor: 1.64.
- J9 Stephen J. Guy, Jur van den Berg, Wenxi Liu, Rynson Lau, Ming C. Lin, and Dinesh Manocha. “A statistical similarity measure for aggregate crowd dynamics.” *ACM Transactions on Graphics (Siggraph Asia)*, 31, November 2012. doi:10.1145/2366145.2366209  
Impact Factor: 3.49.
- J10 Stephen J. Guy, Sean Curtis, Ming C. Lin, and Dinesh Manocha. “Least-effort trajectories lead to emergent crowd behaviors”. *Physical Review E*, 85(1):016110, January 2012. doi:10.1103/PhysRevE.85.016110  
Impact Factor: 2.31
- J11 Jamie Snape, Jur van den Berg, Stephen J. Guy, and Dinesh Manocha. “The hybrid reciprocal velocity obstacle”. *IEEE Transactions on Robotics (T-RO)*, 27, April 2011. doi:10.1109/TRO.2011.2120810  
Impact Factor: 2.57
- J12 Russell Gayle, Avneesh Sud, Erik Andersen, Stephen J. Guy, Ming C. Lin, and Dinesh Manocha. “Interactive navigation of heterogeneous agents using adaptive roadmaps.” *IEEE Transactions on Visualization and Computer Graphics (TVCG)*, 15(1):34 – 48, January 2009.  
Impact Factor: 2.22

### Chapters in books (that are not conference proceedings)

- B1 Stephen J. Guy and Ioannis Karamouzas\*, “A Guide to Anticipatory Collision Avoidance”. In Stephen Rabin, editor, *Game AI Pro: Collected Wisdom of Game AI Professionals*. A. K. Peters, Ltd, 2015.
- B2 Leonid V. Zhigilei, Z. Lin, D. Ivanov, Elodi Levuegle, William Duff, D. Thomas, Carlos Sevilla, and Stephen J. Guy. “Atomic/molecular-level simulations of laser-materials interactions”. In *1st int. school on laser surface interactions for new materials production*, July 2008.

### Refereed Conference Proceedings

- C1 Devin Lange, Francesca Samsel, Ioannis Karamouzas\*, Stephen J. Guy, Rodney Dockter, Timothy Kowalewski, and D.F. Keefe. “Trajectory Mapper: Interactive Widgets and Artist-Designed Encodings for Visualizing Multivariate Trajectory Data (Short Paper)”. In *Eurographics Conference on Visualization (EuroVis)*, 2017.
- C2 Bilal Kartal\*, Nick Sohre\*, and Stephen J. Guy. “Data-Driven Sokoban Puzzle Generation with Monte Carlo Tree Search.” In AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE), 2016.  
**Best Student Paper Award**
- C3 Tiannan Chen\*, Ioannis Karamouzas\*, Xiangyun Lei, Hakan Demir, Christopher J. Cramer, Laura Gagliardi, and Stephen J. Guy. “MOF: Creating an Educational Game on Nanotechnology Through Simulation-driven Optimization”. In *Motion in Games (MiG)*, 2016.
- C4 Julio Godoy\*, Ioannis Karamouzas\*, Stephen J. Guy, and Maria Gini. “Moving in a Crowd: Safe and Efficient Navigation among Heterogeneous Agents”. In *International Joint Conference on Artificial Intelligence (IJCAI)*, 2016. Acceptance Rate: 25%.

- C5 Julio Godoy\*, Ioannis Karamouzas\*, Stephen J. Guy, and Maria Gini. “Implicit Coordination in Crowded Multi-Agent Navigation”. In *Association for the Advancement of Artificial Intelligence (AAAI)*, 2016. Acceptance Rate: 26%.
- C6 Ioannis Karamouzas\*, and Stephen J. Guy. “Prioritized Group Navigation with Formation Velocity Obstacles.” In *IEEE International Conference on Robotics and Automation (ICRA)*, 2015. Acceptance Rate: 41%.
- C7 Bilal Kartal\*, Julio Godoy\*, Ioannis Karamouzas\*, and Stephen J. Guy. “Stochastic Tree Search for Coverage Planning with Useful Cycles.” In *IEEE International Conference on Robotics and Automation (ICRA)*, 2015. Acceptance Rate: 41%.
- C8 Julio Godoy\*, Ioannis Karamouzas\*, Stephen J. Guy, and Maria Gini. “Adaptive Learning for Multi Agent Navigation”. In *Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, 2015. Acceptance Rate: 25%.
- C9 Kyungyoon Kim, Ioannis Karamouzas\*, Bret Jackson, Moses Adeagbo\*, Stephen J. Guy, Richard Graff, and Daniel F. Keefe. “Bema: A multimodal interface for expert experiential analysis of political assemblies at the pnyx in ancient greece”. In *The IEEE Symposium on 3D User Interfaces (3DUI)*, 2015.
- C10 David Wolinski, Stephen J. Guy, Anne-Hélène Olivier, Ming C. Lin, Dinesh Manocha, and Julien Pettré. “Optimization-based pedestrian model calibration for evaluation”. In *Transportation Research Procedia (Proceeding of PEDS)*, vol 2, pages 228–236, Elsevier, 2014.
- C11 Julio Godoy\*, Ioannis Karamouzas\*, Stephen J. Guy, and Maria Gini. “Anytime navigation with progressive hindsight optimization”. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2014. Acceptance Rate: 47%.
- C12 Bilal Kartal\*, John Koenig\*, and Stephen J. Guy. “User-driven narrative variation in large story domains using monte carlo tree search”. In *Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, 2014. Acceptance Rate: 24%.
- C13 John Koenig\*, Ioannis Karamouzas\*, and Stephen J. Guy. Object-centric parallel rigid body simulation with timewarp. In *Motion in Games (MiG)*, pages 181–190, 2013. Acceptance Rate: 42%.
- C14 Sujeong Kim, Stephen J. Guy, and Dinesh Manocha. Velocity-based modeling of physical interactions in multi-agent simulations. In *ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA)*. ACM, 2013. Acceptance Rate: 35%.
- C15 Sujeong Kim, Stephen J. Guy, Ming C. Lin, and Dinesh Manocha. Interactive simulation of dynamic crowd behaviors using general adaptation syndrome theory. In *Symposium on Interactive 3D Graphics and Games (I3D)*, 2012. Acceptance Rate: 40%.
- C16 Sujeong Kim, Stephen J. Guy, Wenxi Liu, and Ming Lin. Predicting pedestrian trajectories using velocity-space reasoning. In *Workshop on the Algorithmic Foundations of Robotics (WAFR)*, 2012.
- C17 Jur van den Berg, Jamie Snape, Stephen J. Guy, and Dinesh Manocha. LQG-Obstacles: Feedback control with collision avoidance for mobile robots with motion and sensing uncertainty. In *IEEE International Conference on Robotics and Automation (ICRA)*, May 2012. Acceptance Rate: 40%.
- C18 Stephen J. Guy, Sujeong Kim, Ming C. Lin, and Dinesh Manocha. Simulating heterogeneous crowd behaviors using personality trait theory. In *ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA)*. ACM, 2011. Acceptance Rate: 39%.
- C19 Jens Schneider, Dina Garatly, Madhusudhanan Srinivasan, Stephen J. Guy, Sean Curtis, Steven Cutchin, Dinesh Manocha, Ming C. Lin, and Alyn Rockwood. Towards a digital makkah – using immersive 3d environments to train and prepare pilgrims. In *Digital Media and its Applications in Cultural Heritage (DMACH)*, 2011.

- C20 Jur van den Berg, Jamie Snape, Stephen J. Guy, and Dinesh Manocha. Reciprocal collision avoidance with acceleration-velocity obstacles. In *IEEE International Conference on Robotics and Automation (ICRA)*, 2011. Acceptance Rate: 49%.
- C21 Stephen J. Guy, Jatin Chhugani, Sean Curtis, Ming C. Lin, and Dinesh Manocha. PLEdestrans: A least-effort approach to crowd simulation. In *ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA)*. [Back Cover Image], ACM, 2010. Acceptance Rate: 43%.
- C22 Stephen J. Guy, Ming C. Lin, and Dinesh Manocha. Modeling collision avoidance behavior for virtual humans. In *Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, 2010. Acceptance Rate: 24%.  
**Best Paper Award Finalist**
- C23 Jamie Snape, Jur van den Berg, Stephen J. Guy, and Dinesh Manocha. Smooth and collision-free navigation for multiple robots under differential-drive constraints. In *Intelligent Robots and Systems (IROS)*, pages 4584–4589. IEEE, 2010. Acceptance Rate: 58%.
- C24 Jamie Snape, Stephen J. Guy, Jur van den Berg, and Dinesh Manocha. Smooth coordination and navigation for multiple differential-drive robots. In *International Symposium on Experimental Robotics (ISER)*, 2010.
- C25 Stephen J. Guy, Jatin Chhugani, Changkyu Kim, Nadathur Satish, Ming C. Lin, Dinesh Manocha, and Pradeep Dubey. Clearpath: Highly parallel collision avoidance for multi-agent simulation. In *ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA)*, ACM, 2009. Acceptance Rate: 39%.  
**CD Cover Image.**
- C26 Ming C. Lin, Stephen J. Guy, Rahul Narain, Jason Sewall, Sachin Patil, Jatin Chhugani, Abhinav Golas, Jur Van Den Berg, Sean Curtis, David Wilkie, and Dinesh Manocha. Interactive modeling, simulation and control of large-scale crowds and traffic. In *Motion in Games (MiG)*, pages 94–103, 2009.
- C27 Jamie Snape, Jur van den Berg, Stephen J. Guy, and Dinesh Manocha. Independent navigation of multiple mobile robots with hybrid reciprocal velocity obstacles. In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 5917–5922, 2009. Acceptance Rate: 54%.
- C28 Jur van den Berg, Stephen J. Guy, Ming C. Lin, and Dinesh Manocha. Reciprocal n-body collision avoidance. In *Inter. Symp. on Robotics Research (ISRR)*, 2009.
- C29 Ming Lin, Avneesh Sud, Jur van den Berg, Russell Gayle, Sean Curtis, Hengchin Yeh, Stephen J. Guy, Eric Andersen, Sachin Patil, Jason Sewall, and Dinesh Manocha. Real-time path planning and navigation for multi-agent and crowd simulations. In *Motion in Games (MiG)*, pages 23–32, 2008.
- C30 Avneesh Sud, Russell Gayle, Eric Andersen, Stephen J. Guy, Ming C. Lin, and Dinesh Manocha. Real-time navigation of independent agents using adaptive roadmaps. In *Symposium on Virtual reality software and technology (VRST)*, pages 99–106, 2007. Acceptance Rate: 21%.  
**Best Paper Award.**

### Peer reviewed Posters and Workshop Presentations

- W1 Nick Sohre\*, Charlie Mackin\*, Victoria Interrante, and Stephen J. Guy. “Evaluating Collision Avoidance Effects on Discomfort in Virtual Environments”. In *Workshop on Virtual Humans and Crowds in Immersive Environments (VHCIE)*, Mar 2017.
- W2 Nick Sohre\* and Stephen J. Guy. “A Data Driven Method for Variation in Animated Smiles”. In *Motion in Games*, Oct 2016.  
**Best Poster Runner Up.**

- W3 David Cherry\* and Stephen J. Guy. “RVO collision avoidance in Unity 3D”. In *TAPIA Conference*, Feb 2014.  
**Best Poster Finalist.**
- W4 Julio Godoy\*, Ioannis Karamouzas\*, Stephen J. Guy, and Maria Gini. e-ucb for action selection in multi agent navigation. In *Machine Learning in Planning and Control of Robot Motion Workshop*, 2014.
- W5 Julio Godoy\*, Ioannis Karamouzas\*, Stephen J. Guy, and Maria Gini. Online learning for multi-agent local navigation. In *AAMAS Workshop on Cognitive Agents for Virtual Environments (CAVE)*, May 2013.
- W6 Ioannis Karamouzas\* and Stephen J. Guy. Prioritized formations for multi-agent group navigation. In *Symposium on Computer Animation (SCA)*, 2013.
- W7 Bilal Kartal\*, John Koenig\*, and Stephen J. Guy. Generating believable stories in large domains. In *Intelligence and Interactive Digital Entertainment Conference (Workshop on Intelligent Narrative Technologies 6)*, 2013.
- W8 Jamie Snape, Stephen J Guy, Ming C Lin, and Dinesh Manocha. Local and global planning for collision-free navigation in video games. In *Planning in Games Workshop*, page 7, 2013.
- W9 Jamie Snape, Stephen J. Guy, Jur van den Berg, Ming Lin, and Dinesh Manocha. Reciprocal collision avoidance and multi-agent navigation for video games. In *AAAI workshop on Multiagent Pathfinding (WoMP)*, 2012.
- W10 Sean Curtis, Stephen J. Guy, Basim Zafar, and Dinesh Manocha. Virtual Tawaf: A case study in simulating the behavior of dense, heterogeneous crowds. In *1st IEEE Workshop on Modeling, Simulation and Visual Analysis of Large Crowds*, 2011.
- W11 Stephen J. Guy, Jur van den Berg, Ming C. Lin, and Dinesh Manocha. Geometric methods for multi-agent collision avoidance. In *Symposium on Computational Geometry (SoCG)*, 2010.
- W12 Jamie Snape, Stephen J. Guy, Jur van den Berg, Sachin Patil, Ming C. Lin, and Dinesh Manocha. Independent navigation of multiple robots and virtual agents. In *Int. Conf. on Autonomous Agents and Multiagent Systems (AAMAS)*, pages 1645–1646, 2010.
- W13 Stephen J. Guy. Massively large crowd simulations on multi-core cpus. In *HPCA’s Second Workshop on Emerging Applications and Many-core Architecture (EAMA)*, Feb 2009.
- W14 Stephen J. Guy, Ming C. Lin, and Dinesh Manocha. Collision-free path computation for human-like agents. In *Workshop on Modeling, Simulation and Optimization of Bipedal Walking at Humanoids*, 2009.
- W15 Jur van den Berg, Stephen J. Guy, Ming C. Lin, and Dinesh Manocha. Reciprocal n-body collision avoidance. In *RSS workshop on Autonomous Flying Vehicles: Fundamentals and Application*, 2009.

## Software and Other Products

- S1 **TTC Collision Avoidance Library**, Co-Maintainer and Co-Author  
Python and C++ implementation of our TTC-based local navigation approach. The code has been downloaded over 300 times and accompanying paper downloaded over 2,000 times.  
<http://motion.cs.umn.edu/PowerLaw>
- S2 **ORCA / RVO2 Collision Avoidance Library**, Co-Maintainer and Co-Author  
Developer for RVO2 collision avoidance library. This library has over 2,500 downloads, and has been licensed by various major game studios for use in many commercial games. A partial list of products which have adopted the approach for their work include: Middle-Earth:Shadow of Mordor, Warhammer 40,000:SpaceMarine, and Warframe.  
<http://gamma.cs.unc.edu/RVO2/>



**S3 HerdEm**, Co-Author

Mobile sheep herding game for iPhone, Android, and Web.

<http://gamma.cs.unc.edu/HERDEM/>

**Invited Plenary Talks & Keynotes**

- *Psycho-physical Crowds*, ACM Siggraph Motion in Games (MiG), Dublin, Ireland, November, 2013.

**Invited Speaker (Conferences)**

- *Forced-Based Anticipatory Collision Avoidance in Crowd Simulations* with Ioannis Karamouzas, Game Developers Conference (GDC) 2015, San Francisco, March, 2015.
- *Crowd Simulation in Games*, East Coast Game Conference (ECGC), Raleigh, NC, April, 2010.

**Invited Pannelist (Conferences)**

- Critical Thinking in Video Games, *GlitchCon*, Minneapolis, Minnesota, March, 2015

**Invited Speaker (Workshop)**

- *Adopting Pedestrian Navigation Techniques for Multi-Agent Coordination*, International Workshop on Multi-Agent Systems and Collaborative Technologies (I-MASC), Minneapolis, Minnesota, May 2014

**Colloquia and other Invited Talks**

- *Capturing Social Intelligence: A Computational Perspective of Human Navigation and Facial Expressions*, Interdisciplinary Center for Neurobehavioral Development (CNBD) at the University of Minnesota, Minneapolis, Minnesota, November 2016
- *Practical Multi-Agent Motion Planning*, UC Berkeley Electrical Engineering and Computer Sciences (EECS) talk, Berkeley, California, March 2015
- *From Data to Crowds: Capturing Human Behaviors to Create Virtual Crowds*, Macalester College Mathematics, Statistics, and Computer Science department Seminar Series, St. Paul, Minnesota, September 2014
- *Crowd Simulation for Human Trajectory Analysis*, 3M Computational Intelligence Colloquium, St. Paul, Minnesota, August 2013

## Contributions to Service

### Professional Contributions

#### Leadership roles

- Co-organizer of CRA-W/CDC Discipline-Specific Mentoring Program on Autonomous Agents and Multi-Agent Systems 2013 (Co-Organized with Anita Raja and Maria Gini)

#### Editorial Boards (Journals)

Associate Editor, IEEE Robotics and Automation Letters (RA-L), 2015 – Present

#### Senior Program Committees (Conferences)

International Joint Conference on Artificial Intelligence (IJCAI), 2017

Autonomous Agent and Multi-Agent Systems (AAMAS) - Robotics Track, 2016

#### Program Committees or Associate Editor (Conferences)

Motion in Games (MiG): 2012, 2014, 2015, 2016, 2017

Eurographics (EG): 2017

Association for the Advancement of Artificial Intelligence (AAAI): 2016, 2017

Computer Animation and Social Agents (CASA): 2017

Pacific Graphics (PG): 2015, 2016

International Joint Conference on Artificial Intelligence (IJCAI), 2016

Workshop on the Algorithmic Foundations of Robotics (WAFR): 2014, 2016

Autonomous Agent and Multi-Agent Systems (AAMAS): 2014, 2015, 2016

Intelligent Robots and Systems (IROS): 2013, 2014, 2015

Robotics Science and Systems (RSS): 2014, 2015

Virtual Reality Software and Technology (VRST): 2014

#### Program Committees (Workshops & Consortiums)

Workshop on Virtual Humans and Crowds for Immersive Environments (at IEEE VR): 2017, 2016

Autonomous Agent and Multi-Agent Systems, Doctoral Consortium (AAMAS-DC), 2016

International Joint Conference on Artificial Intelligence, Doctoral Consortium (IJCAI-DC), 2016

#### Referee or Peer Reviewer (Journals)

Nature Physics, ACM Transactions on Graphics, IEEE Transactions on Robotics, IEEE Computer Graphics & Applications, Computer Graphics Forum, Journal of Parallel and Distributed Computing, Autonomous Robots, Robotica, Graphical Models, IEEE Systems, Man, and Cybernetics - Part B Cybernetics, IEEE Computers and Electrical Engineering

#### Referee or Peer Reviewer (Conferences)

Siggraph, Siggraph Asia, Robotics: Science and Systems (RSS), Autonomous Agents and Multiagent Systems (AAMAS), Pacific Graphics (PG), International Conference on Robotics and Automation (ICRA), Intelligent Robots and Systems (IROS), Computer Animation and Virtual Worlds (CAVW), Eurographics

#### Session Chair or Co-Chair at Conferences

Intelligent Robots and Systems (IROS), 2015

## Mentoring and Outreach

### Advising

- Advisory Board Member, Glitch Gaming, 2015 - Present
- Faculty Advisor, Video Game Development Club, 2014 - Present

### Outreach Activities

- Mentor for students through Institute for African-American Mentoring in Computing Sciences (iAAMCS), 2013 – Present
- Mentor for local high-school summer research programs, 2013 – Present
- Co-Organized (with Maria Gini) a Coding Summer Camp targeted a underrepresented minorities, 2016

### Expert Judging and Voting

- Judge, United States Congressional App Challenge (Minnesota's Second District), 2016
- Voter, Game Developers Choice Award, 2015 – Present

### Mentoring Panels

- Insight into Academic Careers, *North Star Stem Alliance*, Minneapolis, Minnesota, April, 2015
- Undergraduate Research: Making the Most of a Summer Experience, *TAPIA Conference*, Seattle, Washington, 2014
- Research Mentoring Panel, *Advancing Robotics Technology for Social Impact (ARTSI)*, Baltimore, Maryland, 2013

## Departmental Service

### *Univ. of Minnesota:*

Curriculum Committee, 2016–Present  
 Advisory Committee, 2015–Present  
 Ph.D. Committee, 2014–2016  
 Computing Committee, 2015–2016  
 Departmental Steering Committee, 2013–2014  
 Admissions Committee, 2012–2013

### *Previous:*

President - UNC Computer Science Student Association, 2008 – 2009

## University Service

*Faculty Mentor*, President's Distinguished Faculty Mentor Program, 2013 – 2015

### *Previous:*

Senator - UNC Graduate and Progressional Student Association, 2008 – 2009