

# Aline Normoyle, PhD

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## Education

### University of Pennsylvania

Ph.D. Computer Science	2009-2015
M. Eng. Computer Graphics and Game Technology	2009

### McGill University

B.Sc. Honors Computer Science, Dean's Honor List	1999
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## Employment History

### Academic Employment and Internships

Bryn Mawr College, Assistant Professor	2020-Current
Swarthmore College, Visiting Assistant Professor	2017-2020
Clemson University, Engineering Consultant	2017-2018
Recurse Center, Sabbatical Residency	2016
Robotics Institute, Carnegie Mellon University, Research Assistant	2011-2012
Disney Research, Imagineer	Summer 2011

### Professional Employment

Savvy Sine LLC, Sole Proprietor	2018-Current
Venturi Labs LLC, Director of Software Development	2017-2020
Moon Collider Ltd, AI Programmer and Researcher	2015-2016
SIG Center for Computer Graphics, University of Pennsylvania, Associate Director	2012-2013
Ackoff Collaboratory for Advancement of the Systems Approach (ACASA), University of Pennsylvania, Sr. Programmer/Analyst	2006-2008
MAK Technologies, Sr. Software Engineer	1999-2006

## Peer-Reviewed Publications

1. Thumu, N., Meacham, F., Normoyle, A., "Towards Understanding the Role of Curiosity in Puzzle Design", CHI PLAY Companion '23: Companion Proceedings of the Annual Symposium on Computer-Human Interaction in Play, 2023, doi:10.1145/3573382.3616070
2. Adkins, A.; Normoyle, A.; Lin, L.; Sun, Y.; Ye, Y.; Di Luca, M.; Jörg, S., "How Important are Detailed Hand Motions for Communication for a Virtual Character?", ACM Transactions on Graphics, 2022, doi:10.1145/3578575
3. Adkins, A., Lin, L., Normoyle, A., Canales, R., Ye, Y., Jörg, S., "Evaluating grasping visualizations and control modes in a VR game". ACM Transactions on Applied Perception (TAP), 2021, 18(4), doi: 10.1145/3486582
4. Mainardi G., Normoyle A., Cassol V., Badler N. I. and Musse S. R., "An authoring tool to provide group and crowd animation using Natural Language scripts," 20th Brazilian Symposium on Computer Games and Digital Entertainment (SBGames), 2021, doi: 10.1109/SBGames54170.2021.00027
5. Canales, R., Normoyle, A., Sun, Y., Ye, Y., Di Luca, M., Jörg, S., "Virtual Grasping Feedback and the Virtual Hand Ownership", Symposium on Applied Perception, 2019, doi:10.1145/3343036.3343132
6. Cheng, Y., Normoyle, A., "The Q\*bird Level Designer: User-assisted procedural level design in augmented reality", Motion in Games, 2019, doi:10.1145/3359566.3364686

7. Lin, L., Normoyle, A., Adkins A., Sun, Y., Robb, A., Ye, Y., Di Luca, M., Jörg, S., “The Effect of Hand Size and Interaction Modality on the Virtual Hand Illusion”, IEEE Conference on Virtual Reality and 3D (IEEE VR), 2019, doi:10.1109/VR.2019.8797787
8. Chow, K., Nicewinter, J., Normoyle, A., Erickson, C., Badler, N.I., “Crowd and procession hypothesis testing for large-scale archaeological sites”, MARCH Workshop, IEEE International Conference on Artificial Intelligence And Virtual Reality, 2019, doi:10.1109/AIVR46125.2019.00069
9. Normoyle, A., Jörg, S., “The effect of animation controller and avatar on player perceptions”, Computer Animation and Virtual Worlds, 2016, doi:10.1002/cav.1731
10. Normoyle, A., Jensen S. T., “Bayesian Clustering of Player Styles for Multiplayer Games”. AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment, 2015, doi:10.1609/aiide.v11i1.12805
11. Normoyle, A., Jörg, S. “Trade-offs between Responsiveness and Naturalness for Player Characters”, ACM SIGGRAPH conference in Motion in Games, 2014 (won best paper), doi:10.1145/2668064.2668087
12. Normoyle, A., Guerrero, G., Jörg, S., “Player perception of delays and jitter in character responsiveness”, ACM Symposium on Applied Perception, 2014, doi:10.1145/2628257.2628263
13. Normoyle, A., Likhachev M., Safonova A., “Stochastic activity authoring with direct user control”, ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games, 2014, doi:10.1145/2556700.2556714
14. Normoyle, A., Badler, J., Fan T., Badler, N.I., Cassol, V., Musse, S., “Evaluating perceived trust from procedurally animated gaze”, ACM SIGGRAPH conference in Motion in Games, 2013, doi:10.1145/2522628.2522630
15. Normoyle, A., Liu, F., Kapadia, M., Badler, N.I., Jörg, S., “The Effect of Posture and Dynamics on the Perception of Emotion”, ACM Symposium on Applied Perception, 2013 (won best student presentation), doi:10.1145/2492494.2492500
16. Normoyle, A., Drake, J., Likhachev, M., Safonova, A., “Game-based Data Capture for Player Metrics” AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment, 2012, doi:10.1609/aiide.v8i1.12508
17. Joerg, S., Normoyle, A., Safonova, A., “How Responsiveness Affects Players’ Perception in Digital Games” ACM Symposium on Applied Perception, 2012, doi:10.1145/2338676.2338683
18. Zhao, L., Normoyle, A., Khanna, S., Safonova, A., “Automatic Construction of a Minimum Size Motion Graph” ACM SIGGRAPH/Eurographics Symposium on Computer Animation, 2009, doi:10.1145/1599470.1599474
19. Silverman, B.G., Normoyle A., Kannan P., Pater R., Chandrasekaran, D., Bharathy G., “An embeddable testbed for insurgent and terrorist agent theories: InsurgiSim” Intelligent Decision Technologies, Volume 2 Issue 4, 2008, 193-203, doi:10.5555/1515884.1515885
20. Knight, K.M., Chandrasekaran, D., Normoyle, A., Weaver, R., Silverman, B.G., “Transgressions and Atonement”, In Proceedings of the 4th International Conference on Coordination, Organizations, Institutions and Norms in Agent Systems - Volume 4 (LNCS-COIN’08). 250–265., 2008, doi:10.5555/3000392.3000414

## Technical reports, working papers, posters, and talks

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1. “The effects of inaccurate body language on 3D digital self-expression.”, Invited Seminar Talk, Bamberg University, Bamberg, Germany, 2023
2. “How avatar grasping affects perceived body ownership and performance in virtual reality.”, Invited Seminar Talk, Centro de Investigación en Matemáticas (CIMAT), Guanajuato, Mexico, 2022
3. Normoyle A., Zhang E., and Badler N. I., “Open-body-fit: open-source resources for estimating biomechanically-motivated metrics from video”, Poster, ACM SIGGRAPH Motion, Interaction, and Games (MIG ’22). 2022

4. Normoyle A., Artacho B., Savakis A., Senghas A., Badler N. I., Occhino C., Rothstein S. J., Dye M. W. G., “Open-Source Pipeline for Skeletal Modeling of Sign Language Utterances from 2D Video Sources”, 14th International Conference on Theoretical Issues in Sign Language Research (TISLR 14), 2022, Stage Presentation
5. Normoyle, A., Jensen, S. T., “Bayesian Learning of Play Styles in Multiplayer Video Games”, CoRR abs/2112.07437, 2021 *working paper*
6. Normoyle A., Rothstein S. J., and Badler N. I., “Quantifying sign-language movement kinematics from video”, Poster, ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (i3D '21). 2021
7. Lane, S. H. Normoyle, A., “Civic Portal: Virtual Monuments”, Fast Forward Philly, 2018
8. Sedoc, J., Normoyle, A., “Seating Assignment Using Constrained Signed Spectral Clustering”. CoRR abs/1708.00898, 2017
9. “Procedural Art Pop-up“, Recurse Center, Hosted by the School of Machines, Making, and Make Believe, Berlin, December 2017
10. Sunshine-Hill, B., Normoyle, A., “How to use machine learning like a responsible adult”, AI Summit, Game Developer Conference, 2015
11. Normoyle, A., Badler N. I., “How do stylistic motions differ numerically from neutral ones?”, Poster, ACM SIGGRAPH conference in Motion in Games (MIG '14), 2014
12. Normoyle, A., Drake, J., Safonova, A., “Egress Online: Towards leveraging massively, multiplayer environments for evacuation studies”, University of Pennsylvania Department of Computer and Information Science Technical Report No. MS-CIS-12-15. 2012
13. Summers, V.A., Normoyle, A., Flo R., “Increasing Situational Awareness by Combining Realistic and Non-Realistic Rendering Techniques” 10th International Command and Control Research and Technology Symposium, 2005, Conference Paper, Accession Number: ADA463760

## Patents

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1. Lane, S.H., Boyd-Surka, M.A., Bai, Y. and Normoyle, A.S., University of Pennsylvania Penn, 2022. Methods, systems, and computer readable media for extended reality user interface. U.S. Patent Application 17/412,197. (in submission)

## Grants and Awards Received

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1. Bryn Mawr College Digital Scholarship Grant, 2023-2024, “Game-based experiment platform development”
2. National Science Foundation, 2019-2022, “Collaborative Research: Multimethod Investigation of Articulatory and Perceptual Constraints on Natural Language Evolution” (Award 1749397)
3. Swarthmore Faculty Research Support Award, 2018-2019, “Game-based experiment platform development”
4. Wharton Customer Analytics Initiative, 2014, “Discovery of Latent Play Styles for Improved Game Matching and Prediction”
5. Best paper award for “Trade-offs between Responsiveness and Naturalness for Player Characters”, ACM SIGGRAPH conference in Motion in Games, 2014
6. Best student presentation for “The Effect of Posture and Dynamics on the Perception of Emotion”, ACM Symposium on Applied Perception, 2013
7. Teaching practicum award, University of Pennsylvania, 2010

## Teaching

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### **Bryn Mawr College, Assistant Professor**

CS 399: Senior Conference	Spring 2022
CS 223: Systems Programming	Spring 2023, Fall 2022, Spring 2022
CS 317: Computer Animation	Fall 2021
CS 231: Discrete Math	Fall 2021
CS 312: Computer Graphics	Spring 2023, Spring 2021
CS 113: Introduction to Computer Science	Fall 2022, Spring 2021
CS 110: Introduction to Computing	Fall 2020

### **Swarthmore College, Visiting Assistant Professor**

CS 71: Software Engineering	Spring 2019
CS 21: Introduction to Computer Science	Fall 2018, Spring 2020
CS 56/91: Computer Animation	Spring 2018, Spring 2017, Fall 2019

### **University of Pennsylvania, Co-Instructor**

CIS 497: Senior capstone project	2014-2015
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### **University of Pennsylvania, Student Instructor**

CIS 563: Physically-based Animation	Spring 2011
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### **University of Pennsylvania, Teaching Assistant**

Winner of the University of Pennsylvania Teaching Practicum Award

CIS 563: Physically-based Animation	Spring 2010
CIS 660: Advanced Graphics	Spring 2010, 2011
CIS (EAS) 499: Senior Capstone Project	2010-2011

## Academic Service

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### Institutional Service

Faculty Contact for the Accelerated Master's (4+1) Engineering Program with the University of Pennsylvania  
Institutional Review Board, Bryn Mawr College  
Chatbot Improv Event Organizer, Bryn Mawr College  
STEM Posse Immersion Workshop, Bryn Mawr College  
STEMLA Summer Academic Fair, Bryn Mawr College  
Computer Graphics Honors Examiner, Swarthmore College  
Career Services and Job Events, Swarthmore College Computer Science Department  
Judge, SisterHacks, Bryn Mawr College  
Society of Women Gears Workshop Leader, University of Pennsylvania, 2011-2013

### Academic Conference Organization

ACM SIGGRAPH, General Submission Juror  
IEEE VR Workshop on Multi-modal Affective and Social Behavior Analysis and Synthesis in Extended Reality (MASSXR), Panelist  
ACM SIGGRAPH Conference in Motion, Interaction and Games (MIG), Program Co-chair

### Academic Program Committees and Editorships

International Conference on Interactive Media, Smart Systems and Emerging Technologies (IMET)  
IEEE VR 2023 Workshop: MASSXR-Multi-modal Affective & Social Behavior Analysis and Synthesis in Extended Reality (MASSXR)  
International Conference on Computer Animation and Social Agents (CASA)  
Computers & Graphics: Special Section on Motion, Interaction and Games (MIG)  
Graphics Interfaces (GI)  
ACM Conference on Intelligent Virtual Agents (IVA)  
AAAI Conference on Artificial Intelligence in Interactive Digital Entertainment (AIIDE)  
ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (i3D)  
ACM SIGGRAPH Conference in Motion, Interaction and Games (MIG)

### Additional Reviewing (Academics and Books)

Computer Graphics and Applications  
ACM Transactions on Applied Perception  
ACM SIGGRAPH Tertiary Reviewer  
GPU Zen 2  
webGL Insights

## Academic Software

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1. AGL: A Graphics Library. *Small, easy to use C++ library for 3D drawing, based on OpenGL.*, 2021  
<https://github.com/alinen/agl>
2. ATK: Animation Toolkit. *C++ character animation library.*, 2021  
<https://github.com/alinen/atk>
3. open-body-fit *Open-source resources for estimating biomechanically-motivated metrics from video.*, 2022  
<https://github.com/alinen/open-body-fit>

## Advising

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### Bryn Mawr College Thesis

- Foqia Shahid, “Body Transfer in Animal Avatars: An Investigation of Virtual Reality Control Mapping Strategies”, Spring 2023
- Judy Wang, “Investigating Body Ownership in Animal Avatars through Virtual Reality”, Spring 2023
- Jasmine Lei, “Visuaizing Chaotic Systems”, Spring 2023
- Alec Mazzoli, “The Impact of Agent Performance on Human-Agent Conversational Error Analysis”, Spring 2022
- Haiqa Kamran, “Charitably: An Aggregator Web Application for Charity Causes and Events”, Spring 2022
- Sarah Coufal, “Embodiment from Video”, Spring 2022
- William Lawrence, “Automatic Placement of Cultural Objects Within a Simulated Archaeological Environment”, Spring 2022
- Faryal Khan, “Scripting Crowd Behaviors in SPACES”, Spring 2022
- Faith Meacham, “Procedural Level Generation for *Monument Valley* Styled Puzzle Games”, Spring 2021
- Jocelyn Dunkley, “VR Orchestra App: Violin Prototype”, Spring 2020
- Linda Zhu, “InstructAR: Building a Deliverable Infrastructure of How-to Kits for Assembly Scenarios in Augmented Reality”, Spring 2020

### Haverford College Thesis

- Joel Torres, “Facilitating Emotional Wellness Through Virtual Reality”, Fall 2023
- Neha Thumu, “Procedural Content Generation for Puzzles”, Fall 2023
- David Dinh, “\*Parallel Computation: Simulating Smoke on the GPU\*”, Haverford Senior Thesis, Fall 2022
- Macintyre Sunde, Shape Grammars for Architectural Reconstruction, Spring 2022, Fall 2022
- Olga Shevchuk, “Skinning of Characters with Polygonal Mesh”, Fall 2021, Spring 2022
- Ziyao Wang, “Artistic Hair Modeling”, Fall 2021
- Yuxiao Wang, “Literature Review: Embodied Conversational Agents”, Fall 2020

### Independent Study

- Neha Thumu, “Control Strategies for Mobile Augmented Reality”, Spring 2023
- Neha Thumu, “Motion and navigation planning for digital characters”, Fall 2022
- Samuel J. Rothstein, “Procedural generation of body language”, Spring 2020
- Michael Piazza, “Topics in Procedural Animation”, Spring 2017

### Research students

- Neha Thumu, Bryn Mawr Summer Science Researcher, “Understanding how character control and level design affect the player experience in video games”, Summer 2022
- Edward Zhang, University of Pennsylvania REU, “Collaborative Research: Multimethod Investigation of Articulatory and Perceptual Constraints on Natural Language Evolution.”, Summer 2022

Gulesh Shukla, Bryn Mawr RA, “Analysis of motion from video”, Spring 2022

Lola Rodrigues, Bryn Mawr RA, “Peg Game Task”, Fall 2021

Samuel J. Rothstein, University of Pennsylvania REU, “Collaborative Research: Multimethod Investigation of Articulatory and Perceptual Constraints on Natural Language Evolution.”, Summer 2020

Felicity Yick and Samantha Lee, University of Pennsylvania Summer Research, “SPACES Project: Recreating the ancient city of Pachacamac.”, Summer 2020

Katherine Lima, Swarthmore Summer Researcher, “Role Player Game (RPG) Development for Artificial Intelligence Testbed” Summer 2019

Yi Fei Cheng, Swarthmore Summer Researcher, “The Q\*Bird Level Designer: User-assisted procedural Level Design in Augmented Reality”, Summer 2019

Mirabai Smoot and Nana Anikuabe, Swarthmore Summer Researcher, “Adaptive Bayesian learning of Playstyles”, Summer 2019

Effie Li, University of Pennsylvania REU, “Collaborative Research: Multimethod Investigation of Articulatory and Perceptual Constraints on Natural Language Evolution.”, Summer 2019

Kristin Chow, University of Pennsylvania Summer Researcher, “SPACES Project: Recreating the ancient city of Pachacamac.”, Summer 2019

Xuan Huang, Bryn Mawr College, “Procedural Generation of Cities”, Spring 2017

### **Mentorship and Support**

Chandini Ragobar, Haverford College, Chesick Summer Experience Funding, Summer 2023

Swarthmore CPSC 000SR, Student instructor: Aaron Kang, “Introduction to Unity”, Spring 2019