

# CURRICULUM VITAE

## Michael Brandon Haworth

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### 0. EXECUTIVE SUMMARY

Assistant Professor in the Department of Computer Science, Faculty of Engineering and Computer Science at the University of Victoria focused on the representative modelling of humans for inclusive design, media, and policy. I am also the Director of the Graphics, Artificial Intelligence, Design, & Games (GAIDG) Lab and a Research Fellow at the Institute on Aging & Lifelong Health at the University of Victoria. Published 13 journal articles, 19 conference papers, 2 book chapters, 9 workshop papers, 10 posters, and 11 presentations around the world on the topics of games, animation, rehabilitation, design, and artificial intelligence. Officially supervising (or supervised) 19 student roles (1 PhD, 5 Master's, 13 Undergraduate), unofficially advised/mentored 15 student roles (3 PhD, 5 Masters, 7 Undergraduate), and have held multiple teaching roles across teaching assistantships (17) and course instructorships (4). A non-profit board member and volunteer dedicated to professional service, also serving as an associate editor (Computer Animation and Virtual Worlds journal) a frequent peer reviewer (85 invited reviews), as well as, on conference programs (10 memberships, 27 reviews), and academic committees (4).

### 1. PERSONAL

*Nationality:* American, British, and Permanent Resident of Canada

*Language(s):* English

### 2. MAIN ACADEMIC INTERESTS

- Computer Graphics
- Human-Centred Artificial Intelligence
- Agent-based Modelling
- Game Design and Development
- Human Computer Interaction
- Virtual Reality
- Computer Vision
- Architectural Design and Optimization
- Assistive and Healthcare Technologies
- Behavioural Sciences
- Rehabilitation Sciences

### 3. PROFESSIONAL ASSOCIATIONS

- Member ACM
  - ▶ Member ACM Special Interest Group on Computer Graphics and Interactive Techniques (ACM SIGGRAPH)
  - ▶ Member ACM Special Interest Group on Artificial Intelligence (ACM SIGAI)
  - ▶ Member ACM Committee on Women

- Member IEEE
- Member Canadian Human-Computer Communications Society, CHCCS/SCDHM Special Interest Group within the Canadian Information Processing Society (CIPS)

#### 4. EDUCATION

- September 2014 – September 2019: **Ph. D.**, Computer Science at York University, Department of Electrical Engineering and Computer Science.
  - ▶ Thesis: Biomechanical Locomotion Heterogeneity in Synthetic Crowds
  - ▶ Supervisor: Petros Faloutsos
  - ▶ Including NSERC Create Program in Data Analytics & Visualization (2yrs)
- 01/2013 – 01/2016: **M.Sc.**, Computer Science at York University, Department of Electrical Engineering and Computer Science.
  - ▶ Thesis: Computer Games for Motor Speech Rehabilitation
  - ▶ Supervisors: Petros Faloutsos & Melanie Baljko
- 09/2008 – 12/2012: **B.Sc., Hons.**, Computer Science at York University, Department of Electrical Engineering and Computer Science.
  - ▶ Including 2011 International Summer School in Computer Science
    - Computer Vision with Xenophon Zabulis at ICS/FORTH, Heraklion, Greece

#### 5. RESEARCH POSITIONS

- July 2020 – Present: **Director** of the Graphics, Artificial Intelligence, Design, & Games (GAIDG) Lab in the Department of Computer Science at the University of Victoria, Victoria, Canada.
- 12/2019 – 06/2020: **Post-Doctoral Fellow** with the Ontario Research Fund/Intelligent Systems for Sustainable Urban Mobility (ORF/ISSUM) in the Department of Electrical Engineering and Computer Science at York University, Toronto, Canada.
- 01/2013 – 11/2019: **Graduate Researcher/Research Assistant** at the Graphics and Multimedia at York (GaMaY) Lab in the Department of Electrical Engineering and Computer Science at York University, Toronto, Canada.
- 02/2016 – 02/2017: **Developer and Consultant** at the Speech Production Lab in the Department of Speech-Language Pathology at the University of Toronto.
- 01/2013 – 02/2017: **Graduate Researcher/Trainee** at the Vocal Tract Visualization Lab in the Communication Team at the UHN: Toronto Rehabilitation Institute.
- 01/2013 – 02/2016: **Research Assistant** at the Speech Production Lab in the Department of Speech-Language Pathology at the University of Toronto.
- 06/2012 – 12/2012: **Undergraduate Researcher** at the Graphics and Multimedia at York (GaMaY) Lab in the Department of Electrical Engineering and Computer Science at York University, Toronto, Canada.
- 06/2012 – 12/2012: **Research Assistant** at the Sunnybrook Health Sciences Centre.

#### 6. RESEARCH AFFILIATIONS

- **Director** Graphics, Artificial Intelligence, Design, & Games (GAIDG) Lab
- **External Collaborator** Graphics and Multimedia at York (GaMaY)
- **External Collaborator** Rutgers Intelligent Visual Interfaces Lab (IVI)
- **External Collaborator** Intelligent Systems for Sustainable Urban Mobility (ISSUM)
- **Affiliate Alumnus** UBC Motion Control and Character Animation group (UBCMOCCA)
- **Alumnus** University of Toronto Speech Production Lab (SPL)
- **Alumnus** UHN: Toronto Rehabilitation Institute Vocal Tract Visualization Lab (VTV)
- **Alumnus** Practices in Enabling Technologies Lab (PIET)
- **Alumnus** Centre for Innovation in Information Visualization and Data-Driven Design (CIVDDD)

- **Alumnus** Sunnybrook Health Sciences Centre

## 7. INDUSTRY POSITIONS

- February 2018 – August 2018: **Research and Development Intern** (*Virtual Reality and Spatial Analysis Expert*) at Teeple Architects, Toronto, Canada.
- 07/2017 – 08/2017: **Research and Development Intern** (*Virtual and Augmented Reality Expert*) at Programize Hellas S.A., Athens, Greece.

## 8. SUPPORT

### Funding & Awards

- 2021 – 2026: NSERC Discovery Grant (Principal Investigator), University of Victoria *Diverse Synthetic Crowds in Media, Design, and Analysis*
  - ▶ \$24,000 per year for 5 years
  - ▶ \$12,500 Early Career Researcher Supplement for year 1
  - ▶ Total: \$132,500

### Funding & Awards Prior to Faculty Position

- 2019 – 2020: Ontario Research Fund (ORF/ISSUM), Post-Doctoral Fellowship
- 2016 – 2019: York Graduate Fellowship (Ph.D.)
- 2017 – 2019: NSERC CreateDAV (Ph.D.)
- 2018: Compute Canada Resources for Research Groups (RRG) Allocations (Ph.D.)
- 2017: Graduate Development Fund (Seoul, South Korea) (Ph.D.)
- 2016: Graduate Development Fund (Geneva, Switzerland) (Ph.D.)
- 2014 – 2015: York Graduate Scholarship (Ph.D.)
- 2014: Bridgeable–Bridging the Gap Award
- 2013 – 2014: York Graduate Scholarship (M.Sc.)
- 2011: York International Mobility Award (ICS/FORTH, Heraklion, Greece) (B.Sc.)
- 2011: IDCS IAM Award (ICS/FORTH, Heraklion, Greece) (B.Sc.)
- 2010: TD Meloche Monnex Bursary (B.Sc.)
- 2009: GM Bursary for Undergraduate Students in COSC (B.Sc.)
- 2008: Queen Elizabeth II Aiming for the Top Scholarship (B.Sc.)

## 9. PUBLICATIONS AND SCHOLARLY PRESENTATIONS

\* shared first authorship

### Book Chapters

- Usman, M., **Haworth, B.**, Berseth, G., Faloutsos, P., & Kapadia, M. (2021). Towards Democratizing Human-Building Simulation and Analytics in F. S. Roberts and I. A. Sheremet (Eds.), *Resilience in the Digital Age* LNCS 12660 (pp. 157–171). Springer Nature Switzerland AG.
- Berseth, G., Kapadia, M., **Haworth, B.**, & Faloutsos, P. (2016). SteerFit: Automated Parameter Fitting for Steering Algorithms in N. Pelechano, J. M. Allbeck, M. Kapadia, & N. I. Badler Editor (Ed.), *Simulating Heterogeneous Crowds with Interactive Behaviours* (pp. 197–213). Boca Raton, FL: CRC Press, Taylor & Francis Group.

### Journal Articles

- Hu, K.\*, **Haworth, B.\***, Berseth, G., Pavlovic, V., Faloutsos, P., Kapadia, M. (2021). Heterogeneous Crowd Simulation using Parametric Reinforcement Learning. *IEEE Transactions on Visualization and Computer Graphics*.

- Usman, M., **Haworth, B.**, Faloutsos, P., & Kapadia, M. (2021). Simulation-as-a-Service: Analyzing Crowd Movements in Virtual Environments. *Computer Animation and Virtual Worlds*, e1990.
- Kremer, M., **Haworth, B.**, Kapadia, M., & Faloutsos, P. (2021). Modelling distracted agents in crowd simulations. *The Visual Computer*, 37(1), 107-118.
- **Haworth, B.**, Usman, M., Schaumann, D., Chakraborty, N., Berseth, G., Faloutsos, P., & Kapadia, M. (2020). Gamification of Crowd-Driven Environment Design. *IEEE Computer Graphics and Applications*, 41(4), 107-117.
- Berseth, G.\*, **Haworth, B.\***, Usman, M.\*, Schaumann, D., Khayatkhoei, M.\*, Kapadia, M., & Faloutsos, P. (2019). Interactive Architectural Design with Diverse Solution Exploration. *IEEE Transactions on Visualization and Computer Graphics*, 27(1), 111-124.
- Zhang, X., Schaumann, D., **Haworth, B.**, Faloutsos, P., & Kapadia, M. (2019). Coupling agent motivations and spatial behaviors for authoring multiagent narratives. *Computer Animation and Virtual Worlds*, 30(3-4), e1898.
- Kearney, E., **Haworth, B.**, Scholl, J., Faloutsos, P., Baljko, M., & Yunusova, Y. (2018). Treating Speech-Movement Hypokinesia in Parkinson's Disease: Does Movement Size Matter? *Journal of Speech, Language, and Hearing Research*, 61(11), 2703-2721.
- **Haworth, B.**, Kearney, E., Faloutsos, P., Baljko, M., & Yunusova, Y. (2018). Electromagnetic articulography (EMA) for real-time feedback application: computational techniques. *Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization, Advance Online Publication*.
- Kearney, E., Giles, R., **Haworth, B.**, Faloutsos, P., Baljko, M., & Yunusova, Y. (2017). Sentence-Level Movements in Parkinson's Disease: Loud, Clear, and Slow Speech. *Journal of Speech, Language, and Hearing Research*, 60(12), 3426-3440.
- Yunusova, Y., Kearney, E., Kulkarni, M., **Haworth, B.**, Baljko, M., & Faloutsos, P. (2017). Game-based augmented visual feedback for enlarging speech movements in Parkinson's disease. *Journal of Speech, Language, and Hearing Research*, 60(6S), 1818-1825.
- **Haworth, B.**, Usman, M., Berseth, G., Kapadia, M., & Faloutsos, P. (2017). On density–flow relationships during crowd evacuation. *Computer Animation and Virtual Worlds*, 28(3-4), e1783.
- **Haworth, B.**, Usman, M., Berseth, G., Khayatkhoei, M., Kapadia, M., & Faloutsos, P. (2017). CODE: Crowd-optimized design of environments. *Computer Animation and Virtual Worlds*, 28(6), e1749.
- Berseth, G., Usman, M., **Haworth, B.**, Kapadia, M., & Faloutsos, P. (2015). Environment optimization for crowd evacuation. *Computer Animation and Virtual Worlds*, 26(3-4), 377-386.

### Refereed Conference Papers

- Kremer, M., Caruana, P., **Haworth, B.**, Kapadia, M., Faloutsos, P. (Accepted). PSM: Parametric Saliency Maps for Autonomous Pedestrians. In *Proceedings of the 14<sup>th</sup> ACM SIGGRAPH International Conference on Motion, Interaction and Games*. ACM.
- Ferreira, D., **Haworth, B.** (2021, October). DeepSolfège: Recognizing Solfège Hand Signs Using Convolutional Neural Networks. In *International Symposium on Visual Computing (pp. 39-50)*. Springer, Cham.
- **Haworth, B.\***, Berseth, G.\*, Moon, S., Faloutsos, P., & Kapadia, M. (2020, October). Deep Integration of Physical Humanoid Control and Crowd Navigation. In *Proceedings of the 13<sup>th</sup> ACM SIGGRAPH International Conference on Motion, Interaction and Games*. ACM.
- Kremer, M., **Haworth, B.**, Kapadia, M., & Faloutsos, P. (2020, October). Watch Out! Modelling Pedestrians with Egocentric Distractions. In *Proceedings of the 13<sup>th</sup> ACM SIGGRAPH International Conference on Motion, Interaction and Games*. ACM.
- Usman, M., Schaumann, D., **Haworth, B.**, Kapadia, M., & Faloutsos, P. (2019, October). Joint Exploration and Analysis of High-Dimensional Design–Occupancy Templates. In *Proceedings of*

the 12<sup>th</sup> ACM SIGGRAPH International Conference on Motion, Interaction and Games (p. 35). ACM.

- Zhang, X., Schaumann, D., **Haworth, B.**, Faloutsos, P., Kapadia, M. (2019, April). Multi-Constrained Authoring of Occupant Behavior Narratives in Architectural Design. In *Proceedings of the Symposium on Simulation for Architecture & Urban Design*.
- Usman, M., Schaumann, D., **Haworth, B.**, Kapadia, M., & Faloutsos, P. (2019, June). Joint Parametric Modeling of Buildings and Crowds for Human-Centric Simulation and Analysis. In *Proceedings of the International Conference on Computer-Aided Architectural Design Futures* (pp. 279-294). Springer, Singapore.
- Schaumann, D., Sohn, S., Usman, M., **Haworth, B.**, Faloutsos, P., & Kapadia, M. (2019, June). Spatio-Temporal Affordance Maps for Occupancy Simulation in Architectural Design. In *Proceedings of the International Conference on Computer-Aided Architectural Design Futures, Online*.
- Usman, M., Schaumann, D., **Haworth, B.**, Berseth, G., Kapadia, M., & Faloutsos, P. (2018, November). Interactive Spatial Analytics for Human-Aware Building Design. In *Proceedings of the 11<sup>th</sup> ACM SIGGRAPH International Conference on Motion, Interaction, and Games* (p. 13). ACM.
- Usman, M., **Haworth, B.**, Berseth, G., Kapadia, M., & Faloutsos, P. (2017, November). Perceptual evaluation of space in virtual environments. In *Proceedings of the 10<sup>th</sup> ACM SIGGRAPH International Conference on Motion in Games* (p. 16). ACM.
- Chakraborty, N.\*, **Haworth, B.\***, Usman, M., Berseth, G., Faloutsos, P., & Kapadia, M. (2017, November). Crowd sourced co-design of floor plans using simulation guided games. In *Proceedings of the 10<sup>th</sup> ACM SIGGRAPH International Conference on Motion in Games* (p. 1). ACM.
- **Haworth, B.**, Usman, M., Baljko, M., & Hamidi, F. (2016, July). The Use of Working Prototypes for Participatory Design with People with Disabilities. In *Proceedings of the 16<sup>th</sup> International Conference on Computers Helping People with Special Needs* (pp. 134-141). Springer, Cham.
- **Haworth, B.**, Usman, M., Berseth, G., Khayatkhoei, M., Kapadia, M., & Faloutsos, P. (2016, May). Towards computer assisted crowd aware architectural design. In *Proceedings of the 2016 ACM CHI Conference Extended Abstracts on Human Factors in Computing Systems* (pp. 2119-2125). ACM.
- **Haworth, B.**, Usman, M., Berseth, G., Kapadia, M., & Faloutsos, P. (2015, November). Evaluating and optimizing level of service for crowd evacuations. In *Proceedings of the 8<sup>th</sup> ACM SIGGRAPH International Conference on Motion in Games* (pp. 91-96). ACM.
- Berseth, G., **Haworth, B.**, Kapadia, M., & Faloutsos, P. (2014, November). Characterizing and optimizing game level difficulty. In *Proceedings of the 7<sup>th</sup> ACM SIGGRAPH International Conference on Motion in Games* (pp. 153-160). ACM.
- Berseth, G., Kapadia, M., **Haworth, B.**, & Faloutsos, P. (2014, July). SteerFit: Automated parameter fitting for steering algorithms. In *Proceedings of the ACM SIGGRAPH/Eurographics Symposium on Computer Animation* (pp. 113-122). Eurographics Association.
- **Haworth, B.**, Baljko, M., & Faloutsos, P. (2012, December). PhoVR: a virtual reality system to treat phobias. In *Proceedings of the 11<sup>th</sup> ACM SIGGRAPH International Conference on Virtual-Reality Continuum and its Applications in Industry* (pp. 171-174). ACM.
- Shtern, M., **Haworth, B.**, Yunusova, Y., Baljko, M., & Faloutsos, P. (2012, November). A game system for speech rehabilitation. In *Proceedings of the 5<sup>th</sup> International Conference on Motion in Games* (pp. 43-54). Springer, Berlin, Heidelberg.
- **Haworth, B.**, Baljko, M., & Faloutsos, P. (2012, November). Treating Phobias with Computer Games. In *Proceedings of the 5<sup>th</sup> International Conference on Motion in Games* (pp. 374-377). Springer, Berlin, Heidelberg.

- **Haworth, B.**, Kapadia, M., Faloutsos, P. (Accepted). Representative Synthetic Crowds for Inclusive Environment Design. At the *Modeling and Animating Realistic Crowds and Humans Workshop*. 4<sup>th</sup> IEEE International Conference on Artificial Intelligence and Virtual Reality.
- Wang, Y., **Haworth, B.** (2021, July). MASAI: Multi-agent Summative Assessment Improvement for Unsupervised Environment Design. At the *Unsupervised Reinforcement Learning Workshop*. International Conference on Machine Learning 2021.
- (Invited talk) **Haworth, B.** (2021, January). Learning to Move - Reinforcement Learning in Navigation. At the *Neuro-Cognitive Modeling of Humans and Environments Workshop*. 29<sup>th</sup> International Joint Conference on Artificial Intelligence and the 17<sup>th</sup> Pacific Rim International Conference on Artificial Intelligence.
- Berseth, G., **Haworth, B.**, Kapadia, M., Faloutsos, P. (2019, December). Multi-Agent Hierarchical Reinforcement Learning for Humanoid Navigation. At the *Deep Reinforcement Learning Workshop*. 33<sup>rd</sup> Conference on Neural Information Processing Systems.
- **Haworth, B.**, Usman, M., Berseth, G., Kapadia, M., Faloutsos, P. (2017, August). Static and Dynamic Analysis in Computer-Aided Human-Centric Environment Design. At the *Cognition and Artificial Intelligence for Human-Centred Design Workshop*. International Joint Conferences on Artificial Intelligence.
- **Haworth, B.**, Usman, M., Chakraborty, N., Berseth, G., Faloutsos, P., Kapadia, M. (2017, August). Crowd Sourced Co-design of Floor Plans using Simulation Guided Games. At the *Cognition and Artificial Intelligence for Human-Centred Design Workshop*. International Joint Conferences on Artificial Intelligence.
- **Haworth, B.**, Usman, M., Berseth, G., Khayatkhoei, M., Kapadia, M., & Faloutsos, P. (2016, March). Using synthetic crowds to inform building pillar placements. In *Virtual Humans and Crowds for Immersive Environments*, (pp. 7-11). IEEE.
- Moghaddam, A., **Haworth, B.**, Kearney, E., Baljko, M., Faloutsos, P., Yunusova, Y. (2015, August). Artifact Removal Techniques for 3d Electromagnetic Articulography. At the *3<sup>rd</sup> International Workshop on Biomechanical and Parametric Modeling of Human Anatomy*. Parametric Human Project.
- **Haworth, B.**, Kearney, E., Baljko, M., Faloutsos, P., & Yunusova, Y. (2014, August). Electromagnetic articulography in the development of 'serious games' for speech rehabilitation. At the *2<sup>nd</sup> International Workshop on Biomechanical and Parametric Modeling of Human Anatomy*. Parametric Human Project.

## Refereed Posters

- **Haworth, B.**, Kapadia, M., Faloutsos, P. (2017, November). Footstep Action Identification and Clustering from Motion Capture. Poster presented at the *10<sup>th</sup> ACM SIGGRAPH International Conference on Motion in Games*.
- Kearney, E., **Haworth, B.**, Scholl, J., Faloutsos, P., Baljko, M., Yunusova, Y. (2017, November). Game-based Speech Therapy using Visual Feedback in Parkinson's Disease. Poster presented at the *Toronto Rehabilitation Institute Research Day*. UHN: TRI.
- Giles, R., Kearney, E., **Haworth, B.**, Faloutsos, P., Baljko, M., Yunusova, Y. (2017, November). Acoustic - Kinematic Relationships in Speech: Improving Assessment and Treatment of Speech Disorder in Parkinson's Disease. Poster presented at the *Toronto Rehabilitation Institute Research Day*. UHN: TRI.
- Yunusova, Y., Kearney, E., Scholl, J., Janik-Jones, C., **Haworth, B.**, Roberts, E., Faloutsos, P., Baljko, M. (2017, September). Game-Based Augmented Visual Feedback Treatment for Apraxia of Speech After Stroke. Poster presented at the *11<sup>th</sup> World Stroke Congress*. CPSR.
- Usman, M., **Haworth, B.**, Berseth, G., Kapadia, M., Faloutsos, P. (2017, July). Understanding spatial perception and visual modes in the review of architectural designs. Poster presented at the *16<sup>th</sup> annual ACM SIGGRAPH/Eurographics Symposium on Computer Animation*. Eurographics Association.

- Kearney, E., Yunusova, Y., **Haworth, B.**, Faloutsos, P., & Baljko, M. (2014, February). Articulatory Working Space as a Kinematic Target in Augmented Feedback Applications. Poster presented at the *17<sup>th</sup> Biennial Motor Speech Conference*.
- **Haworth, B.**, Kearney, E., Yunusova, Y., Faloutsos, P., & Baljko, M. (2014, February). Rehabilitative Speech Computer Game Calibration Using Empirical Characterizations of Articulatory Working Space (AWS). Poster presented at the *17<sup>th</sup> Biennial Motor Speech Conference*.
- **Haworth, B.**, Yunusova, Y., Kearney, E., Faloutsos, P., & Baljko, M. (2013, November). Enabling Serious Games for Speech Rehab: Movement Space Transformation. Poster presented at the *Toronto Rehabilitation Institute Research Day*. UHN: TRI.
- Kearney, E., **Haworth, B.**, Faloutsos, P., Baljko, M., & Yunusova, Y. (2013, November). Towards Development of Augmented Visual Feedback Targets for Speech Rehabilitation: Articulatory Working Space. Poster presented at the *Toronto Rehabilitation Institute Research Day*. UHN: TRI.
- **Haworth, B.**, Baljko, M., & Faloutsos, P. (2012, November). Treating phobias with computer games using consumer level hardware and software components. Poster presented at the *5<sup>th</sup> International Conference on Motion in Games*.

### Invited Colloquiums

- **Haworth, B.** (2020, May). Representative Crowds for Inclusive Built Environment Design. *University of New Brunswick, Faculty of Computer Science*.
- **Haworth, B.** (2020, March). Representative Crowds for Inclusive Built Environment Design. *University of Victoria, Department of Computer Science*.
- **Haworth, B.** (2019, May). Human Movement Simulation: Environment optimization & diverse crowds for diverse cities. *University of Winnipeg, Department of Applied Computer Science*.

### Refereed Presentations

- **Haworth, B.** (2021, January). Learning to Move - Reinforcement Learning in Navigation. Invited talk at the *Neuro-Cognitive Modeling of Humans and Environments Workshop. 29<sup>th</sup> International Joint Conference on Artificial Intelligence and the 17<sup>th</sup> Pacific Rim International Conference on Artificial Intelligence*.
- **Haworth, B.\***, Berseth, G.\*, Moon, S., Faloutsos, P., & Kapadia, M. (2020, October). Deep Integration of Physical Humanoid Control and Crowd Navigation. Paper presented at the *13<sup>th</sup> ACM SIGGRAPH International Conference on Motion, Interaction and Games*. ACM.
- Diamant, R.\*, **Haworth, B.\*** (2019, July). Reading the Shelves: The Politics of Creating a Diverse Comics Library. *The 2<sup>nd</sup> Annual Conference of the Comics Studies Society – COMICS/POLITICS*.
- Chakraborty, N.\*, **Haworth, B.\***, Usman, M., Berseth, G., Faloutsos, P., Kapadia, M. (2017, November). Crowd Sourced Co-design of Floor Plans using Simulation Guided Games. Paper presented at the *10<sup>th</sup> ACM SIGGRAPH International Conference on Motion in Games*. ACM.
- **Haworth, B.**, Usman, M., Berseth, G., Kapadia, M. & Faloutsos, P. (2017, May). On Density - Flow Relationships During Crowd Evacuation. Paper presented at the *30<sup>th</sup> Conference on Computer Animation and Social Agents*.
- Inampundi, B. C., Zhang, X., Geraci, F., Badler, N. I., & Kapadia, M. (2017, May). Memory Reconstruction from Autobiographic Memories of Autonomous Virtual Agents. Paper presented at the *30<sup>th</sup> Conference on Computer Animation and Social Agents*. (Presenter).
- **Haworth, B.**, Usman, M., Berseth, G., Khayatkhoei, M., Kapadia, M., & Faloutsos, P. (2016, May). CODE: Crowd Optimized Design of Environments. Paper presented at the *29<sup>th</sup> Conference on Computer Animation and Social Agents*.

- Berseth, G., Kapadia, M., & Faloutsos, P. (2016, May). ACCLMesh: Curvature-Based Navigation Mesh Generation. Paper presented at the *29<sup>th</sup> Conference on Computer Animation and Social Agents*. (Presenter).
- Krontiris, A., Bekris, K. & Kapadia, M. (2016, May). ACUMEN: Activity-Centric Crowd Authoring Using Influence Maps. Paper presented at the *29<sup>th</sup> Conference on Computer Animation and Social Agents*. (Presenter).
- **Haworth, B.**, Baljko, M., & Faloutsos, P. (2012, December). PhoVR: A Virtual Reality System to Treat Phobias. Paper presented at the *11<sup>th</sup> ACM SIGGRAPH Conference on Virtual Reality Continuum and Its Applications in Industry*.
- Shtern, M., **Haworth, B.**, Yunusova, Y., Baljko, M., & Faloutsos, P. (2012, November). A Game System for Speech Rehabilitation. Paper presented at the *5<sup>th</sup> International Conference on Motion in Games*.

## 10. TEACHING POSITIONS

- July 2020 – Present: **Course Instructor** in the Department of Computer Science at the University of Victoria, Victoria, Canada.
  - ▶ Spring 2022: CSC 578A Crowd Simulation
  - ▶ Fall 2021: CSC 473/586A Fundamentals of Computer Animation
  - ▶ Spring 2021: CSC 305 Introduction to Computer Graphics
  - ▶ Fall 2020: CSC 473/586A Fundamentals of Computer Animation
- Present: **Guest Lecturer** in the Department of Computer Science at the University of Victoria, Victoria, Canada.
  - ▶ 11/2021: SENG 310 Human Computer Interaction, *Who Do We Design For? Representing humans in the design processes of spaces we use*
  - ▶ 03/2021: CSC 595 Research Skills, *Graphics, Artificial Intelligence, Design, & Games Research + AMA Session*
- 02/2021: **Guest Lecturer** in the Department of Computer Science at Rutgers University, New Jersey, USA.
  - ▶ Topics in Artificial Intelligence, *Learning Representative Crowds*
- 01/2013 – 04/2017: **Teaching Assistant** in the Department of Electrical Engineering and Computer Science at York University, Toronto, Canada.
  - ▶ Object Oriented Programming from Sensors to Actuators
  - ▶ Professional Practice in Computing
  - ▶ Introduction to 3D Computer Graphics (x4)
  - ▶ Advanced Topics in 3D Computer Graphics
  - ▶ Introduction to Virtual Reality
  - ▶ Programming Language Fundamentals
  - ▶ Advanced Object-Oriented Programming
  - ▶ Software Engineering
  - ▶ Computers, Information, and Society
  - ▶ Research Directions in Computing
  - ▶ Introduction to COSC I
  - ▶ Introduction to COSC II
  - ▶ Computer Use: Web and Database Systems
- 11/2013: **Guest Lecturer** in the Department of Electrical Engineering and Computer Science at York University, Toronto, Canada.
  - ▶ Introduction to 3D Computer Graphics (x2), *Ray Tracing and Illumination Models*

## 11. SUPERVISION



## Doctoral

- Qian Wang, Computer Science at the University of Victoria.

## Masters

- Dominic Ferreira, Thesis-based, Computer Science at the University of Victoria.
- Rui Zhang, Thesis-based, Computer Science at the University of Victoria.
- Kun Peng, Thesis-based, Computer Science at the University of Victoria.
- Jonas Buro, Thesis-based, Computer Science at the University of Victoria.
- Kunal Parikh, Project-based, Computer Science at the University of Victoria.

## Undergraduate

- Colin Johnson, Computer Science at the University of Victoria. Jamie Cassels Undergraduate Research Award 2021-2022 recipient. Honours Capstone project.
  - ▶ Project: Autonomous Evaluation of Signage Visibility for Accessibility Auditing
- Lindsey Bellman, Computer Science + Music at the University of Victoria. Interdisciplinary Capstone project.
  - ▶ Project: Music Visualization
- Nick Musey, Computer Science + Psychology at the University of Victoria. Interdisciplinary Capstone project.
  - ▶ Project: Viewpoint of Humanoid Characters in Spatial Perception
- Cairo Sanders, Computer Science + Psychology at the University of Victoria. Interdisciplinary Capstone project.
  - ▶ Project: Virtual Avatar Representation in Spatial Perception
- Yiping Wang, Computer Science at the University of Victoria. Jamie Cassels Undergraduate Research Award 2020-2021 recipient. W.E. Cowie Innovation Award Recipient. Honours Capstone project. Now at University of Waterloo (MMath), Vector Institute Scholarship in Artificial Intelligence recipient.
  - ▶ Project: Learn by Review: Environment Generalization in Multi-Agent Reinforcement Learning
  - ▶ Project: Visual Learning Agents
- Alex Nguyen, Computer Science at the University of Victoria.
  - ▶ Project: Visual Learning Agents
- Eric Wang, Computer Science + Mathematics at the University of Victoria.
  - ▶ Project: Visual Learning Agents
- Jonas Buro, Computer Science at the University of Victoria. Honours Capstone project. NSERC Undergraduate Student Research Award (USRA) Summer 2021 recipient.
  - ▶ Project: Playing the Game of Amazons with Reinforcement Learning
- Rui Zhang, Computer Science at the University of Victoria. Honours Capstone project.
  - ▶ Project: Synthetic Crowd Evaluation for Biomechanics
- Percy Jia, Computer Science at the University of Victoria. Honours Capstone project.
  - ▶ Project: Learning Biomechanical Agents
- Jonathan Maluf, Computer Science + Physics at the University of Victoria. Interdisciplinary Capstone project.
  - ▶ Project: Mesh Deformation for Rectification of Fisheye Images
- Chris Clarke, Computer Science + Music at the University of Victoria. Interdisciplinary Capstone project.
  - ▶ Project: Developing Tools for Musical Creativity
- Dominic Ferreira, Computer Science + Music at the University of Victoria. Interdisciplinary Capstone project.

- ▶ Project: Deep Learning based Solfège Hand Sign Recognition

## 12. STUDENT MENTORING & ADVISING

*(In collaboration with official supervisors)*

### Doctoral

- Muhammad Usman, Electrical Engineering and Computer Science at York University.
  - ▶ Thesis: Spatial Analytics for Simulated User Behaviors in Virtual Environments
- Kaidong Hu, Computer Science at Rutgers University.
  - ▶ Project: Multi-agent Deep Reinforcement Learning
- Seonghyeon Moon, Computer Science at Rutgers University.
  - ▶ Project: Hierarchical Deep Reinforcement Learning for Humanoid Agents

### Masters

- Yunao Shen, Shengdon Liu, Ruolin Qu, Computer Science at Rutgers University.
  - ▶ Thesis: Multi-Modal Curriculum in Multi-Agent Reinforcement Learning
- Melissa Kremer, Electrical Engineering and Computer Science at York University.
  - ▶ Thesis: Distracted Agent Modelling in Synthetic Crowds
- Muhammad Usman, Electrical Engineering and Computer Science at York University.
  - ▶ Thesis: Towards Static and Dynamic Analysis of Architectural Elements

### Undergraduate

- Jeffrey Yang, Computer Science at Rutgers University.
  - ▶ Project: Vehicular Traffic Simulation in Urban Environments
- Yunao Shen, Shengdon Liu, Ruolin Qu, Computer Science at Rutgers University. CS523 Computer Graphics.
  - ▶ Project: Competitive Multi-agent Inverse Reinforcement Learning
- Hemanth Chiluka, Computer Science at Rutgers University. CS523 Computer Graphics.
  - ▶ Project: Robust Multi-Agent Footstep Planning
- Duc Ngo, Computer Science at Rutgers University. Grossman Interdisciplinary Research Team (GIRT) Fellowship Capstone Project.
  - ▶ Project: Heterogeneous Simulation Platform for Pedestrian/Vehicular Interfaces
- Martin Leung, Engineering Science at the University of Toronto. Now at AMD, previously Ubisoft Toronto.
  - ▶ Thesis: Gamifying Speech Therapy for Stroke Victims

## 13. PROFESSIONAL SERVICE

### Editorial

- February 2020 – Present: **Associate Editor** of Computer Animation and Virtual Worlds Journal

### Academic Faculty & Department Committees

- November 2021 – Present: **Member**, Strategic Plan Working Group, Department of Computer Science, University of Victoria.
- 03/2021 – 06/2021: **Chair**, Fairness/Social Aspects/Equity in Artificial Intelligence, Sub-Area Hiring Committee, Department of Computer Science, University of Victoria
- 10/2018 – 04/2019: **Graduate Student Representative**, NSERC Create Program in Data Analytics and Visualization, York University
- 2019: **Graduate Student Representative**, York University Faculty of Graduate Studies Committee on Broadening the Dissertation

### Academic Examination Committees

- November 2021: **External Examiner**, MSc Oral Examination, University of Victoria, Jordie Shier, The Synthesizer Programming Problem: Improving the Usability of Sound Synthesizers
- 12/2020: **External Examiner**, PhD Oral Examination, Rutgers University, Vahid Azizi, Graph-representation Learning for Human-centred Analysis of Building Layouts

### Industrial/Academic Research Proposal Reviews

- October 2021: NSERC Discovery Grant Proposal (Internal, UVic)
- 07/2021: Mitacs Accelerate Proposal

### Industrial/Academic Awards Reviews

- October 2021: NSERC Arthur B. McDonald Fellowship

### Conference Session Chair

- October 2021: 16<sup>th</sup> International Symposium on Visual Computing, Pattern Recognition session
- 04/2021: 12<sup>th</sup> annual Symposium on Simulation for Architecture and Urban Design, Collaborative Design session

### Conference Program/Scientific Committees

- 2021 (x3): 14<sup>th</sup> Annual ACM SIGGRAPH Conference on Motion, Interaction and Games
- 2021 (x2): 16<sup>th</sup> International Symposium on Visual Computing
- 2021 (x2): 19<sup>th</sup> biannual Computer Aided Architectural Design Futures 2021
- 2021 (x4): 12<sup>th</sup> annual Symposium on Simulation for Architecture and Urban Design
- 2021 (x2): 29<sup>th</sup> International Joint Conference on Artificial Intelligence, Workshop on Neural Cognitive Modeling of Humans and Environments
- 2020 (x2): 13<sup>th</sup> annual ACM SIGGRAPH conference on Motion, Interaction, and Games 2020
- 2020 (x2): 15<sup>th</sup> International Symposium on Visual Computing
- 2019 (x5): 12<sup>th</sup> annual ACM SIGGRAPH conference on Motion, Interaction, and Games 2019
- 2019 (x2): 14<sup>th</sup> International Symposium on Visual Computing
- 2018 (x3): 11<sup>th</sup> annual ACM SIGGRAPH conference on Motion, Interaction, and Games 2018

### Peer Reviews

- 2018 – present (x4): Computers & Graphics Journal
- 2015 – present (x9): Computer Animation & Virtual Worlds Journal
- 2013 – present (x16): The Visual Computer Journal
- 2021 (x2): IEEE Transactions on Visualization and Computer Graphics (TVCG)
- 2021: Eurographics 2022
- 2021 (x2): ACM CHI Conference on Human Factors in Computing Systems (CHI 2022)
- 2021: IEEE Transactions on Games (TG)
- 2021: Simulation & Gaming
- 2020: 34<sup>th</sup> AAI Conference on Artificial Intelligence (AAAI 2021)
- 2020: Engineering Applications of Artificial Intelligence
- 2020: Journal of Computational Science
- 2019 (x2): ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2019)
- 2019: 32<sup>nd</sup> Conference on Computer Animation and Social Agents (CASA 2019)
- 2019: Eurographics 2019
- 2019: IEEE VR 2019
- 2018 (x2): SIGGRAPH Asia 2018
- 2018: ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2018)
- 2018: Simulation & Gaming
- 2018: SIGGRAPH 2018
- 2018: 31<sup>st</sup> Conference on Computer Animation and Social Agents (CASA 2018)

- 2018: Eurographics (EG 2018)
- 2017 (x2): SIGGRAPH Asia 2017
- 2017: ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2017)
- 2017 (x2): 30<sup>th</sup> Conference on Computer Animation and Social Agents (CASA 2017)
- 2017 (x2): SIGGRAPH 2017
- 2017 (x2): IEEE International Conference on Robotics and Automation (ICRA 2017)
- 2017: ACM CHI Conference on Human Factors in Computing Systems (CHI 2017)
- 2016: Computer Graphics Forum
- 2016: 24<sup>th</sup> Pacific Conference on Computer Graphics and Applications (Pacific Graphics 2016)
- 2016: SIGGRAPH Asia 2016
- 2016 (x2): SIGGRAPH 2016
- 2016 (x2): ACM CHI Conference on Human Factors in Computing Systems – Late Breaking Works (CHI 2016)
- 2015: 8<sup>th</sup> International ACM SIGGRAPH Conference on Motion in Games (MIG 2015)
- 2015: ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2015)
- 2014: 14<sup>th</sup> International Conference on Intelligent Virtual Agents (IVA 2014)
- 2014: 7<sup>th</sup> International ACM SIGGRAPH Conference on Motion in Games (MIG 2014)

#### 14. VOLUNTEER POSITIONS

- April 2018 – Present: **Board Member & Officer** (Director of Technical Development & Acting Secretary) at The Canada Comics Open Library in Toronto, Canada.
- 03/2018 – Present: **Technical Consultant & Developer** at the Toronto Zine Library in Toronto, Canada.
- 02/2019: **Mentor** at ElleHacks 2019 in Lassonde School of Engineering at York University.
- 05/2018: **Volunteer** at AI·GI·CRV 2018.
- 02/2018: **Mentor** at ElleHacks 2018 in Lassonde School of Engineering at York University.
- 02/2014 – 09/2016: **Executive Member** of the Devices 4 Disabilities student club at York University.
  - 09/2014 – 09/2016: **President**
  - 02/2014 – 08/2014: **Vice President**
- 06/2016 – 08/2016: Data science **Collaborator** on geolocation analysis with the Toronto Tool Library at The Sharing Depot.
- 08/2010 – 08/2012: Astronomy and Cosmology **Tutor** for NATS-AID, a student-run organization in the Faculty of Science, Natural Science Division at York University.

#### 15. WORKSHOPS, PANELS, AND PUBLIC ENGAGEMENT

- “Health and Technology” Panel, Institute on Aging and Lifelong Health – Pathways to Lifelong Health, University of Victoria, 2021.
- “Mission, Strategy, & Politics of Starting a Library” Panel, Information & Museum Studies Conference 2019 – Community Knowledge: Shared Practices of Sense-Making, Communication, & Collaboration, University of Toronto, 2019.
- “Graphics and Media at York (GaMaY) Lab – Animation and Virtual Reality”, Women in Science and Engineering (WISE) Initiative – Science Funday, York University, 2018.
- “Visualize Fast, Visualize Often: Important Insights from Small Changes in Perspective”, NSERC CreateDAV – Summer School, York University, 2018.
- “Toronto Zine Library”, Maker Festival Toronto 2018.
- “Footstep Action Identification and Clustering from Motion Capture”, NSERC CreateDAV – Data Analytics & Visualization Bootcamp, York University, 2017.

- “Graphics and Media at York (GaMaY) Lab”, NSERC CreateDAV – Lab Tours, York University, 2016.
- “Building the TalkBox Do-It-Yourself speech generating device”, Reclaiming Our Bodies and Minds (ROBAM), Ryerson University, 2016.
- “Vocal Tract Visualization (VTV) Project: Centre for Innovation in Information Visualization and Data Driven Design (CIVDDD)”, Ontario Centres of Excellence (OCE): Discovery 2015.
- “TalkBox Project: Tetra Society of North America”, Ontario Centres of Excellence (OCE): Accessibility Innovation Showcase 2015.
- “Devices 4 Disabilities (D4D) @ YorkU”, Maker Festival Toronto 2015.
- “MakeTalk Workshop”, Toronto Mini Maker Faire 2014.