

# CURRICULUM VITAE

## Michael Brandon Haworth

Office: 0018 Lassonde Building, 4700 Keele St, Toronto, ON

Mail: 102 Glenmore Rd, Toronto, ON

Web: bhaworth.ca

Email: brandon@eecs.yorku.ca

Phone: +1 647-772-3012

---

### PERSONAL

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

*Language(s):* English

### MAIN ACADEMIC INTERESTS

- Computer Graphics
- Crowd Simulation
- Virtual Reality
- Computer Vision
- Architectural Design and Optimization
- Game Design and Development
- Human Computer Interaction
- Assistive and Healthcare Technologies
- Behavioural Sciences
- Rehabilitation Sciences

### PROFESSIONAL ASSOCIATIONS

ACM, IEEE

### PROFESSIONAL CERTIFICATIONS

TCPS2: Core – Certification for ethical conduct for research involving humans.

### EDUCATION

- *Ph. D. Candidate* (September 2014 – Present), 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)
- *M. Sc.* (01/13 – 01/16), York University, Department of Electrical Engineering and Computer Science.
  - Thesis: Computer Games for Motor Speech Rehabilitation
  - Supervisors: Faloutsos, Petros ; Baljko, Melanie
- *B. Sc.* (09/08 – 12/12), 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

## RESEARCH POSITIONS

- January 2013 – Present: **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.
- 02/16 – 02/17: **Developer and Consultant** at the Speech Production Lab in the Department of Speech-Language Pathology at the University of Toronto.
- 01/13 – 02/17: **Graduate Researcher/Trainee** at the Vocal Tract Visualization Lab in the Communication Team at the UHN: Toronto Rehabilitation Institute.
- 01/13 – 02/16: **Research Assistant** at the Speech Production Lab in the Department of Speech-Language Pathology at the University of Toronto.
- 06/12 – 12/12: **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.
- 06/12 – 12/12: **Research Assistant** at the Sunnybrook Health Sciences Centre.

## RESEARCH AFFILIATIONS

- Graphics and Multimedia at York Lab (GaMaY)
- Rutgers Intelligent Visual Interfaces Lab (IVI)
- UBC Motion Control and Character Animation group (UBCMOCCA)
- University of Toronto Speech Production Lab (SPL) (*Alumnus*)
- UHN: Toronto Rehabilitation Institute Vocal Tract Visualization Lab (VTV) (*Alumnus*)
- York University Practices in Enabling Technologies Lab (PiET) (*Alumnus*)
- Sunnybrook Health Sciences Centre (*Alumnus*)

## TEACHING POSITIONS

- January 2013 – April 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
  - Professional Practice in Computing
  - Introduction to COSC I
  - Introduction to COSC II
  - Computer Use: Web and Database Systems
- 11/13: **Guest Lecturer** in the Department of Electrical Engineering and Computer Science at York University, Toronto, Canada.
  - Introduction to 3D Computer Graphics, *Ray Tracing*
  - Introduction to 3D Computer Graphics, *Illumination Models*

## STUDENT ADVISING

### Undergraduate

- Martin Leung, Engineering Science at the University of Toronto. Now at AMD, previously Ubisoft Toronto.
  - Thesis: Gamifying Speech Therapy for Stroke Victims

## INDUSTRY POSITIONS

- February 2018 – August 2018: **Research and Development Intern** (*Virtual Reality and Spatial Analysis Expert*) at Teeple Architects, Toronto, Canada.
- 07/17 – 08/17: **Research and Development Intern** (*Virtual and Augmented Reality Expert*) at Programize Hellas S.A., Athens, Greece.
- 04/11 – 12/12: **Web Developer, Software Tester, and Interim IT Manager** at Duraline, Toronto, Canada.
- 09/07 – 02/08: **Web Developer and Technical Advisor** at SuperSaverCa Video Surveillance, Orangeville, ON, Canada.

## VOLUNTEER POSITIONS

- April 2018 – Present: **Board Member** (Director of Technical Development & Acting Secretary) at The Canada Comics Open Library in Toronto, Canada.
- 03/18 – Present: **Technical Consultant & Developer** at the Toronto Zine Library in Toronto, Canada.
- 02/19: **Mentor** at ElleHacks 2019 in Lassonde School of Engineering at York University.
- 05/18: **Volunteer** at AI-GI-CRV 2018.
- 02/18: **Mentor** at ElleHacks 2018 in Lassonde School of Engineering at York University.
- 02/14 – 09/16: **Executive Member** of the Devices 4 Disabilities student club at York University.
  - 09/14 – 09/16: **President**
  - 02/14 – 08/14: **Vice President**
- 06/16 – 08/16: Data science **Collaborator** on geolocation analysis with the Toronto Tool Library at The Sharing Depot.
- 08/10 – 08/12: Astronomy and Cosmology **Tutor** for NATS-AID, a student-run organization in the Faculty of Science, Natural Science Division at York University.

## PROFESSIONAL SERVICE

### Program Committees

- October 2018 – Present: NSERC Create Program in Data Analytics and Visualization
- 2019: 14<sup>th</sup> International Symposium on Visual Computing
- 2018 (x3): Motion, Interaction, and Games 2018

### Peer Reviews

- 2013 – present (x14): The Visual Computer Journal
- 2019: 32nd Conference on Computer Animation and Social Agents (CASA 2019)
- 2019: Eurographics 2019
- 2019: IEEE VR 2019
- 2018 (x2): Computer Animation & Virtual Worlds
- 2018 (x2): SIGGRAPH Asia 2018
- 2018: Computers & Graphics

- 2018: ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2018)
- 2018: Simulation & Gaming
- 2018: SIGGRAPH 2018
- 2018: 31st Conference on Computer Animation and Social Agents (CASA 2018)
- 2018: Eurographics (EG 2018)
- 2017 (x2): Computer Animation & Virtual Worlds
- 2017 (x2): SIGGRAPH Asia 2017
- 2017: ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2017)
- 2017 (x2): 30th 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: SIGCHI 2017
- 2016: Computer Animation & Virtual Worlds
- 2016: Computer Graphics Forum
- 2016: 24th Pacific Conference on Computer Graphics and Applications (Pacific Graphics 2016)
- 2016: SIGGRAPH Asia 2016
- 2016 (x2): SIGGRAPH 2016
- 2016 (x2): SIGCHI 2016 – Late Breaking Works
- 2015: 8th International ACM SIGGRAPH Conference on Motion in Games (MIG 2015)
- 2015: Computer Animation & Virtual Worlds
- 2015: ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA 2015)
- 2014: 14th International Conference on Intelligent Virtual Agents (IVA 2014)
- 2014: 7th International ACM SIGGRAPH Conference on Motion in Games (MIG 2014)

## AWARDS & FUNDING

- 2017 – Present: NSERC CreateDAV (Doctoral)
- 2016 – Present: York Graduate Fellowship (Doctoral)
- 2017: Graduate Development Fund (Seoul, South Korea)
- 2016: Graduate Development Fund (Geneva, Switzerland)
- 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)
- 2011: IDCS IAM Award (ICS/FORTH, Heraklion, Greece)
- 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.)

## PUBLICATIONS

\* shared first authorship

### Journals

- Berseth, G.\*, **Haworth, B.\***, Usman, M.\*, Schaumann, D., Khayatkhoei, M., Kapadia, M., & Faloutsos, P. Interactive Diversity Optimization of Environments. *Unpublished*.
- **Haworth, B.**, Usman, M., Schaumann, D., Chakraborty, N., Berseth, G., Faloutsos, P., & Kapadia, M. Gamification of Crowd-Driven Environment Design. *Unpublished*.
- 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.
- **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.
- **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.
- 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.
- 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 Conferences

- Zhang, X., Schaumann, D., **Haworth, B.**, Faloutsos, P., Kapadia, M. Integrating Individual Motivations and Localized, Task-based Behaviors for Groups of Diverse Virtual Humans. *Unpublished*.
- Diamant, R.\*, **Haworth, B.\***, Radevski, R.\* 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, Accepted*.
- Zhang, X., Schaumann, D., **Haworth, B.**, Faloutsos, P., Kapadia, M. Multi-Constrained Authoring of Occupant Behavior Narratives in Architectural Design. *Symposium on Simulation for Architecture and Urban Design, Accepted*.
- Usman, M., Schaumann, D., **Haworth, B.**, Kapadia, M., & Faloutsos, P. Human-Centered Analytics in a Parametric Design Workflow. *Computer-Aided Architectural Design Futures, Accepted*.
- Schaumann, D., Sohn, S., Usman, M., **Haworth, B.**, Faloutsos, P., & Kapadia, M. Spatio-Temporal Affordance Maps for Occupancy Simulation in Architectural Design. *Computer-Aided Architectural Design Futures, Accepted*.
- 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 11th Annual 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*

*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 11th 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.

### Book Chapters

- 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.

### Refereed Workshops

- **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*, (VHCIE) (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. 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*.
- 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., **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.
- 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. 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*.

### Refereed Presentations

- 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.

## WORKSHOPS AND PUBLIC ENGAGEMENT

- “Graphics and Media at York (GaMaY) Lab – Animation and Virtual Reality”, Women in Science and Engineering (WISE) Initiative - Science Funday. York University, Toronto, Canada, 2018.
- “Visualize Fast, Visualize Often: Important Insights from Small Changes in Perspective”, NSERC CreateDAV – Summer School, York University, Toronto, Canada, 2018.
- “Toronto Zine Library”, Maker Festival Toronto 2018.
- “Footstep Action Identification and Clustering from Motion Capture”, NSERC CreateDAV - Data Analytics & Visualization Bootcamp, York University, Toronto, Canada, 2017.
- “Graphics and Media at York (GaMaY) Lab”, NSERC CreateDAV Lab Tours, York University, Toronto, Canada, 2016.
- “Building the TalkBox Do-It-Yourself speech generating device”, Reclaiming Our Bodies and Minds (ROBAM) 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”, the Toronto Mini Maker Faire 2014.