

## Bio

Omar Hesham is the Visualization and DevOps lead at Zetane Systems, Montreal, developing AI and Machine Learning visual debugging solutions for high-risk industries (transportation, construction, energy, medical training, and defense). He has a PhD from Carleton University's Advanced Real-time Simulation Lab, which specializes in the Discrete Event System Specification (DEVS) formalism. Omar's research on agent-based simulation has been well-received by the simulation community, earning multiple best paper awards for his work on real-time dense crowd simulation. For his MSc, he worked on real-time simulation of soft tissue tearing for surgical training. Prior to academic research, he contracted as a freelancer on interactive multimedia and web development projects.

## Education

**Ph.D.** Electrical and Computer Engineering, Carleton University. Supervisor: Dr. Gabriel Wainer (2013-2019)  
**M.Sc.** Information and Systems Science, Carleton University. Supervisor: Dr. Chris Joslin (2009-2011)  
**B.I.T.** Interactive Multimedia and Design, Carleton University & Algonquin College, with Distinction (2005-2009)

## Teaching

### Teaching Assistant – (2013 – 2017)

Department of Systems and Computer Engineering, Carleton University.

Course	Title	Semester	Instructor
SYSC 3601	Microprocessor Systems: Intel x86	2017 Winter	Dr. Ramy Gohary
SYSC 3006	Computer Organization: ARM Microarchitecture	2016 Fall	Dr. Ramy Gohary
SYSC 3303	Real-time Concurrent Systems	2016 Winter	Dr. Lynn Marshall
SYSC 3006	Computer Organization: ARM Microarchitecture	2015 Fall	Dr. Trevor Pearce
SYSC 3303	Real-time Concurrent Systems (Java)	2015 Winter	Dr. Mohamed Ibrahim
IMD 4003	3D Computer Animation	2014 Fall	Dr. Chris Joslin
IMD 3002	3D Computer Graphics (C++)	2014 Winter	Dr. Chris Joslin
SYSC 3006	Computer Organization: x86 Assembly	2013 Summer	Mr. Graham Eatherley

### Instructor – IMD4005 (Winter 2013)

School of Information Technology, Carleton University.

- Designed and taught a new course on procedural computer graphics at the senior undergraduate level. Topics included generative design and behavioural swarm animation.
- Course load included lectures, labs, and term projects.

### Completed Carleton EDC Training Workshops

- Supporting and Accommodating Students with Disabilities
- Managing Challenging Teaching Situations

## Research

### Ph.D. Electrical and Computer Engineering (2013-2019)

Advanced Real-time Simulation Lab, Carleton University

- Modeling crowd and pedestrian dynamics using the Discrete Event System Specification (DEVS).
- Developed desktop simulation and web visualization tools.
- Dissertation: *Centroidal Particle Dynamics: An Explicit Model of Pedestrian Personal Space for the Simulation of Short-Range Collision-Avoidance and Emergent Motion Patterns in Dense Crowds*.
- Research homepage: <https://omarhesham.com/arslab/>

### M.Sc. Information and Systems Science (2009-2011)

School of Information Technology, Carleton University

- Dissertation: *Fast Meshless Simulation of Anisotropic Tearing in Elastic Solids*.
- Partially funded by Ontario Research Fund - Research Excellence Grant (2009-2011).
- VoroDyn: a novel Voronoi-based implicit collision detection simulation of thick fluids and granular materials on limited mobile devices, written in Java and OpenGL.
- Supervised several experiment runs for fellow Cognitive Science PhD students (2010-2011).

## Honours and Awards

- Outstanding Contribution in Reviewing, Elsevier Simulation Modeling Practice and Theory Journal (2017).
- Bernard Pagurek and Murray Woodside award (2017).
- Carleton EDC Outstanding TA Award nominee (2016-2017).
- Ontario Graduate Scholarship (OGS) (2016-2017).
- Dr. Roger Kaye Memorial Scholarship for Ontario Students (2015-2016).
- Queen Elizabeth II Graduate Scholarship in Science & Technology (QEII-GSST) (2015-2016).
- Carleton EDC Outstanding TA Award nominee (2015-2016).
- Carleton Graduate Scholarship (2013-2016).
- Ontario Graduate Scholarship (OGS) (2010-2011).
- Deans' Honour List (2005-2009).
- Carleton Entrance Scholarship (2005-2009).
- Cambridge ICE Award (2005).

## Academic Service

**Primary Reviewer:** Served as scientific committee member or primary reviewer for the following publications:

- Symposium on Simulation for Architecture and Urban Design (SIMAUD 2018).
- Winter Simulation Conference (WSC 2017).
- Simulation Modelling Practice and Theory (SIMPAT) Special Issue on Agent-based Modeling, Elsevier. June 2017.

**Secondary Reviewer:** Assisted various committee members as secondary reviewer for the following publications:

- ACM SIGSIM Conference on Principles of Advanced Discrete Simulation (SIGSIM PADS 2017).
- IEEE Conference on Enabling Technologies: Infrastructure for Collaborative Enterprises (WETICE 2016).
- International Conference on Cellular Automata for Research and Industry (ACRI 2016).
- Winter Simulation Conference (WSC 2016).
- IEEE International Symposium on Network Computing and Applications (NCA 2016).
- Summer Solstice International Conference on Discrete Models of Complex Systems (SSIC 2015).
- Computer Graphics International (CGI 2012).

## Publications

Google Scholar Profile: <https://scholar.google.com/citations?user=JiRM1gQAAAAJ&hl=en>

### Journal

1. **O. Hesham** and G. Wainer, "Explicit Modeling of Personal Space for Improved Local Dynamics in Simulated Crowds," *ACM Transactions on Modeling and Computer Simulation*, vol. 31, no. 4, pp. 1–29, Jul. 2021.
2. **O. Hesham** and G. Wainer, "Advanced models for centroidal particle dynamics: short-range collision avoidance in dense crowds," *Simulation*, vol. 97, no. 8, pp. 529–543, Aug. 2021.

### Conference

3. S. R. Janapalli, **O. Hesham**, and G. A. Wainer, "Heterogeneous Crowd Simulation," in 2019 Spring Simulation Conference (SpringSim), Apr. 2019, pp. 1–12.
4. **O. Hesham**, Princy, W. Aburime, Z. Rabeh, S. Bhushan, and G. Wainer, "Observed behaviours in simulated close-range pedestrian dynamics," in Proceedings of the Symposium on Simulation for Architecture and Urban Design, Delft, Netherlands, Jun. 2018, pp. 1–8.
5. B. St-Aubin, **O. Hesham**, and G. Wainer, "A Cell-DEVS Visualization and Analysis Platform," in Proceedings of the 50th Computer Simulation Conference, Bordeaux, France, pp. 1-12. SummerSim 2018.
6. **O. Hesham**, C. Joslin, and R. R. Ansara, "Interactive Anisotropic Tearing of Elastic Solids," in Proceedings of the 13th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISIGRAPP 2018) - Volume 1: GRAPP, Funchal, Madeira, Portugal, January 27-29, 2018, pp. 256–263.
7. **O. Hesham** and G. Wainer, "Context-sensitive personal space for dense crowd simulation," in Proceedings of the Symposium on Simulation for Architecture and Urban Design, Toronto, Canada, May 2017, pp. 1–8.
  - **Awarded** Best Student Paper
8. **O. Hesham** and G. Wainer, "Centroidal Particles for Interactive Crowd Simulation," in Proceedings of the Summer Computer Simulation Conference, Montreal, Quebec, Canada, July 2016, pp. 1-8. 2016.
  - **Awarded** Best Paper SCSC
  - **Awarded** Multi-conference Overall Best Paper
9. M. Van Schyndel, **O. Hesham**, G. Wainer and B. Malleck, 2016, "Crowd modeling in the Sun Life building". in Proceedings of Symposium on Simulation in Architecture and Urban Design (SimAUD 2016), London, UK (pp. 4-7).
10. M. Leflar, **O. Hesham**, and C. Joslin, "Use of High Dynamic Range Images for Improved Medical Simulations," in *Modelling the Physiological Human*, Springer Berlin Heidelberg, 2009, pp. 199–208.

## Industrial Experience

### Lead - Visualization and DevOps (September 2018 – Present)

Zetane Systems, Montreal, Canada

- Lead developer: visualization pipeline for Zetane's ML and Deep Learning IDE.
- Shipping a commercial cross-platform C++ desktop application and Python API (Windows, Linux, macOS).
- Deep integration with ML frameworks (TensorFlow, Torch, and ONNX Runtime).
- Onboarding, training, and managing engineering interns.
- DevOps and internal IT/cloud support.
- Writing for patents, grants, proposals, audits.

### Contractor – Self-employed – Part Time (July 2015 – September 2018)

Koldora (omarhesham.com)

- Developed custom tools and educational videos with an emphasis on visual learning
- Web design, development, and hosting for small businesses and research labs
- Design and development of educational videos and illustrative guides for training applications.
- Clients include: Al Noor Institute for The Blind (Doha), Swar Signs (Ottawa), Zetane Systems (Montreal).

### 3D Technical Artist – Part Time (April 2009 – January 2010)

Interactive Media Group (iMG) / Algonquin College Applied Research & Innovations.

- Content developer for Tiontay, an online Unreal Engine 2.5 environment for CHEO Ronald McDonald House patients and their families.
- Working with Tegan Laing, Nuket Nowlan and Dr. Ali Arya, in collaboration with bitHeads and Nortel, I supervised the modeling of 3D characters, and created a Maya rigging pipeline to accommodate additional apparel and accessories for deployment to the Unreal web platform.
- Created documentation and video tutorials for colleagues and future employees.
- Our successful Tipontia launch event was featured on CTV News (July 16, 2009)

### Webmaster – Part Time (September 2006 – August 2008)

Rideau River Residence Association, Carleton University.

- Designed and maintained a more user-friendly UI and several ActionScript 2.0 components.
- CU Students' Charity Ball web coordinator (2007-2009).

## References

### Gabriel Wainer

Professor, Associate Chair for Graduate Studies,  
Systems and Computer Engineering,  
Carleton University  
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### Ramy H. Gohary

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Systems and Computer Engineering,  
Carleton University  
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