

# Dustin Freeman

*dustin@cs.toronto.edu*  
*www.dustinfreeman.org*

---

## PERSONAL STATEMENT

I specialize in fluid, immediate interfaces for creative expression and immersive, interactive theatrical experiences, backed by novel Computer Vision algorithms. I have a strong and diverse background mathematics and theatre, which I use to guide my design process. I am happiest working in novel product development, either in industrial research environments, or early-stage startups.

I finished a PhD in Computer Science at the University of Toronto in May 2015.

I have extensive experience building interfaces in C++ (SFML), Obj-C (UIKit, SceneKit) C# (WPF, Unity), HTML5/CSS/Javascript. Additionally, I have used Python and MATLAB for analyzing large sets of data. I have written high-performance real-time image processing code in C++ (OpenCV and CUDA-C). I am familiar with several methods of gestural and motion recognition, once having implementing a Hidden Markov Model to detect false positives in a large gestural motion dataset. I have convinced uncooperative newborn pieces of hardware to talk to each other for the purposes of demos, but also shipped native code and public-facing SDK to tens of thousands of users.

---

## EDUCATION

- May 2015      **Ph.D. Computer Science**  
UNIVERSITY OF TORONTO  
Advisor: Prof. Ravin Balakrishnan  
Thesis: Improv Remix: Video Manipulation Using Whole-Body Interaction To Extend Improvised Theatre
- 2010          **M.Sc. Computer Science**  
UNIVERSITY OF TORONTO  
Advisor: Prof. Ravin Balakrishnan  
Thesis: Tangible Actions: More Efficient Direct Multitouch Through Replaying Gestures
- 2008          **B.Sc. Mathematics and Engineering**  
QUEEN'S UNIVERSITY  
Thesis: Motion-based Image Segmentation Without Motion Computation  
Advisor: Prof. Abdol-Reza Mansouri
- 

## PROFESSIONAL EXPERIENCE

- Sept - Dec 2016    **Moatboat** (San Francisco, California, USA)  
Contract Software Analyst; Design and Implementation of a Virtual Reality simulation-based creativity tool. I was the first non-founder at Moatboat, a venture-backed Google Daydream launch partner.
- June - Aug 2016    **Secret Location** (Toronto, Canada)  
Contract Software Engineer; integrating an Android NDK 360 video renderer for Virtual Reality with the Unity Engine for upcoming platforms: Google Cardboard and Daydream.
- Nov '14 - Apr '16    **Occipital** (San Francisco, California, USA)  
Spatial Interaction Engineer; exploiting bleeding-edge advancements in mobile SLAM for UX in Augmented and Mixed Reality. Objective-C, SceneKit and Unity.

- Aug - Sept 2014 **Globacore** (Toronto, Canada)  
Contract Software Engineer; built an OpenNI2 wrapper for pre-release Intel RealSense to do body scanning and skeletal mapping of attendees at an event.
- Spring 2011 **Microsoft Research Cambridge** (Cambridge, UK)  
Internship; yielding 2 papers: *KinectFusion* and *The Role of Physical Controllers*.  
Supervisors: Otmar Hilliges, Abigail Sellen, Shahram Izadi
- Summer 2010 **HP Labs India** (Bangalore, India)  
Internship; yielding 1 paper: *Freehand pose-based Gestural Interaction*  
Supervisor: Sriganesh Madhvanath
- Spring 2009 **Microsoft Research Redmond** (Redmond, Washington, USA)  
Internship, yielding 1 paper: *ShadowGuides*  
Supervisors: Hrvoje Benko, Daniel Wigdor, Meredith Ringel-Morris
- Summer 2008 **Queen's University, School of Computing** (Kingston, Canada)  
NSERC USRA Award; Explored curved multitouch interfaces.  
Supervisor: Prof. Roel Vertegaal, Human Media Lab
- Summer 2006 **Queen's University, Mathematics and Statistics Dept.** (Kingston, Canada)  
NSERC USRA Award; Implemented Semi-definite programming algorithms to analyze phase behaviour in high-temperature superconductivity.  
Supervisor: Prof. Bob Erdahl, Quantum Phases Group
- Summer 2005 **Queen's University, Mechanical Engineering Dept.** (Kingston, Canada)  
Research Assistant; Projects: 1) Implemented a reactive daylighting system for a new building. 2) Empirically investigated wicking in fabrics for use in fuel cells.  
Supervisor: Prof. Stephen Harrison, Solar Calorimetry Lab

---

## PUBLICATIONS

- Freeman, D.** and Balakrishnan, R. Improv Remix: Mixed-Reality Video Manipulation Using Whole-Body Interaction to Extend Improvised Theatre. ACM DIS 2016.
- Freeman, D.**, Jota, R., Vogel, D., Wigdor, D. and Balakrishnan, R. A Dataset of Naturally Occurring, Whole-Body Background Activity to Reduce Gesture Conflicts. arXiv 2015.
- Freeman, D.**, Santosa, S., Chevalier, F., Balakrishnan, R., and Singh, K. LACES: Live Authoring through Compositing and Editing of Streaming Video. ACM CHI 2014.
- Freeman, D.**, F. Chevalier, N. Lapierre and D. Reilly. Tweetris: A Study of Whole-Body Interaction During a Public Art Event. ACM Creativity and Cognition 2013. **Emma Candy Award Winner 2013.**
- Freeman, D.**, Vennelakanti, R. and Madhvanath, S. Freehand pose-based Gestural Interaction: Studies and implications for interface design. IEEE IHCI 2012.
- Freeman, D.**, Hilliges, O., Sellen, A., O'Hara, K., Izadi, S. and Wood, K. The Role of Physical Controllers in Motion Video Gaming ACM DIS 2012.
- Freeman, D.** and Balakrishnan, R. Tangible Actions. ACM ITS 2011.
- Izadi, S., Kim, D., Hilliges, O., Molyneaux, D., Newcombe, R., Kohli, P., Shotton, J., Hodges, S., **Freeman, D.**, Davison, A., and Fitzgibbon, A. KinectFusion: real-time 3D reconstruction and interaction using a moving depth camera. ACM UIST 2011.
- Freeman, D.**, Benko, H., Ringel-Morris, M. & Wigdor, D. ShadowGuides: Visualizations for In-Situ Learning of Multi-Touch and Whole-Hand Gestures. ACM ITS 2009.

## PATENTS

**Multimodal interface.** Sriganesh Madhvanath, Dustin Freeman. United States Patent No. US9292112B2. Filing date: 2012-07-06. Grant date: 2016-03-22.

**Hand pose interaction.** Dustin Freeman, Sriganesh Madhvanath, Ankit Shekhawat and Ramadevi Vennelakanti. United States Patent No. US8869073B2. Filing date: 2012-07-27. Grant date: 2014-10-21.

**Teaching gestures with offset contact silhouettes.** Hrvoje Benko, Daniel J. Wigdor and Dustin Freeman. United States Patent No. US8622742B2. Filing date: 2009-11-16. Grant date: 2014-01-07.

---

## OTHER ACTIVITIES

- Oct. 2009      **Scuba Diving License**  
PADI Advanced Open Water Diver. Trained in Koh Tao, Thailand. Have dived in both fresh and salt water since.
- 2006-2008      **Kingston Improv Games**  
HEAD TRAINER  
Ran the training program for the Kingston chapter of the national Canadian Improv Games. This includes scheduling trainings and administering other trainers.
- Dec. 2004      **Mars Society Canada Expedition Alpha**  
GREENHAB ENGINEER  
Two-week simulation mission in the Mars Desert Research Station in Utah. Responsible for water recycling systems, and sent regular field reports to a remote team. Filmed footage that was later used on the Canadian Space Channel.
- 2000            **Aviation Focus Program**  
LaSalle Secondary School in Kingston, Ontario: Constructed a four-person kitplane with a team of students.