

# AAKAR GUPTA

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## RESEARCH INTERESTS

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My research is in the area of Human-Computer Interaction. My research interests are in building and researching interactions for mobile, wearable, and immersive technologies (AR/VR) using a wide range of techniques including computational modeling, machine learning, haptics, sensing, and human factors.

## EDUCATION

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University of Toronto Ph. D. in Computer Science Advisor: Prof. Ravin Balakrishnan Thesis: "Extended Hand Attributes for Touch Input, Touch Output and Touchless Interaction"	Toronto, Canada 2013-2017
University of Toronto M. S. in Computer Science Advisor: Prof. Ravin Balakrishnan Thesis: "Mobile Crowdsourcing in Developing Regions"	Toronto, Canada 2010-2012
Dhirubhai Ambani Institute for Information and Communication Technology (DAIICT) B. Tech. in Information and Communication Technology	Ahmedabad, India 2005-2009

## EMPLOYMENT

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<b>Facebook Reality Labs, Redmond</b> <i>Research Scientist</i> Scientific research on human-computer interaction in augmented and virtual reality.	08/2020 – Present
<b>Facebook Reality Labs, Redmond</b> <i>Postdoctoral Research Scientist</i> Scientific research on human-computer interaction in augmented and virtual reality.	01/2019 – 08/2020
<b>University of Waterloo, Canada</b> <i>Postdoctoral Fellow. Advisor: Prof. Dan Vogel</i> Scientific research on physical capabilities in augmented and virtual reality.	11/2017 – 12/2018
<b>INRIA, Lille, France</b> <i>Research Intern. Advisors: Prof. Thomas Pietrzak and Dr. Nicolas Roussel</i> Scientific research on freehand gestures for mid-air interaction.	06/2016 – 09/2016
<b>INRIA, Lille, France</b> <i>Research Intern. Advisors: Prof. Thomas Pietrzak and Dr. Nicolas Roussel</i> Scientific research on advanced tactile interfaces for wearables.	02/2015 – 04/2015
<b>IBM Research, Bangalore India</b> <i>Research Intern. Advisors: Dr. Bikram Sengupta and Dr. Malolan Chetlur</i> Scientific research on auto-alignments of lecture videos, slides, and other content (EduPal).	08/2012 – 01/2013
<b>Microsoft Research, Bangalore, India</b> <i>Visiting Researcher. Advisors: Dr. Bill Thies and Dr. Ed Cutrell</i> Scientific research on mobile crowdsourcing for low-income workers.	06/2011 – 08/2011
<b>Microsoft Research, Bangalore, India</b> <i>Research Intern. Advisors: Dr. Bill Thies and Dr. Kentaro Toyama</i> Scientific research on biometric terminals for TB clinics in low-connectivity regions.	07/2009 – 05/2010

## AWARDS AND HONORS

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- Best Paper Nominee at ACM CHI 2020 for PneuSleeve: In-fabric Multimodal Actuation and Sensing in a Soft, Compact, and Expressive Haptic Sleeve
- Best Paper Nominee at ACM CHI 2016 for Direct Manipulation in Tactile Displays
- Best Paper Nominee at ACM CHI 2016 for DualKey: Miniature Screen Text Entry via Finger Identification
- Robert E. Lansdale/Okino Computer Graphics Fellowship, 2016
- MITACS Globalink Research Award, 2016
- University of Toronto SGS Conference Grant, 2016
- Robert E. Lansdale/Okino Computer Graphics Fellowship, University of Toronto, 2014
- ICTD 2013 Full Scholarship, Capetown
- GRAND 2011 Travel Scholarship, Vancouver
- ICTD 2010 Full Scholarship, London
- Worldwide Winner, MultiPoint Education Award, Microsoft Imagine Cup 2009
- National Runners Up (India), Software Design, Microsoft Imagine Cup 2009

## PUBLICATIONS

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### REFEREED PUBLICATIONS

- C.20 **Aakar Gupta**, Majed Samad, Kenrick Kin, Per Ola Kristensson, and Hrvoje Benko. (2020) Investigating Remote Tactile Feedback for Mid-Air Text-Entry in Virtual Reality. *Proceedings of the IEEE International Symposium on Mixed and Augmented Reality - ISMAR 2020*.
- C.19 Jun Gong, **Aakar Gupta**, and Hrvoje Benko. (2020) Acustico: Surface Tap Detection and Localization using Wrist-based Acoustic TDOA Sensing. *Proceedings of the ACM Conference on User Interface Software and Technology - UIST 2020*.
- C.18 Jeremy Hartmann, **Aakar Gupta**, and Daniel Vogel. (2020) Extend, Push, Pull: Smartphone Mediated Interaction in Spatial Augmented Reality via Intuitive Mode Switching. *Proceedings of the ACM Conference on Spatial User Interaction - SUI 2020*.
- C.17 **Aakar Gupta**, Borui Lin, Siyi Ji, Arjav Patel, and Daniel Vogel. (2020) Replicate and Reuse: Tangible Interaction Design for Digitally-Augmented Physical Media Objects. *Proceedings of the ACM Conference on Human Factors in Computing Systems - CHI 2020*.
- C.16 Mengjia Zhu, Amirhossein H. Memar, **Aakar Gupta**, Majed Samad, Priyanshu Agarwal, Sean Keller, and Nick Colonnese. (2020) PneuSleeve: In-fabric Multimodal Actuation and Sensing in a Soft, Compact, and Expressive Haptic Sleeve. *Proceedings of the ACM Conference on Human Factors in Computing Systems - CHI 2020*.  
**\*Honorable Mention Award\***
- C.15 Hui-Shyong Yeo, Juyoung Lee, Hyung-il Kim, **Aakar Gupta**, Andrea Bianchi, Daniel Vogel, Hideki Koike, Woontack Woo, Aaron Quigley. (2019) WRIST: Watch-Ring Interaction and Sensing Technique for Wrist Gestures and Macro-Micro Pointing. *Proceedings of the ACM Conference on Human-Computer Interaction with Mobile Devices and Services - MobileHCI 2019*.
- C.14 **Aakar Gupta**, Cheng Ji, Hui-Shyong Yeo, Aaron Quigley, and Daniel Vogel. (2019) RotoSwype: Word-gesture Typing using a Ring. *Proceedings of the ACM Conference on Human Factors in Computing Systems - CHI 2019*.
- C.13 Hemant B. Surale, **Aakar Gupta**, Mark Hancock, and Daniel Vogel. (2019) TabletInVR: Exploring the Design Space for Using a Multi-Touch Tablet in Virtual Reality. *Proceedings of the ACM Conference on Human Factors in Computing Systems - CHI 2019*.
- C.12 **Aakar Gupta**, Jiushan Yang, Ravin Balakrishnan. (2018). Asterisk and Obelisk: Motion Codes for Passive Tagging. *Proceedings of the ACM Symposium on User Interface Software and Technology - UIST 2018*.
- C.11 **Aakar Gupta**, Antony Irudayaraj, Ravin Balakrishnan. (2017). HapticClench: Investigating Squeeze Sensations using Memory Alloys. *Proceedings of the ACM Symposium on User Interface Software and Technology - UIST 2017*.

- C.10 **Aakar Gupta**, Thomas Pietrzak, Cleon Yau, Nicolas Roussel, Ravin Balakrishnan. (2017). Summon and Select: Rapid Interaction with Interface Controls in Mid-air. *Proceedings of the ACM International Conference on Interactive Surfaces and Spaces - ISS 2017*.
- C.9 **Aakar Gupta**, Muhammed Anwar, Ravin Balakrishnan. (2016). Porous Interfaces for Small Screen Multitasking using Finger Identification. *Proceedings of the ACM Symposium on User Interface Software and Technology - UIST 2016*.
- C.8 **Aakar Gupta**, Antony Irudayaraj, Vimal Chandran, Goutham Palaniappan, Khai Truong, Ravin Balakrishnan. (2016). Haptic Learning of Semaphoric Finger Gestures. *Proceedings of the ACM Symposium on User Interface Software and Technology - UIST 2016*.
- C.7 **Aakar Gupta**, Thomas Pietrzak, Nicolas Roussel and Ravin Balakrishnan. (2016) Direct Manipulation in Tactile Displays. *Proceedings of the ACM Conference on Human Factors in Computing Systems - CHI 2016*. **\*Honorable Mention Award\***
- C.6 **Aakar Gupta** and Ravin Balakrishnan. (2016). DualKey: Miniature Screen Text Entry via Finger Identification. *Proceedings of the ACM Conference on Human Factors in Computing Systems - CHI 2016*. **\*\*Honorable Mention Award\*\***
- C.5 **Aakar Gupta**. (2015). Five Years of IndiaHCI. *Proceedings of the ACM International Conference on Human-Computer Interaction - IndiaHCI 2015*.
- C.4 **Aakar Gupta**, William Thies, Edward Cutrell and Ravin Balakrishnan. (2012). mClerk: Enabling Mobile Crowdsourcing in Developing Regions. *Proceedings of the ACM Conference on Human Factors in Computing Systems - CHI 2012*.
- C.3 Nupur Bhatnagar, Abhishek Sinha, Navkar Samdaria, **Aakar Gupta**, Shelly Batra, Manish Bhardwaj and William Thies. (2012). Biometric Monitoring as a Persuasive Technology: Ensuring Patients Visit Health Centers in India's Slums. *Proceedings of the International conference on Persuasive Technology: design for health and safety - Persuasive 2012*.
- C.2 Saurabh Panjwani, **Aakar Gupta**, Navkar Samdaria, Edward Cutrell and Kentaro Toyama. (2010). Collage: A Presentation Tool for the Developing-World School Teacher. *Proceedings of the ACM International Conference on Information and Communication Technologies and Development - ICTD 2010*.
- C.1 **Aakar Gupta**, Milan Saini and Anish Mathuria. (2009). Security Analysis of the Louis Protocol for Location Privacy. *Proceedings of the IEEE International Conference on Communication Systems and Networks - COMSNETS 2009*

## WORKSHOP, ORAL PAPERS

- W.4 **Aakar Gupta** and Thomas Pietrzak. A New Haptic Interaction Paradigm. (2016). *In the CHI 2016 Workshop on Mid-Air Haptics and Displays: Systems for Uninstrumented Mid-Air Interactions*.
- W.3 Navkar Samdaria, Praveen Shekhar, **Aakar Gupta** and David Hutchful. (2011). Teachers as Game Designers: Lessons from a Collaborative Learning Exercise. *Oral Paper at the ACM International Conference on Human-Computer Interaction - IndiaHCI 2011*.
- W.2 Michael Paik, Navkar Samdaria, **Aakar Gupta**, Julie Weber, Nupur Bhatnagar, Shelly Batra, Manish Bhardwaj and William Thies. (2010). A biometric attendance terminal and its application to health programs in India. *Proceedings of the 4th ACM Workshop on Networked Systems for Developing Regions at MobiSys - NSDR 2010*.
- W.1 **Aakar Gupta**, Praveen Shekhar, Navkar Samdaria, Mohit Jain and Joyojeet Pal. (2010). DISHA: Multiple Mice in Narrative Content-based Computer Aided Learning for Children. *Oral Paper at the ACM International Conference on Human-Computer Interaction - IndiaHCI 2010*.

## PATENTS

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- **Spatially Offset Haptic Feedback**. **Aakar Gupta**, Majed Samad, Hrvoje Benko. 16/847327. Provisional.
  - **Wearable Device And User Input System For Computing Devices And Artificial Reality Environments**. Jun Gong, **Aakar Gupta**, Hrvoje Benko. 62/981245. Provisional.
  - **Wearable Device And User Input System With Active Sensing For Computing Devices And Artificial Reality Environments**. Jun Gong, **Aakar Gupta**, Hrvoje Benko. 62/981245. Provisional.
  - **Device Data Personalization**. Malolan Chetlur, **Aakar Gupta**, Bikram Sengupta, Ashay U. Tamhane. US9535958 B2. Granted.

## INVITED TALKS

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- Extending Human Expressivity for Ubiquitous and Immersive Computing Interactions. Apple Inc, Pittsburgh. April 2020. (Remote Talk)
- Extending Human Expressivity for Ubiquitous and Immersive Computing Interactions. Autodesk Research, Toronto. April 2020. (Remote Talk)
- Extending Human Expressivity for Ubiquitous and Immersive Computing Interactions. University of California, Santa Barbara. February 2020.
- Physical Interactions using Human Tactile and Kinesthetic Abilities. University of Calgary, Calgary. November 2018.
- Building Physical Interactions using Human Tactile and Kinesthetic Abilities. Facebook Reality Labs, Redmond. June 2018.
- Data-Driven Utilization of Human Capabilities for HCI. University of Edinburgh, Edinburgh. June 2018.
- Utilizing Human Capabilities for Designing Novel Interactions with Computers. Hong Kong University of Science and Technology (HKUST), Hong Kong. February 2018.
- Utilizing Human Capabilities for Designing Novel Interactions with Computers. University College London, London. January 2018.
- Touch Input, Touch Output and Touchless Interactions. Snap Research, Los Angeles. June 2017.
- Utilizing the Advanced Expressivity of Touch for Interactions. University of Waterloo, Waterloo. May 2017.
- Utilizing the Advanced Expressivity of Touch for Interactions. Autodesk Research, Toronto. December 2016.
- Finger-aware Interactions on Smartwatches. RIA Forum, University of Toronto, Toronto, March 2016.
- Ticketing Problems and a solution using Mobile Barcodes. Microsoft Research, Bangalore, India. January 2013.
- Mobile Crowdsourcing in Developing Regions. Xerox Research, Bangalore, India. June 2012.
- Mobile Crowdsourcing in Developing Regions. IBM Research, Bangalore, India. June 2012.
- Document Transcription using Mobile Crowdsourcing. GRAND 2011, Vancouver. May 2011.
- DISHA: Using Games for Health Awareness among kids. Microsoft Research, Bangalore, India. August 2009.

## PRESS

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- “New Apps for the Bottom Billion”. MIT Technology Review, May 7, 2012.

## ADVISING

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### PHD STUDENTS

- Jun Gong (Facebook Reality Labs - Summer 2019) [C.19]
- Hemant Surale (University of Waterloo - 2018) [C.13]
- Jeremy Hartmann (University of Waterloo - 2018) [C.18]

### MASTERS STUDENTS

- Antony Albert Raj Irudayaraj (University of Toronto - Spring 2016, Spring 2017) [C.8, C.11]
- Vimal Chandran (University of Toronto - Spring 2016) [C.8]
- Goutham Palaniappan (University of Toronto - Spring 2016) [C.8]

## UNDERGRADUATE STUDENTS

- Ningshan Ouyang (University of Waterloo - Fall 2018)
- Arjav Patel (University of Waterloo - Summer 2018) [C.17]
- Ariel Ji (University of Waterloo - Winter 2018) [C.17]
- Boris Lin (University of Waterloo - Winter 2018) [C.17]
- Cheng Ji (University of Waterloo - Winter 2018) [C.14]
- Christina Chung (University of Toronto - Summer 2017)
- Jiushan Yang (University of Toronto - Summer 2017) [C.12]
- Cleon Yau (University of Toronto - Spring 2017) [C.10]
- Muhammed Anwar (University of Toronto - Fall 2015-Spring 2016) [C.9]

## SERVICE

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- Associate Chair in the ACM CHI 2021 Program Committee.
- Associate Chair in the ACM UIST 2020 Program Committee.
- Associate Chair at ACM CHI 2020 in the “Interaction Techniques, Devices and Modalities” subcommittee.
- Associate Chair at ACM CHI 2019 in the “Interaction Techniques, Devices and Modalities” subcommittee.
- Program Committee member at ACM Interactive Surfaces and Spaces - ISS 2018.
- Posters Chair at ACM Interactive Surfaces and Spaces - ISS 2018.
- Associate Chair at ACM CHI 2018 in the “Interaction Techniques, Devices and Modalities” subcommittee.
- Program Committee member at ACM Interactive Surfaces and Spaces - ISS 2018.
- SV (Student Volunteer) Chair at ACM Interactive Surfaces and Spaces - ISS 2017.
- Program Committee member at ACM IndiaHCI 2016.
- Reviewer for TOCHI 2018, CHI 2013-2017, UIST 2015-2018, Ubicomp 2016, ISS 2017, TEI 2017, MobileHCI 2016, IndiaHCI 2015.
- Workshop Organizer “MultiPoint Mouse Learning” for NCERT (National Council of Educational Research and Training), India. May 2009.

## TEACHING EXPERIENCE

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### COURSE INSTRUCTOR

- “CS230: Introduction to Computers and Computer Systems”. University of Waterloo. Summer 2018.

### COURSE GUEST LECTURES

- “Statistical Methods in HCI”. University of Toronto. Nov 2017.  
CSC428: Human-Computer Interaction. Instructor: Prof. Khai Truong
- “Designing Technologies for the Developing World”. University of Toronto. Spring 2011.  
CSC318: Design of Interactive Computational Media. Instructor: Dr. Mike Massimi

### TEACHING ASSISTANT

- CSC428: Human-Computer Interaction. University of Toronto. Spring 2017, Fall 2016, Spring 2016, Fall 2015, Fall 2014.
- CSC343: Introduction to Databases. University of Toronto. Summer 2017, Summer 2015, Spring 2011.
- CSC318: Design of Interactive Computational Media. University of Toronto. Fall 2014.
- BIG102: Internet: Saving Civilization or Trashing the Planet? University of Toronto. Spring 2014, Fall 2013.
- CSC108: Introduction to Computer Programming. University of Toronto. Summer 2013.
- CSC263: Data Structures and Analysis. University of Toronto. Spring 2013.

- CSC192: Data Structures and Algorithms. University of Toronto. Fall 2011.
- CSC209: Software Tools and Systems Programming. University of Toronto. Fall 2010.
- IT215: Systems Software. DAIICT. Spring 2009.
- EL103: Basic Electronic Circuits. DAIICT. Fall 2008.