

XING-DONG YANG

Department of Computer Science
Dartmouth College
Hanover, NH, USA

Email: xing-dong.yang@dartmouth.edu
<http://www.cs.dartmouth.edu/~xingdong/>

My research in Human-Computer Interaction focuses on input technologies, novel interaction techniques and novel augmentations for mobile and wearable devices. In particular, my work focuses on understanding user needs and limitations, and creating new technologies that make interactions between mobile and humans easy and natural. I draw upon a variety of methods in my research, from identifying user needs and limitations to designing and building novel interactive systems and applying methods from qualitative and quantitative research to assess the features of my innovations.

EDUCATION

Ph.D. in Computing Science 2008 - 2013

***Winner of 2013 Bill Buxton Best Canadian HCI Dissertation Award**

Research area: Human-Computer Interaction

Thesis: Blurring the Boundary between Direct & Indirect Mixed Mode Input Environments

Thesis advisors: Pourang Irani and Pierre Boulanger

University of Alberta, Edmonton, Alberta, Canada

M.Sc. in Computing Science 2005 - 2008

Research area: Haptic User Interfaces

Thesis: A Performance Analysis of Motor-skill Training Using Haptic Training

Thesis advisors: Pierre Boulanger and Walter Bischof

University of Alberta, Edmonton, Alberta, Canada

B.Sc. in Computer Science (with Distinction) 2002 - 2005

University of Manitoba, Winnipeg, Manitoba, Canada

GRANTS

[G.3] NSF CRII: SaTC: Lendable: Designing Modular Hardware and Unobtrusive Interactions to Enable Convenient and Trustworthy Lending of Small Personal Computing Devices. (\$175,000). 2017 – 2019

[G.2] NSF CSR: Large: Collaborative Research: Smart earpiece for supporting healthy eating behaviors (\$1,082,976). With David Kotz, Jacob Sorber, Ryan Halter, Kofi M. Odame, and Kelly Caine. 2016 – 2018

[G.1] Microsoft HoloLens Academic Research Grant. Augmenting Reality for the Visually Impaired with Microsoft HoloLens (\$100,000). With Emily Cooper and Wojciech Jarosz. 2016 – 2017

PROFESSIONAL AND RESEARCH POSITIONS

Dartmouth College – Department of Computer Science 2015-Present
Assistant Professor.

University of Calgary – Interactions Lab 2014
Postdoctoral Researcher. Advised by Dr. Anthony Tang and Dr. Saul Greenberg.

Microsoft Research Asia – HCI Group

2012

Research Intern. Advised by Dr. Xiang Cao.

Autodesk Research – User Interface Research Group

2010, 2012

Research Intern. Advised by Dr. Tovi Grossman and Dr. George Fitzmaurice.

REFEREED PUBLICATIONS

A note on publication venues: in Human-Computer Interaction, the ACM Conference on Human Factors in Computing Systems (CHI) and ACM Symposium on User Interface Software & Technology (UIST) are considered the best forums, which have an annual acceptance rate of around 20 - 25%.

Peer-Reviewed Conference Papers

[C.31] D.Y. Huang, R. Guo, J. Gong, J. Wang, J. Graham, D. N. Yang, and **X. D. Yang**. (2017). RetroShape: Leveraging Rear-Surface Shape Displays for 2.5D Interaction on Smartwatches. In *Proceedings of the ACM Symposium on User Interface Software & Technology (UIST'16)*. (in press).

[C.30] T. Han, Q. Han, M. Annett, F. Anderson, D. Y. Huang, and **X. D. Yang**. (2017). Frictio: Passive Kinesthetic Force Feedback for Smart Ring Output. In *Proceedings of the ACM Symposium on User Interface Software & Technology (UIST'16)*. (in press).

[C.29] J. Gong, Y. Zhang, X. Zhou, and **X. D. Yang**. (2017). Pyro: Thumb-Tip Gesture Recognition Using Pyroelectric Infrared Sensing. In *Proceedings of the ACM Symposium on User Interface Software & Technology (UIST'16)*. (in press).

[C.28] T. Seyed, **X. D. Yang**, and Daniel Vogel. (2017). A Modular Smartphone for Lending. In *Proceedings of the ACM Symposium on User Interface Software & Technology (UIST'16)*. (in press).


[C.27] T. Li, X. Xiong, Y. Xie, G. Hito, **X. D. Yang**, and X. Zhou. (2017). Reconstructing Hand Gestures Using Visible Light. In *Proceedings of the ACM International Joint Conference on Pervasive and Ubiquitous Computing (Ubicomp'17)* (in press).

[C.26] J. Gong, L. Li, D. Vogel, and **X. D. Yang** (2017). Cito: An Actuated Smartwatch for Extended Interactions. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI'17)*, 5331-5345.

[C.25] J. Gong, **X. D. Yang**, and P. Irani (2016). WristWhirl: One-handed Continuous Smartwatch Input using Wrist Gestures. In *Proceedings of the ACM Symposium on User Interface Software & Technology (UIST'16)*, 861-872.

[C.24] T. Han, D. Ahlström, **X. D. Yang**, A. Byagowi, and P. Irani (2016). Exploring Design Factors for Transforming Passive Vibration Signals into Smartwear Interactions. In *Proceedings of NordiCHI'16*, Article No. 35.

[C.23] E. Chan, T. Seyed, W. Stuerzlinger, **X. D. Yang**, and F. Maurer (2016). User Elicitation on Single-hand

Microgestures. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI'16)*, 3403-3414.
Honorable Mention Award (Top 5%) 

[C.22] T. Seyed, **X. D. Yang**, and D. Vogel (2016). Doppio: A Reconfigurable Dual-Face Smartwatch for Tangible Interaction. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI'16)*, 4675-4686.

[C.21] M. Serrano, B. Ens, **X. D. Yang**, and P. Irani (2015). Gluey: Developing a Head-Worn Display Interface to Unify the Interaction Experience in Distributed Display Environments. In *Proceedings of the ACM International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI'15)*, 161 - 171.

[C.20] T. Seyed, **X. D. Yang**, A. Tang, S. Greenberg, J. Gu, B. Zhu, and X. Cao (2015). CipherCard: Enhancing Security on Common Touchscreen Devices using Two-factor Authentication. In *Proceedings of the IFIP conference on Human-Computer interaction (INTERACT'15)*, 436 - 454.

[C.19] A. Nittala, **X. D. Yang**, S. Bateman, E. Sharlin, and S. Greenberg (2015). PhoneEar: Interactions for Mobile Devices that Hear High-Frequency Sound-Encoded Data. In *Proceedings of the ACM SIGCHI Symposium on Engineering Interactive Computing Systems (EICS'15)*, 174-179.

[C.18] R. Tang, **X. D. Yang**, S. Bateman, J. Jorge, and A. Tang. (2015). Physio@Home: Exploring visual guidance and feedback techniques for physiotherapy patients at home. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI'15)*, 4123-4132.

[C.17] **X. D. Yang**, K. Hasan, N. Bruce, and P. Irani (2013). Surround-See: Enabling Peripheral Vision on Smartphones during Active Use. In *Proceedings of the ACM Symposium on User Interface Software & Technology (UIST'13)*, 291-300.

[C.16] M. Nancel, O. Chapuis, W. Pietriga, **X. D. Yang**, P. Irani, and M. Beaudouin-Lafon (2013). High-Precision Pointing on Large Wall Displays using Small Handheld Devices. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI'13)*, 831-840.

[C.15] **X. D. Yang**, T. Grossman, D. Wigdor and G. Fitzmaurice. (2012). Magic Finger: Always-Available Input through Finger Instrumentation. In *Proceedings of the ACM Symposium on User Interface Software & Technology (UIST'12)*, 147-156.

[C.14] H. Zhang, **X. D. Yang**, B. Ens, H. N. Liang, P. Boulanger, and P. Irani (2012). See Me, See You: A Lightweight Method for Discriminating User Touches on Tabletop Displays. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI'12)*, 2327-2336.

[C.13] K. Hasan, **X. D. Yang**, A. Bunt, and P. Irani (2012). A-Coord Input: Coordinating Auxiliary Input Streams for Augmenting Contextual Pen- Based Interactions. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI'12)*, 805-814.

- [C.12] K. Hasan, **X. D. Yang**, H. N. Liang and P. Irani. (2012). How to Position the Cursor?: An Exploration of Absolute and Relative Cursor Positioning for Back-of-Device Input. In *Proceedings of the 13th International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI'12)*, 103-112.
- [C.11] H. Tu, **X. D. Yang**, F. Wang, F. Tian and X. Ren. (2012). Mode Switching Techniques through Pen and Device Profiles. In *Proceedings of the 10th Asia Pacific Conference on Computer Human Interaction (APCHI'12)*, 169-176.
- [C.10] **X. D. Yang**, T. Grossman, P. Irani, and G. Fitzmaurice. (2011). TouchCuts and TouchZoom: Enhanced Target Selection for Touch Displays using Finger Proximity Sensing. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI'11)*, 2585-2594.
- [C.9] C. Williams, **X. D. Yang**, G. Partridge, J. Usiskin-Miller, A. Major, P. Irani. (2011). TZee: Exploiting the Lighting Properties of Multi-touch Tabletops for Tangible 3D Interactions. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI'11)*, 1363-1372.
- [C.8] **X. D. Yang**, E. Mak, D. McCallum, P. Irani, X. Cao, and S. Izadi (2010). LensMouse: Augmenting the mouse with an interactive touch display. In *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI'10)*, 2431-2440. **Honorable Mention Award (Top 5%)** 🏆
- [C.7] **X. D. Yang**, E. Mak, P. Irani, and W. F. Bischof (2009). Dual-Surface Input: Augmenting One-Handed Interaction with Coordinated Front and Behind-the-Screen Input. In *Proceedings of the ACM International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI'09)*, 10 pages, Article No.5. **Honorable Mention Award (Top 5%)** 🏆
- [C.6] **X. D. Yang**, P. Irain, P. Boulanger, and W. F. Bischof (2009). A Model for Steering with Haptic-Force Guidance. In *Proceedings of the IFIP conference on Human-Computer interaction (INTERACT'09)*, 465–478.
- [C.5] **X. D. Yang**, W. F. Bischof, and P. Boulanger (2008). The Effects of Hand Motion on Haptic Perception of Force Direction. In *Proceedings of the Euro-haptics (EH'08)*, 355–360.
- [C.4] **X. D. Yang**, W. F. Bischof, and P. Boulanger (2008). Perception of Haptic Force Magnitude during Hand Movements. In *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA'08)*, 129–135.
- [C.3] **X. D. Yang**, W. F. Bischof, and P. Boulanger (2008). Validating the Performance of Haptic Motor Skill Training. In *Proceedings of the Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems (HAPTICS'08)*, 129–135.
- [C.2] P. Irani, C. Gutwin, and **X. D. Yang** (2006). Improving Selection of Off-Screen Targets with Hopping. In *Proceedings of the ACM SIGCHI conference on Human Factors in computing systems (CHI'06)*, 299–308.

[C.1] I. Cheng, R. Shen, **X. D. Yang** and Pierre Boulanger (2006). Perceptual Analysis of Level-of-Detail: The JND Approach. In *Proceedings of the IEEE International Symposium on Multimedia*, 533–540.

Workshop Papers & Posters

[W.7] M. Serrano, K. Hasan, B. Ens, **X. D. Yang**, and P. Irani (2015). Smartwatches + Head-Worn Displays: the ‘New’ Smartphone. *Workshop on Mobile Collocated Interactions: From Smartphones to Wearables (CHI 2015)*.

[W.6] M. Serrano, B. Ens, **X. D. Yang**, and P. Irani (2015). Desktop-Gluey: Augmenting Desktop Environments with Wearable Devices. In *ACM MobileHCI 2015 Workshop on Mobile Collocated Interactions With Wearables (MobileHCI’15)*.

[W.5] K. Zarei-nia, **X. D. Yang**, P. Irani, N. Sepehri (2009). Evaluating Factors that Influence Path Tracing with Passive Haptic Guidance. In *Proceedings of the International Workshop on Haptic and Audio Interaction Design (HAID’09)*, 21–30.

[W.4] **X. D. Yang**, P. Irani, P. Boulanger, and W. F. Bischof (2009). One-Handed Behind-the-Display Cursor Input on Mobile Devices. In *Proceedings of the ACM Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA ’09)*, 4501–4506.

[W.3] N. Kadaba, **X. D. Yang**, and P. Irani (2009). Facilitating Multiple Target Tracking using Semantic Depth of Field (SDOF). In *Proceedings of the ACM Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA ’09)*, 4375–4380.

[W.2] **X. D. Yang** and I. Cheng (2006), 3D Skeletonization Using an Enhanced Voxel Tree. In *Proceedings of the ACM SIGGRAPH research poster and abstract*.

[W.1] P. Boulanger, G. Wu, W. F. Bischof, and **X. D. Yang** (2006). Hapto-Audio-Visual Environments for Collaborative Training of Ophthalmic Surgery over Optical Network. In *Proceedings of the IEEE International Workshop on Haptic Audio Visual Environments and their Applications (HAVE’06)*, 21–26.

PROFESSIONAL SERVICES

Program Committee:

ACM Conference on Human Factors in Computing Systems (CHI)	2018
Graphics Interface (GI)	2015 - 2017
ACM Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI)	2014, 2016

Conference Organization

Session Chair. Inking, Perception and Adaptation at Graphics Interface (GI)	2014
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Conference Reviewer:

ACM Conference on Human Factors in Computing Systems (CHI)	2010 - 2017
ACM Symposium on User Interface Software & Technology (UIST)	2012 - 2017
ACM Conference on Tangible, Embedded and Embodied Interaction (TEI)	2013 - 2017

ACM Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI)	2012, 2013, 2015, 2017
ACM conference on Designing Interactive Systems (DIS)	2014 - 2017
SIGGRAPH Asia Emerging Technologies	2016
ACM SIGCHI Symposium on Engineering Interactive Computing Systems (EICS)	2015
IACR Conference on Financial Cryptography and Data Security (FC)	2015
Graphics Interface (GI)	2009 - 2010, 2014
Asia Pacific Conference on Computer Human Interaction (APCHI)	2012
ACM Conference on Interactive Tabletops and Surfaces (ITS)	2011- 2012
IEEE Symposium on 3D User Interfaces (3DUI)	2010, 2012, 2016
IEEE Information Visualization Conference (InfoVis)	2011
IEEE Conference on Intelligent Robots and Systems (IROS)	2010

Journal Editor and Reviewer:

International Journal of Human-Computer Studies – Editor	2017 - present
Human-Computer Interaction	2017
International Journal on Computers & Graphics	2013, 2015
International Journal of Human-Computer Studies	2013
Transactions on Haptics	2010

Grant Reviewer:

Natural Sciences and Engineering Research Council of Canada Discovery Grants	2017
NSF Small Business Innovation Research	2016

HONORS AND AWARDS

Scholarships

Queen Elizabeth II Graduate Student Scholarship (\$10,000 for 4 months)	2013
Institutional Academic Scholarship.	
SurfNet Research Grant (\$21,000)	2011
National Academic Scholarship.	
iCORE Graduate Student Scholarship in ICT (\$15,000 per year).	2010 - 2012
Provincial Academic Scholarship.	
Walter H Johns Graduate Fellowship (\$4600 per year)	2010 - 2012
Institutional Academic Scholarship.	
Natural Sciences and Engineering Research Council of Canada (NSERC) (PGS D3: \$21,000 per year)	2009 - 2012
National Research Award.	
President’s Doctoral Prize of Distinction (\$10,000)	2009
Institutional Academic Scholarship.	
Provost Doctoral Entrance Award (\$4000)	2009
Institutional Academic Scholarship.	
Provost Doctoral Entrance Award (\$8000)	2008
Institutional Academic Scholarship.	
University of Manitoba Student Union Scholarship for Academic Excellence (\$3000)	2005

Institutional Academic Scholarship.

Awards

Bill Buxton Best Canadian HCI Dissertation Award National Research Award.	2013
Award of Excellence, Star of Tomorrow Internship Program, Microsoft Research Asia Industrial Research Award.	2012
CHI'10 Best Paper Honorable Mention International Research Award.	2010
MobileHCI'09 Best Paper Honorable Mention International Research Award.	2009
Best Teaching Assistant Award Institutional Teaching Award.	2009

TEACHING EXPERIENCE

Dartmouth College - Computer Science Department Introduction to HCI, Research Topics in HCI, and Smartphone Programming	2016- present
University of Calgary - Computer Science Department Sessional Instructor (winter). Instructor for Introduction to Computer Science for Computer Science Majors I.	2014
University of Alberta - Computing Science Department Teaching Assistant (fall and winter). Lab instructor for Programming with Data Structures.	2005 - 2009
University of Alberta - Computing Science Department Undergraduate Mentor. Helped 1 st year CS undergraduate students to acclimatize to university.	2006 - 2008

STUDENTS AND POST-DOCS

Post-Docs

Guangyu Xia (Ph.D., CMU) With Michael Casey. Now: Assistant Professor at NYU Shanghai	2016 – 2017
Da-Yuan Huang (Ph.D., National Taiwan University) Now: Assistant Professor at NTUST	2016 – 2017

Graduate Students

Jun Gong (Ph.D., Dartmouth College) Thesis: Novel Smartwatch Interaction Techniques. Led to paper publications at UIST 2016-2017 and CHI 2017.	2015 - present
Teddy Seyed (Ph.D., University of Calgary) Winter project. Explored a modular smartphone design for lending. Summer project. Explored shoulder-surfing resistant authentication themes using two-factor authentication and head-worn display.	2014 - present

- Summer project. Explored a dual-face smart watch concept and associated novel interaction techniques.
Led to paper publications at INTERACT 2015, CHI 2016, and UIST 2017.
- Ruizhen Guo (M.Sc., Dartmouth College)** 2016 - present
Thesis: Leveraging Rear-Surface Shape Displays for 2.5D Interaction on Smartwatches.
Led to paper publication at UIST 2017
- Linjun Li (M.Sc., Dartmouth College)** 2016 - present
Thesis: Actuated Wearable Devices.
- Qianwen Chen (M.Sc., Dartmouth College)** 2016 - present
Thesis: A haptic Irish Whistle Instruction System.
- Ruchir A. Patel (M.Sc., Dartmouth College)** 2016
Winter project. Novel Haptic Feedback for Smart Rings.
Now: Cofounder of Hey Natasha
- Aditya Shekhar Nittala (M.Sc., University of Calgary)** 2014
Summer project. Explored a technique for broadcasting data to smartphones via audio streams.
Led to paper publication at EICS 2015.
Now: Ph.D. Student at Max Planck Institute For Informatics
- Richard Tang (M.Sc., University of Calgary)** 2014
M.Sc. thesis, with Anthony Tang. Explored visual guidance and feedback techniques for physiotherapy exercises.
Led to paper publication at CHI 2015.
Now: SE at IBM Canada
- Khalad Hasan (M.Sc., University of Manitoba)** 2010 - 2012
Summer project, with Pourang Irani. Explored design space of multi-channel pen input.
Winter project, with Pourang Irani. Explored absolute and relative cursor positioning for back-of-device input.
Led to paper publication at CHI 2012 and MobileHCI 2012.
Now: Assistant Professor of Computer Science at San Francisco State University
- Cary Williams (M.Sc., University of Manitoba)** 2011
Summer project, with Pourang Irani. Explored tangible interface on diffuse illumination (DI) tabletops.
Led to paper publication at CHI 2012.
- Undergraduate Students**
- Marissa C. Le Coz (B.Sc., Dartmouth College)** 2016 - 2017
Undergraduate thesis. A Mobile App that Assists Catholics in Praying Novenas.
Now: SE Intern at Twitter
- Jacob Gaba (B.Sc., Dartmouth College)** 2015 - 2016
Undergraduate honors thesis. Hand Gesture Detection using EMG Sensors.
Now: MS Student at Tsinghua University
- Catherine M. Most (B.Sc., Dartmouth College)** 2015 - 2016
Undergraduate honors thesis. Interaction Techniques on a Spring Shape Smart Ring.
Now: UXE at NEA
- Emily Dann (B.Sc., Dartmouth College)** 2015
Summer project. Explored hand gesture recognition technology using Visible Light Communication.

Now: SE at Pandora

Edwin Chan (B.Sc., University of Calgary) 2015

Honours degree research project. Studied user defined micro-hand gestures.

Led to paper publication at CHI 2016.

Now: SE at VizworX Inc.

Edward Mak (B.Sc., University of Manitoba) 2008 – 2009

Summer project, with Pourang Irani. Explored augmenting the mouse with an interactive touch display.

Winter project, with Pourang Irani. Explored augmenting one-handed interaction with coordinated front and behind-the-screen input.

Led to paper publications at MobileHCI 2009 and CHI 2010.

Now: SE at Priceline Partner Network

TALKS AND PRESENTATIONS

Presentations at International Conferences

UIST'13 – St. Andrews, UK 2013

“Surround-See: Enabling Peripheral Vision on Smartphones during Active Use.”

UIST'12 - Boston, MA, USA 2012

“Magic Finger: Always-Available Input through Finger Instrumentation.”

CHI'12 - Austin, TX, USA 2012

“A-Coord Input: Coordinating Auxiliary Input Streams for Augmenting Contextual Pen-Based Interactions.”

CHI'11 - Vancouver, BC, Canada 2011

“TouchCuts and TouchZoom: Enhanced Target Selection for Touch Displays using Finger Proximity Sensing.”

CHI'10 - Atlanta, GA, USA 2010

“LensMouse: Augmenting the mouse with an interactive touch display.”

INTERACT'09 - Uppsala, Sweden 2009

“A Model for Steering with Haptic-Force Guidance.”

ICRA'08 - Pasadena, CA, USA 2008

“Perception of Haptic Force Magnitude during Hand Movements.”

EuroHaptics'08 Poster - Madrid, Spain 2008

“The Effects of Hand Motion on Haptic Perception of Force Direction.”

Haptics'08 Poster - Reno, NV, USA 2008

“Validating the Performance of Haptic Motor Skill Training.”

SIGGRAPH'06 Poster - Boston, MA, USA 2006

“3D Skeletonization using an Enhanced Voxel Tree.”

Invited Talks

Nanjing University – Department of Computer Science Summer School. Nanjing, China 2017

“Unleash Wearable Interactions from the Disappearing Touchscreens”

Fudan University – Department of Computer Science Colloquium. Shanghai, China 2017

“Unleash Wearable Interactions from the Disappearing Touchscreens”

Brown University – Department of Computer Science Colloquium. Providence, RI, USA 2017

“Unleash Wearable Interactions from the Disappearing Touchscreens” Graphics Interface – Montreal, QC, Canada	2014
“Towards Mobile Interactions that Go Beyond the Touchscreen” University of Waterloo – School of Computer Science. HCI Group Seminar. Waterloo, ON, Canada	2014
“Towards Mobile Interactions that Go Beyond the Touchscreen” Queen's University – School of Computing. HCI Group Seminar. Kingston, ON, Canada	2014
“Towards Mobile Interactions that Go Beyond the Touchscreen” York University – Department of EE&CS. HCI Group Seminar. Toronto, ON, Canada	2014
“Towards Mobile Interactions that Go Beyond the Touchscreen” Microsoft Research Asia – HCI Group Seminar. Beijing, China	2012
“Blurring the Boundary of Direct & Indirect Input in a Shared Input Space.” Xi'an Jiaotong-Liverpool University – Department of Computer Science Seminar. Suzhou, China	2012
“Blurring the Boundary of Direct & Indirect Input in a Shared Input Space.” Kochi University of Technology – Department of Computer Science. HCI Group Seminar. Kochi, Japan	2010
“LensMouse: Augmenting the mouse with an interactive touch display.”	

PATENTS

[P.4] Always-Available Input through Finger Instrumentation. X. D. Yang, T. Grossman, D. Wigdor, and G. Fitzmaurice (US: 20140098067)	2014
[P.3] Enabling Peripheral Vision on Smartphones. (Pending) X. D. Yang, J. D. Hincapié-Ramos and P. Irani	2013
[P.2] Enhanced Target Selection for a Touch-Based Input Enabled User Interface. T. Grossman, G. Fitzmaurice, X. D. Yang, and P. Irani (WO: 2013055997; US: 20130097550)	2013
[P.1] Computer Input and Output Peripheral Device. P. Irani, E. Mak, and X. D. Yang (WO: 2010148483; US: 20120092253)	2012

SELECTED PRESS

Digital Trends “This Absurdly Overengineered Smartwatch Crawls, Tilts, and Slides on Your Wrist”	2017
EurekAlert “Dartmouth-led Team Develops Smartwatch with All The Moves”	2017
Wall Street Journal “The Smartwatch You Can Use With One Hand”	2016
Gizmodo “Smartwatch Prototype to Use Wrist as Joystick”	2016
TechCrunch “WristWhirl lets you control your smartwatch with hand gestures”	2016
Phys.Org “Doppio: Researchers unveil dual screen smartwatch”	2016
Gizmodo “A Multi-Screen Smartwatch Might Actually Be a Brilliant Idea”	2016
Verge “Smartwatch concept puts two screens on your wrist”	2016
New Scientist “A phone, or an all-seeing sentry at your command?”	2013
Discovery News “A Phone That Can See Its Surroundings.”	2013
Mashable “Lens Gives Your Phone Peripheral Vision.”	2013
Discovery News “Magic Finger' Swipes Smartphone Remotely.”	2012
NBC News “Magic Finger Turns Everything into a Touch Surface.”	2012

Engadget “Magic Finger' Reads Gestures from any Surface.”	2012
Gizmodo “Magic Thimble Turns the Entire World into a Touch Surface.”	2012
Mashable “Send Texts from Your Pocket with This Handy Ring.”	2012
Slashdot “Magic Finger Turns Any Surface into a Touch Interface.”	2012
Phys.Org “Magic Finger Device Suggests New Day for Calling up Content.”	2012
Hackaday “Magic Finger Input Device is a Camera on Your Finger Tip.”	2012
GizMag “Magic Finger Turns Any Surface into a Touch Interface.”	2012
Ubergizmo “Magic Finger Allows you to Control Computer from nigh any Surface.”	2012
Dvice “Optical Finger Input Lets You Control a PC from Nearly Any Surface.”	2012
Techaunt “Touch Your Phone from Distance – Magic Finger”	2012
Make “Finger-Mounted Device Creates Its Own Touch Interface.”	2012
Winnipeg SUN “Smart Touchscreen Built at U of M.”	2011