

Toby Jia-Jun Li

Curriculum Vitae

Human-Computer Interaction Institute
School of Computer Science
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Research Interests

Human-Computer Interaction (HCI), End-User Development, Programming by Demonstration, Multi-modal Interaction, Natural Language Programming, Instructable Agents, Human-Agent Interaction

Education

- Ph.D. in Human-Computer Interaction (*in progress*)** **2015 – Present**
Carnegie Mellon University, *Pittsburgh, PA*
Human Computer Interaction Institute, School of Computer Science
Advisor: Dr. Brad A. Myers
- B.S. with Distinction in Computer Science** **2012 – 2015**
University of Minnesota, *Minneapolis, MN*
Department of Computer Science and Engineering
Advisor: Dr. Brent J. Hecht

Peer-reviewed Conference and Journal Papers

- [C.9] **Toby Jia-Jun Li**, Marissa Radensky, Justin Jia, Kirielle Singarajah, Tom M. Mitchell and Brad A. Myers. PUMICE: A Multi-Modal Agent that Learns Concepts and Conditionals from Natural Language and Demonstrations. *Proceedings of the 32nd Annual ACM Symposium on User Interface Software and Technology (UIST 2019)*.
- [C.8] **Toby Jia-Jun Li**, Igor Labutov, Xiaohan Nancy Li, Xiaoyi Zhang, Wenze Shi, Wanling Ding, Tom M. Mitchell and Brad A. Myers. A Multi-Modal Interface for Specifying Data Descriptions in Programming by Demonstration Using Verbal Instructions. *IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC 2018)*.
- [C.7] **Toby Jia-Jun Li** and Oriana Riva. KITE: Building conversational bots from mobile apps. *Proceedings of the 16th ACM International Conference on Mobile Systems, Applications, and Services (MobiSys 2018)*.
- [C.6] **Toby Jia-Jun Li**, Yuanchun Li, Fanglin Chen and Brad A. Myers. Programming IoT Devices by Demonstration Using Mobile Apps. *End-User Development. International Symposium on End User Development (IS-EUD) 2017. LNCS, vol. 10303. Best Paper Award.*

- [C.5] **Toby Jia-Jun Li**, Amos Azaria and Brad A. Myers. SUGILITE: Creating Multimodal Smartphone Automation by Demonstration. *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI 2017). Best Paper Honorable Mention Award.*


- [C.4] Yuanchun Li, Fanglin Chen, **Toby Jia-jun Li**, Yao Guo, Gang Huang, Matthew Fredrikson, Yuvraj Agarwal and Jason I. Hong. PrivacyStreams: Enabling Transparency in Personal Data Processing for Mobile Apps. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (PACM IMWUT/UbiComp 2017)*.
- [C.3] Isaac Johnson, Yilun Lin, **Toby Jia-Jun Li**, Andrew Hall, Aaron Halfaker, Johannes Schöning and Brent Hecht. Not at Home on the Range: Peer Production and the Urban/Rural Divide. *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI 2016)*.
- [C.2] **Toby Jia-Jun Li**, Shilad Sen and Brent Hecht. *Leveraging Advances in Natural Language Processing to Better Understand Tobler's First Law of Geography*. *Proceedings of the 22nd ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (SIGSPATIAL 2014)*.
- [C.1] Shilad Sen, **Toby Jia-Jun Li**, WikiBrain Team and Brent Hecht. WikiBrain: Democratizing Computation on Wikipedia. *Proceedings of the 10th International Symposium on Open Collaboration (OpenSym/WikiSym 2014)*.

Book Sections

- [B.2] **Toby Jia-Jun Li**, Igor Labutov, Brad A. Myers, Amos Azaria, Alexander I. Rudnický and Tom M. Mitchell. 2018. Teaching Agents When They Fail: End User Development in Goal-oriented Conversational Agents. Chapter of *Studies in Conversational UX Design*, Robert J. Moore, Margaret H. Szymanski, Raphael Arar, Guang-Jie Ren eds. Springer.
- [B.1] Brad A. Myers, Andrew Ko, Chris Scaffidi, Stephen Oney, YoungSeok Yoon, Kerry Chang, Mary Beth Kery and **Toby Jia-Jun Li**. 2017. Making End User Development More Natural. Chapter of *New Perspectives in End-User Development*, Fabio Paternò and Volker Wulf, eds. Springer.

Posters and Workshop Papers

- [W.6] **Toby Jia-Jun Li**, Marissa Radensky, Tom M. Mitchell and Brad A. Myers. A Multi-Modal Approach to Concept Learning in Task Oriented Conversational Agents. *Conversational Agents: Acting on the Wave of Research and Development - CHI 2019 Workshop*.
- [W.5] Marissa Radensky, **Toby Jia-Jun Li**, and Brad A. Myers. How End Users Express Conditionals in Programming by Demonstration for Mobile Apps. *2018 IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC 2018) Poster Track*.
- [W.4] **Toby Jia-Jun Li**, Igor Labutov, Xiaohan Nancy Li, Tom M. Mitchell and Brad A. Myers. Supporting Co-Adaptive Human-Agent Relationship through Programming by Demonstration using Existing GUIs. *Rethinking Interaction CHI 2018 Workshop*.
- [W.3] **Toby Jia-Jun Li**. End User Mobile Task Automation using Multimodal Programming by Demonstration. *IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC 2017) Graduate Consortium*.
- [W.2] **Toby Jia-Jun Li**, Brad A. Myers, Amos Azaria, Igor Labutov, Alexander I. Rudnický and Tom M. Mitchell. Designing a Conversational Interface for a Multimodal Smartphone Programming-by-Demonstration Agent. *Conversational UX Design CHI 2017 Workshop*.
- [W.1] **Toby Jia-Jun Li** and Brad A. Myers. Smartphone Text Entry in Cross-Application Tasks. *CHI 2016 Workshop on Inviscid Text Entry and Beyond*.

Invited Talks and Presentations

- [P.6] **Toby Jia-Jun Li** and Forough Arabshahi. Machine Learning from Human Instruction: Every Person a Programmer. Talk at J.P. Morgan. New York, NY. May 24, 2019.
- [P.5] Brad A. Myers and **Toby Jia-Jun Li**. Teaching Intelligent Agents New Tricks: Natural Language Instructions plus Programming-by-Demonstration for Teaching Tasks. *Human Computer Interaction Consortium (HCIC '18)*. Watsonville, CA. June 25, 2018.
- [P.4] **Toby Jia-Jun Li** and Brad A. Myers. SUGILITE: Enabling InMind Agent to Learn New Tasks from User Demonstration. Talk at Oath (formerly Yahoo!). Sunnyvale, CA. May 30, 2018.
- [P.3] **Toby Jia-Jun Li**, Josh Ford, Doug Downey, Brent Hecht, Vijay Murganoor and Shilad Sen. Atlasify – The Geography of Everything. *3M Science and Engineering Symposium*. St Paul, MN. June 25, 2015.
- [P.2] **Toby Jia-Jun Li**, Josh Ford, Doug Downey, Brent Hecht, Vijay Murganoor and Shilad Sen. Atlasify – The Geography of Everything. *The Social Media and Business Analytics Collaborative (SOBACO) Spring Research Symposium*. Minneapolis, MN. May 14, 2015.
- [P.1] **Toby Jia-Jun Li** and Brent Hecht. WikiBrain: Making Computer Programs Smarter with Knowledge from Wikipedia. *The Social Media and Business Analytics Collaborative (SOBACO) Spring Research Symposium*. Minneapolis, MN. May 6, 2014.

Research Experience

Graduate Research Assistant

Aug. 2015 – Present

Human-Computer Interaction Institute, Carnegie Mellon University

- Working on various research projects on end user development, instructable intelligent agents, human-AI interaction and natural language programming.
- Helped preparing and drafting multiple grant proposals resulting in over \$1M in research funds awarded from NSF, Yahoo!, Verizon, and J.P. Morgan.

Engineering Implementation Consultant

Aug. 2017 – Dec. 2017

Research Intern

May. 2017 – Aug. 2017

Microsoft Research, Redmond, WA

Mentor: Dr. Oriana Riva

- Designed and developed a new conversational bot development tool using deep neural network, user task modeling, and mobile app analysis. [C. 7]

Research Assistant

Jan. 2013 – Aug. 2015

GroupLens Research, University of Minnesota

- Led the development and deployment of ATLASIFY – a novel interactive spatial visualization and exploratory search system used by over 10,000 unique users at its peak. [P. 2] [P. 3]
- Developed major parts of WIKIBRAIN – a popular open-source software framework for knowledge mining and computation on Wikipedia. [C. 1] [P. 1]
- Designed and conducted spatial and natural language analysis on Wikipedia data for evaluating Tobler's First Law of Geography and measuring the urban/rural bias in Wikipedia. [C. 2] [C. 3]

Teaching Experience

Teaching Assistant, 05391 / 05891: *Designing Human-Centered Software*
Human-Computer Interaction Institute, Carnegie Mellon University

Spring 2019

Teaching Assistant , 05410 / 05610: <i>User-Centered Research & Evaluation</i> Human-Computer Interaction Institute, Carnegie Mellon University	Fall 2018
Teaching Staff , CSCI 5715: <i>From GPS and Google Maps to Spatial Computing</i> Coursera MOOC & Dept. of Computer Science and Engineering, Univ. of Minnesota	Fall 2014
Teaching Assistant , CSCI 2011: <i>Discrete Structures of Computer Science</i> Department of Computer Science and Engineering, University of Minnesota	Fall 2013, Spring 2014

Students Mentored

Tiffany Cai (CMU) - <i>Worked on a new mobile keyboard for recording text entries in demonstration.</i>	Spring 2017
Jeremy Wei (CMU) - <i>Worked on identifying crucial actions in demonstrated scripts.</i>	Spring 2017
Xiaohan Nancy Li (CMU, now at Microsoft) - <i>Worked on representing and querying snapshots of mobile GUIs. [C.8][W.4]</i>	Fall 2017
Wenze Shi (CMU) - <i>Worked on extracting semantic entities from mobile GUIs. [C.8]</i>	Spring 2018
Wanling Ding (CMU) - <i>Worked on generating user friendly representations for demonstrated scripts. [C.8]</i>	Spring 2018
Marissa Radensky (Amherst College, REU intern at CMU, now Ph.D. student at UW) - <i>Worked on supporting conditionals in programming by demonstration. [W.5][W.6][C.9]</i>	Summer 2018
Justin Jia (CMU) - <i>Worked on semantic parsing for concept instructions. [C.9]</i>	Spring 2019
Kirielle Singarajah (CMU) - <i>Worked on semantic parsing for concept instructions. [C.9]</i>	Spring 2019
Brandon Canfield (Yale University, REU intern at CMU) - <i>Worked on enabling privacy-preserving sharing of end user developed scripts.</i>	Summer 2019
William Timkey (Cornell University, REU intern at CMU) - <i>Worked crowd-sourced data collection for semantic parsers.</i>	Summer 2019
Jingya Chen (CMU) - <i>Worked on multi-modal error handling for speech interfaces.</i>	Summer 2019

Selected Honors, Grants and Awards

Yahoo! InMind Fellowship (\$400,000 over 4 years)	2016 – 2019
NSF Travel Grant for ACM MobiSys 2018 (\$1,500)	2018
Rethinking Interaction CHI 2018 Workshop Travel Grant (\$1,000)	2018
IS-EUD 2017 Best Paper Award	2017
CHI 2017 Best Paper Honorable Mention Award	2017
2016 Bosch/Bezirk Internet of Things Hackathon – 1st place (\$1,000)	2016
University of Minnesota Gold Global Excellence Scholarship (\$33,680 over 4 years)	2012 – 2015
UROP Undergraduate Research Opportunity Program Grant (\$1,400)	2013 – 2014
NSF Travel Grant for ACM SIGSPATIAL 2014 (\$720)	2014
ESRI Scholarship (\$2,000)	2014
University of Minnesota Cultural Corps Awards (\$150)	2014
University of Minnesota College of Science and Engineering: Dean's List	2012 – 2015
ACM/ICPC International Collegiate Programming Contest Word Final Qualifier	2013

Professional Service

Academic Service

Associate Chair, ACM CHI 2019 Late Breaking Work (LBW) Program Committee

Session Chair, ACM CHI 2019 Session on *Conversational Interactions*

Department and Community Service

Committee Member, CMU HCII Ph.D. Admissions Committee (2018-2019)

Student Volunteer, ACM IUI 2019, ACM SIGSPATIAL 2014

Paper Reviewing

Conferences: **ACM CHI** (2017-2019), **ACM UIST** (2017-2019), **ACM CSCW** (2018-2019), **ACM DIS** (2018-2019), **ACM MobileHCI** (2018-2019), **ACM TEI** (2018), **ACM SIGCSE** (2018), **ACM CHI PLAY** (2019).

- Received “special recognitions” for excellent reviews for ACM UIST 2017 and ACM CHI 2018

Journals: **ACM IMWUT** (2017-2019), **IEEE TMC** (2018), **IEEE Pervasive** (2018-2019), **IJGIS** (2017)

Languages

English – Native or bilingual proficiency, **Chinese (Mandarin)** – Native or bilingual proficiency

Technical Skills

Programming Languages: C/C++, Java, Python, Scheme, Android, JavaScript, SQL, HTML and others

Keywords: Machine Learning, Deep Learning, Natural Language Processing, Dialog Systems, Conversational UX