

## SUMMARY

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I am a researcher at Apple, applying **machine learning** and **HCI** to improve **accessibility** in technology. I received my PhD at the University of Washington with **NSF** and **Microsoft Research fellowships**, advised by Shwetak Patel in the Ubiquitous Computing Lab.

## EDUCATION

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### University of Washington (2012 – 2019)

Ph.D. Student, Computer Science

Area: Ubiquitous Computing

Advisor: Dr. Shwetak Patel

### Harvey Mudd College (2008 – 2012)

Bachelor of Science, Computer Science

☆ President Scholar (full tuition merit scholarship)

Graduated with distinction

GPA: 3.6/4.0

## SKILLS

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**Programming:** Python, C++, OpenCV, scikit-learn, Pandas, Altair, MXNet, Java, Arduino, SystemVerilog, Objective-C, C#, Scheme, Prolog

**Software:** SolidWorks, Autodesk Inventor, Photoshop

**Hardware:** 3D printing, laser cutting, fabrication for eTextiles, machining for metal and wood

**Languages:** English; conversational in Dutch, French; familiar with Chinese, German, Hungarian

## WORK EXPERIENCE

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### Researcher, Apple

9/2019 – present

Manager: Jeff Bigham

Working at the intersection of machine learning and HCI to improve accessibility. One project, Screen Recognition, applies computer vision to automatically infer accessibility metadata for mobile apps from their pixels. Built much of the supporting infrastructure for research and development, analyzed collected dataset. Published at CHI '21 and released as an accessibility feature in iOS for VoiceOver.

### Graduate Research, University of Washington

9/2012 – 8/2019

Advisor: Shwetak Patel

Dissertation work investigated how smartphone cameras can screen newborns for dangerous levels of jaundice, yellowing of the skin, in close collaboration with UW Medical Center. Developed data collection procedures and software, applied computer vision to parse images and machine learning to estimate jaundice levels. Work resulted in two publications (one awarded best paper nominee), two patents, and commercial development.

### Research Intern, Microsoft Research Redmond

6/2018 – 9/2018

Manager: Jessica Lundin

Worked on improving CHAMP, a system to monitor infants with single ventricle heart disease. Communicated with medical partners at Children's Mercy Hospital, concretized technical goals, formulated methodology, wrangled and pre-processed data, developed prediction algorithms, and drafted future work. Published as part of my dissertation.

### Research Intern, Microsoft Research Redmond

6/2015 – 9/2015

Manager: Merrie Morris

Conceived and developed a prototype of TeleTourist, a system that uses video calls with strangers to share experiences for people with mobility restrictions. Interviewed individuals with mobility restrictions as formative work, designed system features, and implemented a subset of them for a prototype. Presented the work as a poster at CSCW '16 and resulted in a patent.

### Research Science Intern, Amazon

6/2014 – 9/2014

Manager: Jim Curlander

Designed, developed, and evaluated eyes and head tracking based user interface elements for enhanced reality interfaces in fulfillment centers. Combined concepts from computer graphics with HCI. Produced several prototypes, demonstrated the system in its intended environment. Resulted in a patent.

### Microsoft Computer Science Clinic, Harvey Mudd College

9/2011 – 5/2012

*Faculty Advisor: Z Sweedyk, Microsoft Liaison: Cati Boulanger*

Designed and developed technology to motivate and assess rehabilitation for stroke patients affected in their upper extremities, using the Microsoft Surface in a team of four. Interviewed stroke patients and physical therapists, designed rehabilitative game, produced prototype, and ran user study with stroke patients. Published at CHI '13.

### Undergraduate Research, Harvey Mudd College

6/2011 – 8/2011

*Advisor: Zachary Dodds*

Created and explored vision-based localization algorithms for aerial robots, in team of five students. Developed and prototyped computer vision-based autonomous cooperation between a ground-based and airborne robot and localization for a toy quadrotor helicopter using only its built-in camera. Presented work as demos at GCER '11 and AAAI '11, a talk at CWIC '12, and a publication in TePRA '12.

### Undergraduate Research, Harvey Mudd College

6/2010 – 8/2010

*Advisor: Christine Alvarado*

Developed software for tablet PCs to recognize and simulate hand-drawn logic circuits. Focused on methods to refine sketch recognition and refactoring code. Helped the other five team-members with user interface design and circuit simulation. Resulting software was rolled out and used in Harvey Mudd College's introductory computer science course.

### Engineering Design Project, Harvey Mudd College

3/2009 – 5/2009

*Advisors: Lori Bassman & Patrick Little, Client: Rodney Shannon*

Designed device to automatically open and close a chicken coop for a client in Australia, in a team of four students. It enables chickens to go outside early and be safe from foxes when they roost at night, regardless of the client's availability. We designed and developed a system, including a functional prototype, regularly communicated with our client, and delivered a final tech memorandum & presentation.

## PATENTS

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Colburn, R.A., Curlander, J.C., Gorumkonda, G.K., de Greef, L., inventors; Aug. 2017. **Perspective-Aware Projected User Interfaces**. United States patent US 9723248 B1.

Quinn, K.I., Morris, M., Venolia, G., Tang, J., de Greef, L., inventors; Mar. 2017. **Immersive Telepresence**. United States patent US 9591260 B1.

Taylor, J.A., Patel, S.N., Stout, J.W., de Greef, L., Goel, M., Larson, E.C., inventors; Dec. 2015. **Systems, Devices, and Methods for Estimating Bilirubin Levels**. United States patent US 20150359459 A1.


Taylor, J.A., Patel, S.N., Stout, J.W., de Greef, L., Goel, M., Larson, E.C., inventors; Oct. 2014. **Estimating Bilirubin Levels**. United States patent US WO2014172033 A1.

## PUBLICATIONS

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Zhang, X., **de Greef, L.**, Swearngin, A., White, S., Murray, K., Yu, L., Shan, Q., Nichols, J., Wu, J., Fleizach, C. and Everitt, A. *Screen Recognition: Creating Accessibility Metadata for Mobile Applications from Pixels*. ACM SIGCHI Conference on Human Factors in Computing Systems Proceedings (CHI) 2021

Taylor, J.A., Stout, J.W., **de Greef, L.**, Goel, M., Patel, S., Chung, E.K., Koduri, A., McMahon, S., Dickerson, J., Simpson, E.A. and Larson, E.C. *Use of a Smartphone App to Assess Neonatal Jaundice*. Pediatrics, 2017

 **de Greef, L.**, Goel, M., Seo, M.J., Larson, E.C., Patel, S.N., Stout, J.W., Taylor, J.A. *BiliCam: Using Mobile Phones to Monitor Newborn Jaundice*. ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp) 2014 **Best paper nominee**

Boulanger, C., Boulanger, A., **de Greef, L.**, Kearney, A., Sobel, K., Transue, R., Sweedyk, Z., Dietz, P., Bathiche, S. *Stroke Rehabilitation with a Sensing Surface*. ACM SIGCHI Conference on Human Factors in Computing Systems Proceedings (CHI) 2013

Berezny, N., **de Greef, L.**, Jensen, B., Sheely, K., Sok, M., Lingenbrink, D., Dodds, Z. *Accessible Aerial Autonomy*. IEEE International Conference on Technologies for Practical Robot Applications (TePRA) 2012

## ADJUNCT PROCEEDINGS

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Poster: **de Greef, L.**, Morris, M.R., Inkpen, K. *TeleTourist: Immersive Telepresence Tourism for Mobility-Restricted Participants*. ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW), San Francisco, CA, February 2016

Poster: **de Greef, L.**, Goel, M., Seo, M.J., Larson, E.C., Patel, S.N., Stout, J.W., Taylor, J.A. *BiliCam: Using Mobile Phones to Monitor Newborn Jaundice*. ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp) 2014

Demonstration: Berezny, N., **de Greef, L.**, Jensen, B., Sheely, K., Sok, M., Dodds, Z. *Accessible Aerial Autonomy via ROS*. Association for the Advancement of Artificial Intelligence (AAAI), San Francisco, CA, June 2011

Demonstration: Berezny, N., **de Greef, L.**, Jensen, B., Sheely, K., Sok, M., Dodds, Z. *Autonomous Robot Cooperation*. Global Conference on Educational Robotics (GCER), Orange County, CA, July 2011

## HONORS AND AWARDS

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National Science Foundation Graduate Research Fellowship: 2013 – present

Microsoft Research PhD Fellowship: 2015 – 2017

Microsoft Research Graduate Women's Scholar: 2013 – 2014

Marilyn Fries Endowed Regental Fellowship: 2012 – 2013

President Scholar's Program (4 year full-tuition merit scholarship): 2008 – 2012

University of Washington CSE Three-Sixty Fellowship Fund: 2012

People's Choice Prize at UW CSE's Industry Affiliates Meeting: 2014

Graduated Harvey Mudd College with honors in computer science: 2012

Graduated Harvey Mudd College with honors in humanities, social sciences, and the arts: 2012

Dean's List: Spring 2009, Fall 2009, Fall 2010, Fall 2011, Spring 2012

Davies Prize (top student in engineering design course): 2009

## TEACHING & MENTORING

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### Graduate Mentor

2014 - present

*Undergraduate Research in the Ubicomp Lab, University of Washington*

Mentored four undergraduate students to participate in research projects. Helped them understand research, learn and develop skills for applying computer vision or user-centered design, practice skills for working with iOS or OpenCV, and figure out future career plans.

### Instructor

Summer 2017

*CSE 373: Data Structures and Algorithms for Non-Majors, University of Washington*

As a Predoctoral instructor, I prepared and delivered lectures with interactive activities for a class of 67 students ranging from high school to graduate school students with a diverse set of majors. Managed a team of 5 teaching assistants; prepared homework assignments; wrote, proctored, and graded exams; hosted office hours; and mentored some students one-on-one outside of office hours. Rated 4.4/5 in course review.

### Teaching Assistant

Summer 2016

*CSE 373: Data Structures and Algorithms for Non-Majors, University of Washington*

Prepared and ran review sections, hosted and tutored students in office hours, graded homework assignments, and helped proctor and grade exams for a class of 78 students. Worked in a team with two other teaching assistants.

### Grutor (Grader and Tutor)

2010 - 2012

*CS 70: Data Structures and Program Development, Harvey Mudd College*

Graded and tutored for one of the most intense courses in Harvey Mudd's core computer science curriculum; for their first time in the program, students design and implement programs from scratch, learn C++ in depth, and experience strict grading rubrics that emphasize coding style and rigor. My tutoring hours became so popular that I usually kept a mental queue of who I was supposed to help next, often approached by people asking "enqueue?"

#### **Grutor (Grader and Tutor)**

Spring 2010

*CS 60: Principles of Computer Science, Harvey Mudd College*

Hosted and tutored students in office hours and graded homework assignments as part of a team of grutors for the second course in Harvey Mudd's computer science curriculum.

#### **Teaching Assistant**

Winter 2010

*Winter Physics, Harvey Mudd College*

To help students who entered Harvey Mudd College with less physics experience, I helped assist the first iteration of a one-week intensive workshop that took place during winter break. With one other assistant, roles included attending all class sessions, and tutoring students through homework assignments and in-class exercises.

## **TALKS**

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**See What You Can Be.** TUNE House International Women's Day Event: You Can't Be What You Can't See, Seattle, WA, 8 March 2019 **(Invited Speaker)**

**BiliCam: using Smartphones to Monitor Newborn Jaundice.** IBM India, Bangalore, India, 4 January 2019 **(Invited Speaker)**

**Health @ the ubicomplab.** Women in Science & Engineering Conference (WiSE Conference), Seattle, WA, 18 February 2017 **(Invited Speaker and Panelist)**

**Smart Care through Smartphones.** Tintash Lahore (Software Company), Lahore, Pakistan, 16 January 2018 **(Invited Speaker)**

**BiliCam: Using Mobile Phones to Monitor Newborn Jaundice.** ACM International Joint Conference on Pervasive and Ubiquitous Computing (UbiComp), Seattle, WA, 16 September 2014

**Using Mobile Technology to Monitor Bilirubin and Diagnose Jaundice in Infants.** Global WACH Seminar Series, Seattle, WA, 12 February 2014 **(Invited Speaker)**

**Ubiquitous Computing: Our Approach to Technology Innovations.** Northwest Regional Women in Computing (NWrWIC), Portland, OR, 19 October 2013 **(Distinguished Speaker)**

**Stroke Rehabilitation with the Microsoft Surface.** Harvey Mudd College Projects Day, Claremont, CA, 1 May 2012

**Microsoft Surface for Stroke Rehabilitation.** Celebration of Women in Computing in Southern California (CWIC SoCal), Santa Ana, CA, 14 April 2012

**Accessible Aerial Autonomy.** Celebration of Women in Computing in Southern California (CWIC SoCal), Santa Ana, CA, 14 April 2012.

**Accessible Aerial Autonomy.** Harvey Mudd College Computer Science Colloquium, Claremont, CA, 8 September 2011

**LogiSketch: An Intuitive System for Sketching and Simulating Logic Circuits.** Harvey Mudd College Computer Science Colloquium, Claremont, CA, 21 October 2010