

# Liwei Jiang

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## RESEARCH INTERESTS

My research interests lie at the intersection of Human-computer Interaction (HCI), Artificial Intelligence (AI), and Human-robot Interaction (HRI) applied to improve social goods, particularly in healthcare and education fields.

## EDUCATION

**University of Washington**, Seattle, Washington *September 2019 – 2024 (Expected)*

*Ph.D. in Computer Science & Engineering, Anne Dinning - Michael Wolf Endowed Regental Fellowship* **Advisor:** James Fogarty

**Colby College**, Waterville, Maine (**GPA: 4.08, Class Rank: 4 / 462, Dean's List: '15 – '19**) *September 2015 - January 2019*

*Bachelor of Arts in Computer Science, summa cum laude, GPA 4.08* **Advisor:** Bruce Maxwell

*Bachelor of Arts in Mathematics, summa cum laude, GPA: 4.13* **Advisor:** Scott Taylor

## AWARDS AND HONORS

- **Anne Dinning - Michael Wolf Endowed Regental Fellowship** *September 2019*  
*University of Washington, Paul G. Allen School First-Year Ph.D. Fellowship*
- **Member of the Phi Beta Kappa Society** *March 2018*  
*Elected as a member of Phi Beta Kappa with junior standing at Colby College*
- **Julius Seelye Bixler Scholar** *September 2016, 2017, 2018*  
*Colby College, top-ranking students as determined by the cumulative academic record, three-time recipient*
- **Honorable Mention of Interdisciplinary Contest in Modeling (ICM)** *February 2018*  
*20th annual Interdisciplinary Contest in Modeling (ICM)*
- **Phi Beta Kappa Undergraduate Scholastic Achievement Award** *September 2017*  
*Colby College, top two students in the sophomore and junior classes*
- **Phi Beta Kappa Summer Research Scholar** *June 2016*  
*Colby College, summer research stipend*

## RESEARCH EXPERIENCES

**University of Washington**, Seattle, Washington *September 2019 – Present*

### Research Assistant

**Supervisor: Prof. James Fogarty**

- Build and evaluate effective and easy-to-use self-tracking tools for migraine patients

**Tsinghua University, Future Lab**, Beijing, China

*July 2019 – Present*

### Research Assistant

- Collected, scraped, and parsed online open source conversational English practicing materials
- Designed and implemented the full-stack frameworks (UI/UX, database, and server) of *EnglishBot*, an interactive web-based chatbot, and a *listen-and-repeat* system used to teach oral English conversations to native Chinese speakers with English as the second language
- Devised, streamlined and conducted two between-subject studies with 56 users to compare the learning

engagement and effectiveness of using *EnglishBot* and the *listen-and-repeat* system for practicing conversational English

**Stanford University, Computer Science Department HCI Group**, Stanford, California

*March 2019 – Present*

**Research Assistant**

**Supervisor: Prof. James Landay**

- Pre-processed and conducted statistical analysis of over 8,000,000 GMAT question practicing records for 32,414 users from TAL Education Group's online test preparation platform
- Predicted GMAT test scores by training and testing baseline machine learning models (Linear Regression, Decision Tree, Gradient Tree, SVM etc.) on a subset of users with in-system question practicing records and reported real GMAT test scores
- Conducted a study with five 5 and 6-year-olds for using the BookBuddy app, an interactive chatbot tutor for kids to practice reading abilities
- Coded emotions of the five kids while they used the app to study

**Colby College, Computer Science Department**, Waterville, Maine

*September 2017 – January 2019*

**Student Researcher**

**Supervisor: Prof. Bruce Maxwell**

- Researched on *Robot Guide for the Blind* Honors Thesis project utilizing Robot Operating System (ROS)
- Designed and conducted a user study with 30 participants in which people walk with eyes closed holding hard, soft, and rope handles installed on the TurtleBot
- Evaluated testers' anxiety level for different robot actions (walking straight, turning at corners, stopping to avoid obstacles etc.) based on the pre-, post- and in-trial surveys
- Formulated a second user study in which the TurtleBot will provide different audio or physical clues including varying beep tones, varying navigation speed, and responsive audio instructions to inform the user about the distance between him/her and the TurtleBot
- Compared different ways to relieve users' anxiety level while interacting blindly with the TurtleBot guide

**Stanford University, Computer Science Department HCI Group**, Stanford, California

*June 2018 – November 2018*

**Intern Researcher**

**Supervisor: Prof. James Landay**

- Investigated and confirmed the hypothesis that interactive conversational AI (chatbot) is a more effective and engaging tool than traditional static flashcard apps for factual knowledge learning
- Developed *QuizBot*, a dialogue-based conversational agent embedded in Facebook Messenger app, via Python3, AWS and SES Flask, that helps students learn factual knowledge in science, safety, and English vocabulary
- Devised an Apache Cordova *Flashcard* app via HTML and JavaScript, deployed as iOS and Android apps
- Conducted two within-subject studies with 76 users to compare the learning engagement and outcomes using *QuizBot* and *Flashcard*

**Stanford University, Computer Science Department HCI Group**, Stanford, California

*June 2017 – September 2017*

**Stanford CSLI Summer Research Intern**

**Supervisor: Prof. James Landay**

- Built a chatbot tutor, capable of answering children's questions, as a part of *The Smart Primer* project
- Launched a rule-based educational chatbot system using Google's Dialogflow
- Augmented and trained a context-based Q&A system, a deep neural network, via TensorFlow 1.2 and Python 2.7
- Integrated the Q&A system with the front-end framework via TensorFlow Serving running on Google Cloud
- Evaluated the performance of the chatbot quantitatively and performed a user study with 16 children aged 5 to 9

**Research Assistant**

**Supervisor: Prof. Ying Li**

- Conducted research on navigating an iPhone without connectivity such as GPS or Wi-Fi
- Engineered an Inertial Navigation System (INS) on the iOS platform that allowed users to locate themselves via iPhone's internal sensors, including accelerometers, magnetometers, and gyroscopes, without using external networks given a map of the area
- Collected walking data from twelve users and implemented a step-based stop detection mechanism

**PUBLICATIONS**

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Sherry Ruan, Liwei Jiang, Justin Xu, Bryce Tham, Zhengneng Qiu, Yeshuang Zhu, Elizabeth Murnane, Emma Brunskill, and James A. Landay. 2019. *QuizBot: A Dialogue-based Adaptive Learning System for Factual Knowledge*. In *CHI Conference on Human Factors in Computing Systems Proceedings (CHI 2019)*, May 4–9, 2019, Glasgow, Scotland UK. ACM, New York, NY, USA, 13 pages. <https://doi.org/10.1145/3290605.3300587>

Sherry Ruan, Angelica Willis, Qian Yao Xu, Glenn Davis, Liwei Jiang, Emma Brunskill, James Landay. 2019. *BookBuddy: Turning Digital Materials to Interactive Second Language Learning Lessons Through a Voice Chatbot, 2019 (L@S WIP)*. Proceedings of the Sixth Annual ACM Conference on Learning at Scale.

**PRESENTATIONS**

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- **Educational Chatbot Tutor for Smart Primer.** Poster Session. Stanford University Computer Science Department Undergraduate Research Internship (CURIS). 2017.
- **Smart Primer with Educational Chatbot Tutor.** Oral Presentation. Center for the Study of Linguistic and Information (CSLI) at Stanford University. 2017.
- **Smart Primer with Educational Chatbot Tutor.** Oral Presentation. Stanford University Computer Science Department Human-computer Interaction (HCI) lunch talk. 2017.
- **Navigating an iPhone Without Connectivity.** Poster Session. Colby Undergraduate Summer Research Retreat (CUSRR). 2016.

**COMPUTER SCIENCE RELATED PROJECTS**

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**“Turtle Race” Computer Game Design**, Colby College, Waterville, Maine

January 2017

- Led the design and the implementation of a computer card game called *Turtle Race* using Python and Pygame
- Coded the game user interface, card functionalities, fundamental game logic, and start, end, instruction pages
- Created game UI (e.g., logos, game characters, introduction and end pages) using Photoshop
- Link to the project details: <https://turtlerace2017.tumblr.com>

**“Dance in the Line” Interactive Digital Art Installation Design**, Colby College, Waterville, Maine

January 2016

- Schemed the initial project concept and programmed Isadora plugins and the user interface via C++
- Designed art components of the project including light effects, logos, control icons, instruction boards, advertisement posters and keyboards etc. using Photoshop
- Set up the installation at Colby College student center lounge and displayed the project publicly during January 2016
- Link to the project details: <http://dancingintheline.tumblr.com>

## TEACHING EXPERIENCES

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*Colby College, Mathematics Department, Waterville, Maine*

*September 2018 – January 2019*

### Teaching Assistant

- Held TA office hours and grade problem sets weekly for 30 students in the Differential Equation course

*Colby College, Computer Science Department, Waterville, Maine*

*September 2016 – January 2019*

### Teaching Assistant & Tutor

- Graded 15 programming projects weekly for Introduction to Computational Thinking, Data Structure & Algorithm, Data Analysis & Visualization courses
- Tutored students weekly for Introduction to Computational Thinking, Data Analysis & Algorithm, and Analysis of Algorithm courses, and answered students' laboratory, project and homework questions

## WORK/EXTRACURRICULAR EXPERIENCES

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*Colby College Language Resource Laboratory (LRC), Waterville, Maine*

*September 2016 – January 2019*

### Laboratory Assistant

- Explained the usage of LRC equipment (audio, video, printers, scanners etc.) and software (Adobe, Audacity etc.) to lab users
- Recorded, downloaded, and transformed audio, video, visual, and text materials for professors, students, and librarians

*Global China Connection Colby College Chapter (GCCColby), Waterville, Maine*

*May 2016 – January 2019*

### Club President

- Managed GCCColby WeChat account, answer subscribers' questions, and post Colby event blogs to the public
- Organized Colby 2016 Beijing, Shanghai, and Hong Kong receptions and 2018 Chinese New Year Celebration

*Colby College Physical Plant Department, Waterville, Maine*

*January 2016 – May 2016*

### Engineering Assistant & Office Assistant

- Gathered and analyzed data for dormitory and academic building maintenance
- Located all donor recognition signs on campus, captured their photos, and matched them on building maps
- Completed office logistics works such as typing, data entry, and file management

*Colby College Chemistry Department, Waterville, Maine*

*October 2015 – March 2016*

### Project Assistant

- Assisted Prof. Thomas Shattuck's project on creating daily-used, high-precision thermometer
- Adjusted the computer software, set up the experiment apparatus, and monitored the experiment temperature
- Made aluminum components and parts of the thermometer model

## SKILLS

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### Computer:

*Programming:* Python, Java, C/C++, JavaScript, HTML, CSS, R, Ruby, C#, Swift, SQL, MATLAB, VHDL

*Tools and Services:* PyTorch, LaTeX, ROS, OpenGL, TensorFlow, Flask, MySQL, Docker, Google Cloud Platform, Amazon Web Service, Amazon Mechanical Turk, GitHub/GitLab, Jupyter Notebook, Tableau

### Language:

*Native Language:* Chinese; *Proficient:* English; *Intermediate:* Japanese

***Relevant Coursework:***

*Computer Science:* Deep Learning, Data Structures & Algorithms, Data Analysis & Visualization, Programming Language, Theory of Computation, Analysis of Algorithm, Object-Oriented Design, Parallel & Distributed Processing, Computer Organization, Robotics, Computer Graphics, Interactive Digital Media, Computer Game Design

*Mathematics:* Graph Theory, Linear Algebra, Probability, Abstract Algebra, Real Analysis, Differential Equation, Geometric Group Theory, Calculus