

# Brooke K. Ryan

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## Education

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University of California, Irvine

M.S. in Computer Science, 3.82/4.0

Sept. 2020 – June 2022

Irvine, CA

University of California, San Diego

B.S. in Mathematics & Computer Science

Sept. 2013 – June 2017

La Jolla, CA

## Research Interests

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• Artificial Intelligence • Deep Learning • Neural Networks • Machine Learning • Computer Vision • Data Science • Cognitive Science • Neuroscience • Natural Language Processing • Computer Science Education

## Research Experience

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Graduate Student Researcher

Professor André van der Hoek, Department Head of Informatics

Feb. 2021 – May 2022

Irvine, CA

- Conducting research incorporating industrial Software Engineering experience to critically evaluate and develop new approaches to teaching CS. Focus on topics that are difficult to address in the classroom to enhance equity and accessibility to underrepresented groups.
- First-author and co-lecturer for graduate course Reverse Engineering and Modeling; identifies gap in software engineering curriculum and teaches students techniques of leveraging existing source code to develop software.

Graduate Student Researcher

Professor Pierre Baldi, Distinguished Professor of Computer Science

Mar. 2021 – Dec. 2021

Irvine, CA

- Conducting research around the applications of Deep Learning to biomedical imaging intersecting with human cognition, with the goal of understanding the mechanisms of natural and artificial intelligence.
- Lead Machine Learning researcher in Machine Visual Acuity project, examining the parallels between human and computer vision in recognition acuity exams, utilizing convolutional neural networks.
- Conducted experiments utilizing various generative deep learning models to recover high-resolution retinal images through training patch-based CNNs on multiple low-cost, low-energy images.

## Publications

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1. **Brooke Ryan**, Adriana Meza Soria, Kaj Dreef and André van der Hoek. 2022. Reading to Write Code: An Experience Report of a Reverse Engineering and Modeling Course. In *44th International Conference on Software Engineering: Software Engineering Education and Training (ICSESEET '22)*, May 21–29, 2022, Pittsburgh, PA, USA. ACM, New York, NY, USA, 12 pages. <https://doi.org/10.1145/3510456.3514164>

## Research Projects

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Reverse Engineering and Modeling

*Methods of Teaching Software Engineering Skills* | Professor André van der Hoek

Mar. 2021 – May 2022

Irvine, CA

- First-author in paper working with Professor André van der Hoek to disseminate industry-acquired skills of synthesizing code in the context of large, existing software projects into a graduate-level course.
- Identified a gap in the software engineering curriculum; researched and wrote up techniques of leveraging existing source code to develop software for other universities wishing to implement a similar course.

### Machine Visual Acuity

Mar. 2021 – Dec. 2021

*Deep Learning, Computer Vision* | Baldi Lab & Browne Lab of Ophthalmology

- Lead student in interdisciplinary research project with UCI Ophthalmology School investigating the parallels between machine and human vision using deep learning and human subject experiments.
- Contributed original insights and experiments to the project, including whether English literacy might superficially increase subjects' acuity recognition on the exams. Constructed series of experiments training models of neural networks and injecting "literacy" by providing additional training on the EMNIST dataset.

### Hyperresolution Biomedical Imaging

Mar. 2021 – June 2021

*Deep Generative Models, Biomedical Imaging* | Baldi Lab and Browne Lab of Ophthalmology

Irvine, CA

- Worked in team research project, generate high resolution image (that could be obtained with a 100K microscope) from multiple low resolution images (taken with a 10K microscope).
- Investigated several deep generative models STAR-GAN, EDSR, deep autoregressive generative models. Applied image augmentation, experimented with modification of the architecture, optimized EDSR model using SHERPA hyperparameter optimization.

## Software Engineering

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### Blizzard Entertainment

Jan. 2020 – Feb. 2021

Associate Software Engineer, *Battle.net and Online Products*

Irvine, CA

- Backend Java engineer in the Battle.net and Online Products organization, delivering eCommerce APIs and capabilities on the Purchase team; additionally working in SQL and relational databases.
- Altered critical Purchase-system APIs to implement functionality to support several new payment methods and platforms in Korea region; co-presented an organization-wide talk on the project and methodologies used.

### Intuit

Aug. 2017 – Nov. 2018

Software Engineer I, *Core Technology Team*

San Diego, CA

- Backend Java engineer; delivered Identity capabilities across Intuit products.
- Created Spring "Annotator" tool, automatically converts any Spring XML project to equivalent annotation configuration. Increases unit test speed 12x, provides business savings in reducing server runtime during test build. Gave organization-wide tech talk; open-sourcing for over 10,000 Intuit employees.
- Led Identity team to improve speed and stability of CICD test and build cycle. Researched strategies to address infrastructure issues, implemented automated build jobs for visibility on flaky tests. Decreased build by 1.5 hrs.

### Intuit

June 2016 – Sept. 2016

Software Engineering Intern, *TurboTax Mobile Application Team*

San Diego, CA

- Intern on iOS TurboTax application team, focus in Java and React Native.
- Implemented Java HipTest integration project for TurboTax mobile front-end QE team. Improved visibility of manual tests by implementing interface for test data. Reduced time in manual testing by >40hr/ release.

### CBS Interactive

June 2015 – Aug. 2015

Software Engineering Intern, *Advanced Technology Team*

San Francisco, CA

- Front-end software engineering intern on the Advanced Technology Team. Implemented several key features on the Content Management System JavaScript framework, increased efficiency with AJAX and MVC design.

## Teaching

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- Intermediate Programming (ICS 33)** Summer 2022  
Co-Lecturer & Teaching Assistant, *Professional Master of Software Engineering* UC Irvine
- Served as Co-Lecturer and teaching assistant for the second course in the introductory Computer Science courses at UC Irvine. Presented guest lecture on Programming in Industry, created tutorials hosted on my website.
- Reverse Engineering and Modeling (SWE 265P)** Spring 2022, Spring 2021  
Co-Lecturer & Teaching Assistant, *Professional Master of Software Engineering* UC Irvine
- Served as Co-Lecturer and teaching assistant for professional graduate-level course. Created original course curriculum, presented lectures and tutorials, which are hosted on my website.
- Programming Styles (SWE 262P)** Winter 2022, Winter 2021  
Teaching Assistant, *Professional Master of Software Engineering* UC Irvine
- Graduate professional course covering variety of programming styles and composition mechanisms. Held 5 hours of weekly mentoring, providing students with programming tools and techniques and professional advising.
- Information Retrieval (CS 121)** Fall 2021  
Teaching Assistant, *Department of Computer Science* UC Irvine
- Facilitated discussion sections for over 75 students, and held 3 hours of office hours weekly. Developed custom educational materials from topics on the command line, development environments, documentation synthesis.
- Project Management (INF 151)** Fall 2020  
Teaching Assistant, *Department of Informatics* UC Irvine
- Upper-division informatics course, provided hands-on advising to student teams focusing on technical projects.
- Humanitarian Engineering (ENG 100L)** Fall 2015 – Spring 2017  
Undergraduate Project Advisor, *Jacobs School of Engineering* UC San Diego
- Advised machine learning/ computer vision Digital Vision Screening project to detect eye anomalies in children for UCSD Eye Mobile program. Finished 10yr legacy project in first year.
- Design for Development (ENG 100D)** Fall 2015 – Spring 2017  
Undergraduate Project Advisor, *Jacobs School of Engineering* UC San Diego
- Advised hundreds of students in ongoing humanitarian software engineering projects for non-profit clients tied to UCSD startup community.
- Multivariable Calculus (MATH 10C)** Spring 2014  
Student Workshop Facilitator, *Office of Academic Support and Instructional Services* UC San Diego
- Facilitated Multivariable Calculus workshop in two-hour sessions twice a week. Created lesson plans that engage students in participation and active learning.
  - Received 10 weeks of formal training in techniques to effectively tutor and retain underrepresented students.

## Fellowships & Awards

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- UC Irvine Teaching Assistant Fellowship** Apr. 2020 – June 2022  
*Donald Bren School of Information and Computer Sciences* \$56,000  
Awarded full tuition and monthly stipend for outstanding teaching ability, scholastic aptitude, and research potential. Rarely awarded to Master's students.
- First Place** July 2016  
*CBS Interactive Company-Wide Summer Hackathon* \$1,000  
Awarded 1st place and grand prize for developing feature in the Content Management System that allows CBS

articles to be published directly from Twitter. Increased SEO, article views, and ad revenue.

### Provost Honors

2013 – 2017

UC San Diego

Awarded four times for maintaining a top quarterly GPA.

## Outreach

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### STEM Blog

Jan. 2021 – Present

*brookekryan.com*

- I maintain a STEM blog and website, where I write about topics and host tutorials to make Computer Science, Software Engineering, and Artificial Intelligence more accessible to underrepresented groups.

### Girls Who Code, Lead Instructor

May 2021 – July 2021

Virtual Summer Immersion Program, *AT&T*

Remote

- Head instructor of virtual 2-week summer program for 10th-11th grade girls. Taught 30+ students and led 2 undergraduate teaching assistants. Used JavaScript, CSS, and HTML to develop an activism-focused informative webpage.

### Girls Who Code, Lead Instructor

May 2019 – Aug. 2019

Summer Immersion Program, *Blizzard Entertainment*

Irvine, CA

- Leader of teaching team and 20+ students in flagship 7-week summer program for 10th-11th grade girls, teaching computer science fundamentals using Scratch, Python, Arduino, C, JavaScript, CSS, and HTML.
- Implemented original curriculum to further understanding and engagement in advanced topics such as Git, command line, and Python source code. Rated highest-performing teaching team in the Southern California.

### K-12 STEM Education Program, Global Teams in Engineering Service

Sept. 2016 – June 2017

Undergraduate Project Advisor, *Jacobs School of Engineering*

San Diego, CA

- Facilitated visits to local schools to engage children in STEM topics taught by UCSD engineering students.
- Trained UCSD students in active learning and creation of engaging lesson plans based on participant age, knowledge level, and interest.

## Skills

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**Machine Learning Libraries:** Keras, Tensorflow, PyTorch, Scikit-Learn, OpenCV, NumPy, Weights and Biases

**Programming Languages:** Python, Java, C++, C, Kotlin, Scala, JavaScript, Ruby, HTML, CSS, SQL

**Distributed Computing:** CUDA, Sun Grid Engine, Linux, Unix, Bash, AWS

**Natural Language Processing:** AllenNLP, HuggingFace, SpaCy, NLTK, Gensim

**Embedded Computing:** Arduino, Raspberry Pi

**Software Engineering:** Node.js, React Native, Jekyll, functional programming, software design, code generation, Git, backend software engineering, front-end software engineering, quality engineering, human-centered design

## Miscellaneous

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### John Muir Trail

Aug. 2019 – Sept. 2019

*211-mile long-distance backpacking trail in the Sierra Nevada Mountain range. Hiked in 24 days.*

### Ocean Lifeguard, Huntington State Beach

July 2012 – June 2014

*Performed over 100 aquatic ocean rescues in three years of service; busiest state beach in California.*