Brooke K. Ryan

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Education

University of California, Irvine — Sept. 2020 – June 2022
M.S. in Computer Science, *3.82/4.0* — Irvine, CA

University of California, San Diego — Sept. 2013 – June 2017
B.S. in Mathematics & Computer Science — La Jolla, CA

Research Interests

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

Publications

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 *44nd 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

AI-Generated Art for Creativity and Inclusion in STEM — Mar. 2022 – Present
Artificial Intelligence, STEM Education, AI-Generated Art | Professor Kylie Peppler — Irvine, CA

- Proposed original research project for AI-Generated art for promoting learning and inclusion in STEM, particularly for underrepresented groups.
- Currently writing paper for Summer submission.

BBMA: A Blockchain-Based Messaging Application — Jan. 2022 – June 2022
Blockchain, Distributed Systems, Messaging | Professor Faisal Nawab — Irvine, CA

- Researched and implemented a novel Blockchain-based messaging system. Architecture utilizes NFTs for Identity system. Written in Solidity on the Ethereum ecosystem.
- In submission.

Reverse Engineering and Modeling — Mar. 2021 – May 2022
Methods of Teaching Software Engineering Skills | Professor André van der Hoek — 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.

Experience

Creativity Labs Student Researcher Mar. 2022 – Present

Professor Kylie Peppler, Professor of Informatics and Education Irvine, CA

– Conducting research around the intersection of AI-generated artwork and STEM education and inclusion for underrepresented groups.

Edge Lab Student Researcher Jan. 2022 – June 2022

Professor Faisal Nawab, Professor of Computer Science Irvine, CA

– Researched and implemented a prototype of a novel Blockchain-based messaging application.

Graduate Student Researcher Feb. 2021 – May 2022

Professor André van der Hoek, Department Head of Informatics 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.

Baldi Lab Student Researcher Mar. 2021 – Dec. 2021

Professor Pierre Baldi, Distinguished Professor of Computer Science 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.

Associate Software Engineer Jan. 2020 – Feb. 2021

Blizzard Entertainment, *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.

Software Engineer I Aug. 2017 – Nov. 2018

Intuit, *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.

Software Engineering Intern June 2016 – Sept. 2016
Intuit, *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.

Software Engineering Intern June 2015 – Aug. 2015
CBS Interactive, *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

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

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.

Service

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

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

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.