Brooke K. Ryan

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Education

Princeton University — Aug. 2023 – Present
Ph.D. in Psychology — Princeton, NJ
Advisor: Uri Hasson

University of California, Irvine — Sep. 2020 – Sep. 2022
M.S. in Computer Science — Irvine, CA

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

Research Interests

• Computational Cognitive Neuroscience • Psychology • Artificial Intelligence • Deep Learning • Neural Networks • Neurolinguistics • Language Acquisition • Developmental Psychology • CS 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 Experience

Professor Marcelo Mattar, Cognitive Science — Aug. 2022 – Present
Artificial Neural Networks, Human Behavior, Decision Science — UC San Diego

- Lead student in artificial intelligence research project investigating neural networks pre-trained with optimal priors for predicting human decision-making in small-data regimes.
- Generated new dataset with optimal targets to supply for pre-training methodology.
- Constructed experimental pipeline using Python, JAX, Matplotlib, weights and biases, etc. to train models with increasing proportions of human data. Preliminary results show accuracy converges more efficiently on models using pre-training with optimal priors.

Professor Pierre Baldi, Computer Science — Mar. 2021 – Dec. 2021
Machine Visual Acuity: *Deep Learning, Computer Vision, Ophthalmology* — UC Irvine

- Lead student in interdisciplinary research project with Professor Andrew Browne of the UCI Ophthalmology School investigating the parallels between machine and human vision using CNNs and human experiments.
- Constructed series of experiments using Python, Tensorflow, training models of neural networks and injecting "literacy" by providing additional training on the EMNIST dataset.

Hyperresolution Biomedical Imaging: *Deep Generative Models, Biomedical Imaging*

- 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.

Professor Faisal Nawab, Computer Science Jan. 2022 – Nov. 2022
Blockchain-Based Messaging Application: *Distributed Systems, Ethereum* UC Irvine

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

Professor Kylie Peppler, Informatics and Education Mar. 2022 – Present
AI-Generated Art: *STEAM Education, Constructionism, Creativity, Maker Culture* UC Irvine

- Proposed and leading original research project for how AI Generated Art can be leveraged as a transdisciplinary educational tool for teaching the technical mechanisms underlying those deep neural models.
- Leveraging creative and visual medium of generative art to increase participation underrepresented groups.
- Lead first-author student in research project reviewing tools for an educational audience, writing submission for Creativity and Cognition conference (submission in January 2023).

Professor André van der Hoek, Informatics Feb. 2021 – May 2022
Reading to Write Code: *Software Engineering, Computing Education, Human-Centered Design* UC Irvine

- Co-lecturer and co-course designer for graduate course Reverse Engineering and Modeling; identifies gap in software engineering curriculum and teaches students techniques of leveraging existing source code.
- First-author in research paper that disseminates findings to universities wishing to implement similar courses.

Software Engineering Experience

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 Jun. 2016 – Sep. 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 Jun. 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.

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 – Jul. 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 Sep. 2016 – Jun. 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, Jax, Flax, Scikit-Learn, 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 – Sep. 2019

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

Ocean Lifeguard, Huntington State Beach Jul. 2012 – Jun. 2014

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