Isabel Gerrard

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Adaptable and inventive R&D Engineer with experience across neuroscience, software, and radio astronomy, applying scientific computing skills including system design, signal processing, and algorithm development.

PROFESSIONAL EXPERIENCE

SONERA - *Berkeley, CA*

R&D ENGINEER 05/2023 - Present

Building neuroscience data systems & software experimental tools for industry research of magnetic sensors

- (Data Analysis) Spectral analysis + signal processing on physiological electromagnetic data (Numpy, Scipy, Matplotlib), both offline + real-time, for objectives including: extracting gesture, vision, speech, neuronal activity; characterizing sensor properties; & denoising + synthesizing signals into useful visualizations
- (System Design) Integrating all demos + study protocols in a unified recording pipeline (Python) that manages both analog & digital data acquisition (NI-DAQ) agnostic to sensor type (often 3rd-party), handles multithreaded logging, controls subject interface; streams live data to a custom GUI (Flutter); is automated by collaboration-friendly menu (Unity/C#); Maintaining Neuro team main repo + PRs (Git)
- (Experimental Design) Draft calculations, plan test set-ups, & connect background literature to establish Proof of Concepts to generate funding and cutting-edge research; Conceive of, design, & conduct studies for human data collection; Write scientific papers to build IP; Brainstorm & execute demos for investors

THE SETI INSTITUTE - *Remote/Mountain View, CA*

SCIENTIFIC SOFTWARE DEVELOPER 11/2024 - Present

Streamlining the analysis pipeline of the Anti-Solar Point (ASP) survey with the Allen Telescope Array (ATA) at Hat Creek Radio Observatory (HCRO) as Research Assistant to techno signature scientist Dr. Sofia Sheikh

- Implemented time profiling (Bash, Python); Reduced primary bottleneck step by 40% “per-hit” with pre-compiling and identifying redundant I/O (h5py, Blimpy, jit); another 30% via CPU parallel processing capping total step time by “max hits”; Contributed changes to external git repo (NBeamAnalysis)
- Revealed ATA specific polyphase artifact causing thousands of “false hits” (Bliss); Developed custom algorithm to remove artifact using polynomial and Gaussian mixture model fitting (Jupyter); Integrating algorithm adds only 2s computation for every 4.5 hours saved; GPU parallelization and Multithreading
- Contributions resulted in 98.3% time reduction to pipeline, from 55 days analysis per single night of data to <1 day, saving years of computation and petabytes of storage constraining overall survey and network

TELEDYNE INTELLIGENT SYSTEM LABORATORY - *Research Triangle Park, NC*

RESEARCH ENGINEER 08/2022 - 02/2023

Software and electrical engineering for BMI research to enhance learning and sleep through neuromodulation

- Integrated Android codebase with interface design tools (Figma) to improve communication about design ideas; and with QtDesignStudio to semi-automatically configure mockups into code (QML), making both design and implementation of the user-interface easier and more efficient
- As part of a DARPA demonstration team, contributed significantly to the signal processing (Matlab) to determine the hardware for the final candidate product (OpenBCI); accomplished the transfer of the EEG technology from a breadboard into the product, allowing for colocated EEG and MEG measurements
- Responsible for updating legacy project from minimal documentation, rapidly adapting to new software, and re-writing 50+ scripts in a new language to deliver a quality user experience in time for clinical trials

JADU AR INC. - *Remote/Los Angeles, CA*

DevOps SOFTWARE DEVELOPER 05/2021 - 05/2022

DevOps, backend oversight, and Unity development for an iOS game platform for NFTs and holograms in AR

- Built Unity plugins to automatically integrate SDKs such as Coinbase and Ledger Live (C#): including the first bridge to allow mobile AR content from Unity apps to be uploaded to TikTok (XCode/Objective-C)
- Responsible for developing an internal client-metadata writer that mediates updates to an NFT's metadata between our backend (Firebase, AWS), the OpenSea models, and the assets used in the AR game

SELECTED PROJECTS & INTERNSHIPS

BREAKTHROUGH LISTEN : BERKELEY SETI RESEARCH CENTER - *Remote/Berkeley, CA*

RESEARCH INTERN / ENGINEERING APPRENTICE 01/2021 - 05/2021

Design and test ML algorithms + database querying to identify possible signs of extraterrestrial intelligence

- Injected fake signals into radio data (setigen), then tested different algorithms and created visualizations of the signal analysis to evaluate the algorithms' performance retrieving the signal (Jupyter, Python)
- Built a database index to translate lightcurve data from the Transiting Exoplanet Survey Satellite (TESS) into a comparable Sky Coordinate to query the SIMBAD Astronomical Database to identify information about the lightcurves and astronomical objects previously unknown to the world (SQL)

BLACK GIRLS BRILLIANCE (BGB) - *Remote/Oakland, CA*

SOFTWARE ENGINEER 01/2021 - 05/2021

Developed early database infrastructure (Ruby on Rails, SQL) for prototype mobile app & Agile methodology

- Represented the developer team in bi-weekly meetings with the CEO & BGB leadership to present progress and communicate next steps according to their specifications and mission: to support Black middle school girls in Oakland and South Africa to access local mental health and community resources

UC BERKELEY ELECTRICAL ENGINEERING AND COMPUTER SCIENCE DEPARTMENT - *Berkeley, CA*

ACADEMIC INTERNSHIP 08/2019 - 05/2020

Prepared lesson material for labs and assisted the lab director by helping students taking "[CS61A] The Structure and Interpretation of Computer Programs" to debug code and answer technical questions (Java)

WOMEN HELPING WOMEN - *Berkeley, CA* 03/2018 - 06/2018

Implemented a website to profile homeless women and distribute donations (HTML, CSS, Javascript, Java)

- Interviewed local homeless women to personalize donations and publicize their story to support humanizing homelessness; Awarded $2,000 funding as a finalist in the Global Changemakers Competition

PAPERS & PATENTS

Magnetomyography: A novel Modality for Non-Invasive Muscle Sensing [Preprint]

Yun, R., Gonzales, G., **Gerrard, I.**, Csaky, R., Dash, D., Kittle, E., Deka, N., & Labanowski, D. (2024). *bioRxiv*.

Generalizable Gesture Recognition using Magnetomyography [Preprint]

Yun, R., Csaky, R., Dash, D., **Gerrard, I.**, Kittle, E., Soroushmojdehi, R., Taylor, D., Labanowski, D., & Deka, N. (2024). *bioRxiv*.

A Randomized Study on the Effect of a Wearable Device Using 0.75 Hz Transcranial Electrical Stimulation on Sleep Onset Insomnia [Peer-reviewed]

Simons, S. B., Provo, M., Yanoschak, A., Schmidt, C., **Gerrard, I.**, Weisend, M., Anderson, C., Shimizu, R., & Connolly, P. M. (2024). *Frontiers in Neuroscience*.

Magnetic Sensing of Muscle Activity [Provisional Patent]
Yun, R., Gonzales, G., **Gerrard, I.**, Csaky, R., Dash, D., Kittle, E., Deka, N., & Labanowski, D. (2024).

System to Record Biomagnetic Signals in Ambient Conditions. [Provisional Patent]
Yun, R., Dash, D., **Gerrard, I.**, & Labanowski, D (2024)

Gesture Classification with Magnetomyography [Provisional Patent]
Richy Yun, Richard Csaky, Rahil Soroushmojdehi, **Isabel Gerrard**, David Taylor, Debadatta Dash, Evan Kittle (2024). *U.S. Patent Application No. 63/689,700.*.

EDUCATION

UNIVERSITY OF CALIFORNIA BERKELEY - *Berkeley, CA* GPA: 3.67

Bachelor's Degree, May 2022 - Major: Cognitive Science | Minor: Computer Science | Minor: Japanese

Relevant Coursework

Data Structures | Great Ideas of Computer Architecture (Machine Structures) | Database Systems | Calculus | Designing Information Devices and Systems | Foundations of Data Science | Artificial Intelligence | Discrete Mathematics and Probability Theory | The Structure and Interpretation of Computer Programs | Software Engineering | Software Engineering Team Project | Computational Models of Cognition | Rhythms of the Brain: Neuronal Communication and Networks | Cognitive Neuroscience | MCB: Brain, Mind, and Behavior

SKILLS & INTERESTS

Programming & Software Tools (not otherwise specified)

- (Current) Jira, Signal Analyzers, Mock-Ups, Hand-tracking, XCode/SwiftUI, Windows, jit, MMG/MEG/MCG
- (Other Past) Linux/Unix, EEG/EMG, Google Cloud Platform, Docker, SCM, Redis, C, Pandas, Sockets …

Research Training

- (Deep Learning - DeepLearning.AI) Neural Networks and Deep Learning | Improving Deep Neural Networks | Structuring Machine Learning Projects | Convolutional Neural Networks | Sequence Models
- (Human Subjects Research - CITI) Biomedical Investigators & Research Study Team | Good Clinical Practice (GCP) US FDA focus | GCP - Social & Behavioral Research best practices for Clinical Research

Soft Skills

- Science Communication | Conference Exhibitor | Conducting Interviews | Marketing & Business Development | Leadership & Team Coordination | Presentations | Teaching & Tutoring | IRB | Forklift

Languages

- English (native) | French (fluent) | Japanese (intermediate) | Swedish (beginner)

Associations

- The Order of the Octopus (Early Career SETI Researchers) | Society for Neuroscience | UK Citizen | Neurotech@Berkeley (Mentor) | Creative Growth (Volunteer) | California Ski & Snowboard Team

Favorite Sci-Fi

- The Varieties of Scientific Experience (Carl Sagan) | Death's End (Liu Cixin) | Star Maker (Olaf Stapledon)