
Karan P. Singh

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karanps.com

Education

Stanford University

Sep. 2023 - Present

PhD in Electrical Engineering

Cal Poly San Luis Obispo

Sep. 2019 - Mar. 2022

Bachelor of Science in Electrical Engineering

Research Experience

Stanford University

Graduate Research Assistant — Machine Learning

Sep. 2023 - Present

Advisor: Dr. James Zou

- I am rotating with Dr. James Zou this Autumn Quarter 2023, working on watermarking for LLMs.

Post-Baccalaureate Researcher — Machine Learning, Bioengineering

Jun. 2022 - Aug. 2023

Advisors: Dr. Kim Butts Pauly, Dr. Gerald Popelka

- Applied machine learning (unsupervised image generation and sequence models for medical images) to novel problems in focused ultrasound neuromodulation
- Analyzed calcium imaging data taken from mice under transcranial ultrasound stimulation to correlate sonication parameters to neural responses

Radiological Sciences Laboratory REU — Bioengineering

Jun. 2021 - Sep. 2021

Advisors: Dr. Kim Butts Pauly, Dr. Gerald Popelka

- Developed a web-based tool to aid in the standardized reporting of focused ultrasound neuromodulation parameters
- Improved and applied a novel metric for assessing signal audibility during transcranial ultrasound stimulation

Cal Poly SLO

Research Assistant — Biomedical Engineering

Nov. 2020 - Jun. 2021

Advisor: Dr. Benjamin G. Hawkins

- Developed electrowetting (digital microfluidics) simulations in COMSOL Multiphysics to investigate new theoretical models and recapitulate observed droplet motion
- Assembled and troubleshooted a physical digital microfluidics platform (OpenDrop) for experimental comparison to simulated results and use in bioassays

Research Assistant — Electrical Engineering

Nov. 2020 - Mar. 2021

- Evaluated the relevance of virtual reality for electrical engineering laboratory exercises

Publications

Kasra Naftchi-Ardebili†, **Karanpartap Singh**†, Reza Pourabolghasem, Gerald Popelka, & Kim Butts Pauly, "TUSNet: Machine Learning Based Phase Aberration Correction and Simulation for Transcranial Ultrasound," Manuscript In Preparation.

Kasra Naftchi-Ardebili†, **Karanpartap Singh**†, Reza Pourabolghasem, Pejman Ghanouni, Gerald R. Popelka, & Kim Butts Pauly, "SkullGAN: Synthetic Skull CT Generation with Generative Adversarial Networks," 2023, [arXiv:2308.00206](https://arxiv.org/abs/2308.00206).

Karanpartap Singh and Benjamin Hawkins, "Improved Modeling of Droplet Motion in Open-Format Digital Microfluidic Devices," 2023, [bioRxiv:2022.11.30.518563](https://doi.org/10.1101/2022.11.30.518563).

(† denotes equal contribution)

Posters and Talks

"Application of deep learning to phase aberration correction in transcranial focused ultrasound."
International Symposium on Transcranial Ultrasound (ISTU), Apr. 2023. **Oral presentation: Best Talk Award Winner.**

"TUSNet: Deep learning based instant stimulations for transcranial focused ultrasound."
Caltech International Symposium on Biomedical Ultrasound & Sonogenetics, Dec. 2022. **Poster presentation.**

"Transcranial Ultrasound Stimulates Neurons at the Focus."
Stanford Bio-X Seed Grants Symposium, Aug, 2022. **Poster presentation.**
Focused Ultrasound Neuromodulation (FUN) Symposium, Sep. 2022. **Poster presentation.**

"Development of a computational tool to guide transcranial ultrasound parameter selection and reporting."
Focused Ultrasound Neuromodulation Symposium, Sep. 2021. **Poster presentation.**

Honors and Awards

- ISTU 2023 Best Oral Presentation Award 2023
- NSF Graduate Research Fellowship 2023
- Ford Foundation Fellowship — Honorable Mention 2023
- Youngest Engineering Graduate in Cal Poly SLO History 2022
- Cal Poly Engineering Graduate of the Year 2022
- Cal Poly SLO President's List 2020 - 2022

Work Experience

HP
Summer Scholars Intern

Jun. 2020 - Aug. 2020

Livinglight Inc.
Freelance Mobile App Developer

May 2015 - May 2019

Teaching / Mentoring

REU Mentor
Stanford RSL REU

Jun. 2022 - Aug. 2022

- Co-mentored an undergraduate through a quarter-long radiology research program involving image processing and analysis for GCaMP imaging in mice

Teaching Assistant / Grader
Cal Poly SLO

Jan. 2022 - Mar. 2022

- EE 409: Electronic Design

Academic Server & Study Session Host

Apr. 2020 - Mar. 2021

- Created and managed various online academic servers for Cal Poly classes and standardized testing with a collective 1000+ members
- Planned and hosted regular study sessions for electrical engineering classes

Extracurriculars / Outreach

Co-Founder and Co-President
Stanford Piano Society (SPS) [<https://piano.stanford.edu/>]

Mar. 2023 - Present

Event Coordinator
Graduate Students in Electrical Engineering (GSEE)

Jan. 2023 - Present

Volunteer Teacher and Lesson Planner
Stanford RSL SEED (Science Education Enrichment for Diversity) Program

Sep. 2022 - Jan. 2023

Skills and Interests

Languages: English (Native), Punjabi (Native), Hindi (Fluent), French (Conversational), Korean (Beginner)

Programming: Python (PyTorch, TensorFlow), MATLAB, C, Java, Verilog

Circuit Design / Simulation: SPICE, COMSOL Multiphysics

Musical Qualifications: ABRSM Piano Grade 8 Diploma, Grade 5 Theory with Distinction

Interests: Piano (Classical), Badminton, Calisthenics, Cooking

Last Updated: 10/29/2022