Shifa Somji

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Research Interests

Human-robot interaction, robotics, personalized healthcare, autonomous vehicles, large language models

Education

Purdue University West Lafayette, IN

Ph.D. in Computer Science, Advisor: Sooyeon Jeong, GPA: 3.96 *Aug 2023 - present*

Relevant Coursework: Deep Learning, Robot Learning, Computer Vision, Human Robot Interaction, Statistical Machine Learning, Algorithms, Distributed Systems

Harvey Mudd College Claremont, CA

B.S. in Computer and Cognitive Science, GPA: 3.7 *Aug 2019 - May 2023*

Relevant Coursework: Artificial Intelligence, Machine Learning, Neural Networks, Computer Vision, Statistical Linear Models, Operating Systems, Databases, Managing Data at Scale, Algorithms, Programming Languages, Software Engineering, Computability and Logic, Cognitive Science, Linguistics

Skills

- Machine Learning: deep learning, reinforcement learning, adversarial training, recommendation systems
- Programming Languages: Python, Java, C++, JavaScript, React, Racket, MATLAB, SQL
- Tools: PyTorch, TensorFlow, NumPy, Jupyter, Git, Bash, Spark, Linux, Latex, HTML/CSS

Research Experience

Personalized Speech Therapy Robot for Aphasia Patients - HAI Lab Aug '23 - present

- Developed, trained, and personalized socially assistive robots (SARs) as a long-term speech therapy solution for patients with aphasia, a neurogenic post-stroke condition that results in communication deficits, language production, and comprehension. My research shows that SARs can deliver successful scalable speech language therapy and adapt their interaction style based on participants' unique needs and preferences in a home context.
- Incorporated large language models (LLMs) to generate real-time personalized responses and adjust SAR's interaction style based on user input.
- Employed efficient text to speech (TTS) systems, analyzed facial expressions and behavioral cues, and conducted data analysis of qualitative surveys.

Algorithmic Search Framework - AMISTAD Lab Jan '21 - May '22

- Proposed an algorithmic search framework, unifying machine learning and artificial intelligence under the single research discipline of artificial learning. The framework bounds the performance and provides an intuitive understanding of artificial learning algorithms.

xenoGI 3 - Bush Lab May '21 - Aug '21

- Developed a new simulator that evolves sequences over a user-provided phylogenetic tree to test xenoGI, a software package that identifies genomic islands, maps their origin within a clade of closely related bacteria while allowing for horizontal transfer of novel genes as well as for genomic scale deletions, duplications and inversions, and amino acid level sequence change. Such information is valuable because it helps us understand the adaptive path that has produced living species.
- Created a plotting feature for reconciliation between gene and species trees. This feature overlaps the species and gene trees and adds different markers for origin, speciation, rearrangement, duplication, and transfer, identifying the location of each event.

Publications

- **Somji, S.**, Gergerli, G., Lee, J., Jeong, S. Language Alignment with Socially Assistive Robots in Older Adults: Implications for Aphasia Rehabilitation. The 62nd Annual Meeting of Academy of Aphasia. (2024).
- Liu, N., Gonzalez, T.A., Fischer, J., Hong, C., Johnson, M., **Somji, S.**, Wirth, J., Libeskind-Hadas, R., Bush, E. xenoGI 3: using the DTLOR model to reconstruct the evolution of gene families in clades of microbes. BMC Bioinformatics 24, 295 (2023).

Industry Experience

Impinj Seattle, WA

Platform Architecture Intern *May '23 - Aug '23*

- Primary engineer responsible for utilizing RFID to speed up sorting, routing, and tracking packages for a major shipping company.
- Trained and evaluated several machine learning models to determine the best system configuration parameters. Selected Gradient Boosting and Artificial Neural Network to increase overall accuracy of found packages to 95%.
- Built web/mobile UI to provide intuitive, comprehensive, and accessible package tracking summary.
- Analyzed manifests to determine misloaded and unexpected packages. Tested potential system configurations to improve accuracy and performance.

Harvey Mudd Clinic x FedEx Claremont, CA

Engineering Manager *Aug '22 - May '23*

- Led a team of five students working on a Harvey Mudd senior capstone project with the FedEx Autonomous Vehicle Deliverability Team.
- Created a Python model to determine necessary factors for autonomous vehicle delivery and provided an interpretable decision when to prioritize AV delivery for specific packages.

Meta Seattle, WA

SWE Intern *May '22 - Aug '22*

- Interned on the Curated Ads Data team, responsible for building the platform to enable transparency, control, and purpose in FB advertisements.
- Created a system that intelligently identified duplicate requests for curated ads, identifying 20% of curated requests as duplicates and significantly improving curation throughput.
- Authored a Dataswarm pipeline, using SQL and Python, that created and updated a datastore of hashed values of requested CDS columns. Integrated another Dataswarm pipeline, using Hack, in Curated Data Management System (CDMS) that checked new requests against the datastore of hashed values and notified the users of duplicate requests.

TeamTime Claremont, CA

Co-Founder/CTO *May '20 - Aug '20*

- Co-founded TeamTime, a startup where members of a team can set group alarms for better collaboration and enhanced productivity.
- Created a JavaScript app using React Native, the most popular framework for building mobile apps.
- Designed and developed the application's persistence layer, comprising of users, groups, and alarms, using Firestore, a NoSQL database with data sync support and instant change listeners.
- Developed the app's user interface using React Native Elements and React Native Material UI packages with custom CSS.

Awards

- Young Investigator Fellowship, *Academy of Aphasia*
- John W. Anderson Foundation Scholarship, *Purdue Regenstrief Center for Healthcare Engineering*
- Graduate Teaching Award, *Purdue Department of CS*
- Class of '94 Award, *HMC Department of CS*
- Departmental Honors, *HMC Department of CS*
- Dean Chris Sundberg Prize, *HMC*

Teaching Experience

Teaching Assistant, Purdue University

- Foundations of Computer Science (Spring 2025, Fall 2023)
- Human Computer Interaction (Spring 2024)

Teaching Assistant, Harvey Mudd College

- Programming Languages (Spring 2023, Fall 2022, Spring 2022)
- Software Engineering (Fall 2021)
- Data Structures and Program Development (Spring 2021)
- Principles of Computer Science (Fall 2020)

Leadership

Center for Innovation & Entrepreneurship • Business Development Manager Aug '21 - May '23

- Prepared students to be innovative entrepreneurs by providing experiential learning and networking.

Women of the Association of Computing Machinery • Co-Chair Aug '21 - May '22

- Led resume workshops and company sponsored events for women in computer science.

Washington Student Math Association • President Sep '16 - Jul '19

- Led a student leadership team from six Eastside High Schools.
- Organized an annual premier math competition, Math Bowl, for middle school mathaletes.
- Reviewed and approved grant proposals from high school math teachers on mathematical tools such as The Game of Life and MATLAB.

Chess4Girls • CEO Sep '15 - Aug '19

- Hosted motivational workshops for all participating girls at Washington State Elementary Chess Championship.
- Ran a monthly chess strategy session for all girls in King County.
- Sponsored girl-exclusive chess tournaments in the State of Washington including Washington Girls Chess Championship and Queen's Quest Chess Tournament.