PRERNA RAVI

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Education:

MASSACHUSETTS INSTITUTE OF TECHNOLOGY | CAMBRIDGE, MA
Doctor of Philosophy (PhD), Computer Science (2022-Present)

- Research Areas: Educational Technology and Accessibility
- Computer Science and Artificial Intelligence Laboratory (CSAIL)
- Groups: MIT App Inventor and MIT Haystack
- Advisors: Dr. Hal Abelson and Dr. David Karger
- **Ida M. Green Memorial Fellow** and MIT Vice Chancellor's Inclusive Excellence Fellow

GEORGIA INSTITUTE OF TECHNOLOGY | ATLANTA, GA
Bachelor of Science, Computer Science (2018-2022)

- GPA: **4.0/4.0** (Highest Honors)
- Concentration: **Intelligence** and **Human Computer Interaction**
- Advisors: Dr. Thad Starner, Dr. Neha Kumar, and Dr. Betsy DiSalvo

Publications:

1) **Prerna Ravi,** Azra Ismail, and Neha Kumar. "The Pandemic Shift to Remote Learning under Resource Constraints". Proceedings of the ACM on Human-Computer Interaction 5, CSCW2, Article 314 (October 2021), 28 pages.

2) Dhruva Bansal, **Prerna Ravi,** Matthew So, Pranay **A**grawal, Ishan Chadha, Ganesh Murugappan, and Colby Duke. 2021. "CopyCat: Using Sign Language Recognition to Help Deaf Children Acquire Language Skills." Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems. Association for Computing Machinery, New York, NY, USA, Article 481, 1–10. [ACM CHI Student Research Competition Winner 2021]

3) **Prerna Ravi** (Advisor: Thad Starner). "CopyCat: Leveraging American Sign Language Recognition in Educational Games for Deaf Children." Bachelor's Thesis (2022)

Research Experience:

RESEARCH INTERN | GOOGLE | *JANUARY 2022 – APRIL 2022*

- Research in American Sign Language (ASL) Recognition at **Google Research's Perception Team**, under the guidance of wearable computing pioneer Dr. Thad Starner.
- Collected and annotated over **1 million** videos for an ASL fingerspelling dataset in collaboration with the National Technical Institute for the Deaf (NTID) and DPAN (Deaf Professional Arts Network).
- Built an automated **data processing** pipeline for extracting features and tracking movement using **pose estimation** tools: Google MediaPipe.
- Led the development, training, testing and fine tuning of multiple models-- Hidden Markov Models (**HMMs**), Long Short-Term Memory models (**LSTMs**), and **Transformers**-- used for fingerspelling sign recognition.

RESEARCH ASSISTANT | GT UBIQUITOUS COMPUTING LAB | *JANUARY 2019 – MAY 2022*

- Research in **Contextual Computing**, at Georgia Tech, under the guidance of **Dr. Thad Starner**.

- Developed an **American Sign Language Recognition (ASL) System** through the CopyCat game in **Unity** with **C#** to improve communication between the deaf children and the hearing using **Computer Vision** tools – Microsoft **Kinect**, Google **MediaPipe** and **AlphaPose**.
- Built a calibration feature in Unity using the **Azure Kinect 4K depth** camera to create a real-time motion capture system (body, hands and face) for ASL signers.
- Achieved an accuracy of **90.6%** for a recognition pipeline built using pose-estimation and **Hidden Markov Models (HMMs).**

RESEARCH ASSISTANT | GT TANDEM LAB | ***MAY 2020 – OCTOBER 2021***

- Research in Human Centered Computing and Global Development at the **Technology and Design for Empowerment on the Margins** (TanDEm) Lab under the guidance of **Dr. Neha Kumar**.
- Conducted **empirical** and **ethnographic** studies to examine the transition into online learning within the education system for underserved communities in India, during the COVID-19 pandemic.
- Employed **qualitative methods** such as **interviews** and surveys to **study** the workflows and social dynamics across different sectors and intersections of the Indian population such as class, gender and caste.
- Outlined areas for improvement in the **design of online learning platforms**, by partnering with students, teachers, non-profit organizations and school administrators within marginalized contexts.

RESEARCH INTERN | AVANTI FELLOWS | ***JUNE 2021 – OCTOBER 2021***

- Research Intern at Avanti Fellows, an **educational technology**-based startup guided by **Dr. Neha Kumar**.
- Organized a **girls' leadership and mentorship program** for high school girls of low-income backgrounds from central schools for students predominantly from rural areas in India, in partnership with LedBy Foundation to facilitate equitable access to high-quality college education and accelerate professional growth.
- Conducted **ethnographic studies** to examine and assess the outcomes of the mentorship program with respect to students' ability to articulate their career goals, confidence in communicating with peers and professionals, public speaking, their leadership strengths, and their ability to recognize and navigate anger and stress triggers.
- Designed and employed **qualitative methods - interviews and surveys** at the baseline, midline and endline stages of the program with its participants and **code**, summarize, and compare their results to analyze the effectiveness of the program and define domains that students need **support and help** with.

Blog – "Avanti Fellows — LedBy Girls' Leadership and Mentorship Program: The Why, What, and How [Part 1]", August 2021

RESEARCH ASSISTANT | GT CAT LAB | ***AUGUST 2019 – MAY 2020***

- Research in the Culture and Technology (CAT) Lab advised by **Dr. Elizabeth DiSalvo**.
- Organized **participatory design** workshops to explore how low-income Hispanic immigrant parents leverage **Information & Communication Technologies (ICTs)** to engage in their children's education, given the information channels, cultural practices, & socio-economic contexts.
- Conducted **ethnographic studies** informing the role of **bilingual parent-education liaisons** in creating connections towards assisting immigrant parents in the United States.

Awards and Honors:

- Winner - ACM CHI Student Research Competition, 2021
- Outstanding Junior (EDS Rising Senior) Award, 2020-2021
- Outstanding Sophomore Award, 2019-2020
- Adobe Research Women in Technology Scholarship, 2021

- Google Computer Science Research Fellowship, 2021
- President's Undergraduate Research Award (PURA), 2020
- Apple Women in Science and Engineering Scholarship, 2021
- Georgia Tech Faces of Inclusive Excellence Honoree, 2021
- Microsoft Invent Finalist, 2021
- Winner - Nunn School of International Affairs Paper Competition for Global Development, 2021
- Rewriting the Code Fellowship, 2020-2021
- Apple's Grace Hopper Conference Scholarship, 2020
- Honorable Mention, Microsoft Global Hackathon, 2020
- GT College of Computing Grace Hopper Conference Scholarship, 2019
- Faculty Honors for 4.0 GPA, 2018, 2019, 2020 and 2021

Work Experience:

SOFTWARE ENGINEER INTERN | MICROSOFT | ***MAY 2022 – JULY 2022***

- Software Engineer Intern for the Corporate, External, and Legal Affairs (CELA) team within Microsoft's Experiences and Devices (E&D) organization.
- Designed and built an end-to-end Office 365 Extension/Add-in: Legal Ease for Microsoft's Artifact Management System, used for onboarding all legal matters (involving law firms for example), their stakeholders and documents into the Office 365 Infrastructure.
- Constructed a pipeline using React and C# .NET Core APIs to facilitate the smooth migration of artifacts sent via email on the Exchange server to the rest of the Office 365 ecosystem (SharePoint, OneDrive, Teams), thereby centralizing their storage.
- Developed an ML-based recommendation service for the add-in that displays projects (already in SharePoint) pertinent to the emails opened on Outlook, allowing users to iterate on existing matters and eliminating duplication.
- Deployed the add-in to the Office 365 add-in store, thereby making it available to over 220,000 employees.
- Formulated and conducted extensive accessibility assessments to test the functionality of interactive interface elements for the accessibility team within CELA.

SOFTWARE ENGINEER INTERN | MICROSOFT | ***MAY 2021 – JULY 2021***

- Software Engineer Intern for the Employee Experience Team within Microsoft's Cloud and Artificial Intelligence (C+AI) organization at **Redmond WA.**
- Designed and built an end-to end modern, intelligent solution for the **Microsoft Office 365 Enterprise Records Management System** used for storing over **6 million** regulatory, legal, and business-critical electronic records spanning **100** countries managed in three regions (US, EMEA and Asia) for over **160,000** employees.
- Constructed a pipeline to create file plans and retention policies that automatically labels, stores, retains, retrieves and disposes records stored across the entire Office 365 ecosystem (**SharePoint, OneDrive, Teams, Outlook Exchange**) using an **in-place** approach that allows users to manage their content from within existing repositories.
- Built a **microservice** for transactional systems using **Azure Functions** and data connectors that leverages **C# (.NET Core**) Rest APIs, Azure Portal and Visual Studio resources to facilitate automatic and iterative migration of records from every external Microsoft System (**Azure Cosmos DB**, SQL, File/Data Storage Blobs, etc.) into the Office 365 infrastructure, after which the records get stored and retained in-place.
- Implemented and trained **machine learning models** to automatically classify records stored across all Office 365 locations into different categories and extract critical and sensitive metadata information from them by leveraging **Azure Machine Learning** resources and **SharePoint Syntex**.

SOFTWARE ENGINEER INTERN | MICROSOFT | *MAY 2020 – JULY 2020*

- Software Engineer Intern for Professional Services within Microsoft's **Core Services Engineering and Operations (CSEO)** organization at **Redmond WA**.
- Designed and implemented a **centralized telemetry service** to monitor an all-inclusive web platform used by internal consultants to track their projects and finances.
- Developed a new telemetry system using **Angular** and **TypeScript** that logs all UI events, page views, API requests and errors to **Azure Application Insights** to assist debugging and product improvement, thereby directly impacting **5000+ users**.
- Standardized telemetry and documented new rules and updated naming conventions, to make telemetry development and querying from Azure Application Insights fast, efficient and consistent.
- Built dashboards from real-time user data using **Kusto Query Language (KQL), Azure Data Explorer** and **Microsoft Power BI** to analyze user behavior and track key trends, feature usage and main pain points across multiple environments, to make recommendations for improving application performance.

HEAD TEACHING ASSISTANT | GT COLLEGE OF COMPUTING | *JANUARY 2019 – OCTOBER 2021*

- Head Teaching Assistant for CS1331- **Object-Oriented Programming in Java** under **Dr. John Stasko** and **Professor Susan Watson-Phillips**.
- Led a team of 30 Teaching Assistants (8% of total undergraduate TAs employed by the College of Computing) for the course and substituted as a lecturer for **800+** students when the professor was not available.
- Directed the **Teaching Assistant hiring process** and conducted interviews for candidate TAs every semester.
- Assigned responsibilities and coordinated timely delivery of course materials between the internal teams for homeworks, lectures, exams, office hours and autograders.
- Conducted recitations and office hours to instruct and train students in fundamental Object-Oriented Programming concepts and help them develop strong **coding** & **debugging** skills
- Developed automated **frameworks** to grade weekly programming assignments.

HUMAN CENTERED DESIGN INSTRUCTOR | CODE.X | *JUNE 2021 – JULY 2021*

- Instructor for Human Centered Design for Code.X under its Code for Palestine (Gaza and West Bank) summer program which serves over **150** students.
- Led the Human Centered Design Year 3 program which guides students through an end-to-end process of identifying a problem space, **ideation**, outlining user personas, conducting **market research** and creating minimum viable products (**MVPs**), visioning, low and high-fidelity **prototyping**, heuristic evaluations, and usability testing.
- Created course materials and delivered lectures on principles of human centered design, qualitative user research, **laws of user experie**nce (UX), **information architecture**, visual design, branding and aesthetic refinement, and evaluation of prototypes.
- Organized and supervised **design sprints** with every student group to help execute their capstone projects.

Leadership and Service:

FOUNDER AND PRESIDENT | UNICEF AT GEORGIA TECH | *NOVEMBER 2018 – MAY 2022*

Initiated and started the UNICEF chapter at Georgia Tech in collaboration with UNICEF Atlanta to organize campaigns, fundraisers and global projects, aimed at food security, healthcare and safety of vulnerable children.

EXECUTIVE PROJECT LEAD | CS + SOCIAL GOOD AT GEORGIA TECH | *AUGUST 2019 – MAY 2022*

Executive Lead on the Educational Team to empower adults in the community and the next generation of students with basic and advanced computer science skills through weekly courses and training workshops.

TRAINING MANAGER | ROBOGALS AT GEORGIA TECH | *JANUARY 2019 – MAY 2020*

Developed and programmed robots for engineering workshops to teach primary, middle, and high school girls the basics of robotics, computing and other STEM fields.

Selected Projects:

SCHOOL LIBRARY LEARNING HUB FOR MICROSOFT TEAMS | *JULY 2020 – AUGUST 2020*

- Designed and developed a cross platform application that empowers kids, students and teachers in underserved communities with the ability to connect, read and learn virtually both online and offline.
- Built an accessible and fluid user interface using **React** and **Node.js** that gives diverse users the ability to search and filter from a free book library sourced from multiple open-source platforms including Gutenberg.
- Extracted detailed information about books using **Azure Cognitive Search**, built **Rest APIs** using **Python Flask** and constructed **Cosmos DB (NoSQL)** databases to store user preferences and recommendations.
- Deployed the application to **Microsoft Azure** using **CI/CD** pipelines and successfully integrated it into Microsoft Teams, to be shipped and used by **115 million+** daily users.

understaNDing MICROSOFT | *JULY 2020 – AUGUST 2020*
Honorable Mention - Microsoft Global Hackathon 2020

- Designed and built a cross platform application that aims to accelerate awareness of and engagement with Microsoft's "neurodiverse" employees, customers and partners.
- Developed an accessible user interface using **React.js** that showcases resources and engaging videos of neurodiverse individuals including those with ADHD, Autism, Dyslexia, PTSD, Depression and Anxiety.
- Created **Rest APIs** for the application using **Node.js** and **Postman**.
- Constructed databases using **MongoDB** to store user data as well as resources hosted on the platform.
- Deployed the application to **Microsoft Azure** using **CI/CD** pipelines, to reach **150,000+** employees.

DAYBOOK - MENTAL HEALTH JOURNALING | *JUNE 2020 – JULY 2020.*

- Designed and built a cross-platform Intelligent, Mental Health Journaling Application-Daybook using **React Native** as part of the **Microsoft Azure Cloud + AI Social Good Hackathon 2020**.
- Extracted information regarding the user's mood and mental health using **Azure Cognitive Services.**
- Generated journaling prompts and recommended goals and action items tailored to the user, by leveraging sentiment analysis tools within **Azure Cognitive Services Text Analytics and Personalizer**.
- Constructed **Azure SQL** databases to store user data and created **Rest APIs** using **C#, ASP.NET Core** and **Swagger UI** hosted on **Microsoft Azure Cloud Services**.

MICROSOFT DEEPDIVE COMPUTER SCIENCE WORKSHOP | *MAY 2020 – JULY 2020.*

- Co-initiated and led a ten-week workshop series as part of the **Microsoft Co-Creation Program** to introduce underserved students in low-income communities to **computer science** foundations for technical interviews.
- Created **tutorials** in the form of videos, presentations and documentation to go over **technical topics** such as arrays, linked lists, trees, and recursion as well as **interpersonal skills** such as working the clock, proactive communication and developing a solution using the whiteboarding technique.
- Designed and built a web application using **React.js** showcasing resources from each week of the workshop as well as assigned coding problems covering the technical topics explored that week.
- Deployed the application to **Microsoft Azure**, thereby making it available to **3,200+** Microsoft Interns with a special focus on Explorer (Freshmen and Sophomores) interns for professional training and development.