

UTKARSHA KSHIRSAGAR

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RESEARCH SUMMARY

Prospective PhD student in Human Computer Interaction (HCI) focused on accessibility and inclusive system design. My research investigates multimodal emergency communication systems for Deaf and Hard-of-Hearing (DHH) users, integrating human-centered design, qualitative user research, and IoT-enabled real-time architectures.

RESEARCH INTERESTS

Accessibility and Inclusive Computing • Human Computer Interaction (HCI) • Assistive and Communication Technologies for Deaf and Hard of Hearing (DHH) Users • IoT and Real-Time Systems for Accessibility

EDUCATION

Rochester Institute of Technology,

Golisano College of Computing and Information Science,

Department of Information Sciences & Technologies, Rochester, New York, USA

Master of Science (M.S.), Spring 2026

GPA 3.96

Relevant Course work: Scholarship in ITA, Information Retrieval and Text Mining, Data Warehousing, Visual Analytics, Geographic Visualization

Masters Project: Accessible Emergency Notification System designed to support Deaf and Hard-of-Hearing (DHH) individuals during emergencies by delivering real-time alerts through customizable haptic and visual modalities using a human-centered design approach. This project extends my ongoing research at the National Technical Institute for the Deaf (NTID), focusing on accessibility-first system architectures.

ASL Courses: FSSL 1B (Elementary ASL II), FSSL 2A (Intermediate ASL I)

Mumbai University,

Vidyalankar Institute of Technology,

Department of Computer Engineering, Mumbai, India

Bachelor of Engineering (B.E), 2021

CGPA 8.9

Bachelors Project: Krushi Mitra: a fully functional agricultural information chatbot designed to provide farmers with free, localized access to farming practices, government schemes, and agricultural innovations through a regional-language conversational interface.

Government Polytechnic Pen,

Department of Computer Technology, Maharashtra, India

Diploma, 2018

Percentage 85.12 %

Diploma Project: Sponsored project for a small-scale company, TRANSPARENCY LIGHTS (Panvel, India), involving the design and implementation of a centralized ERP system to manage delivery data, generate GST-compliant invoices, and notify dealers of product deliveries.

RESEARCH EXPERIENCE

Center on Access Technology Lab (NTID, RIT)

Full Stack Engineer,

Jan 2024 - May 2025

Advisors: Prof. Tae Oh, Prof. Brian Tomaszewski

Research Domain: Accessible IoT-based emergency alerting architectures for DHH users supporting multi-channel notifications (NWS and 911 alerts).

Research Contributions:

- Investigated gaps in the existing Rochester emergency alerting infrastructure by Office of Emergency Management (OEM) for DHH individuals, with a focus on timeliness, modality flexibility, and device interoperability.

- Conducted qualitative and quantitative user research, including focus groups and surveys with DHH individuals, and stakeholder meetings with Deaf Refugee Advocacy (DRA), to identify root-level accessibility challenges in emergency communication.
- Synthesized user feedback to inform the design of a scalable, context-aware emergency alerting architecture capable of integrating heterogeneous IoT devices dynamically.
- Designed and implemented a research prototype using the MEVN stack (MongoDB, Express, Vue.js, Node.js) to allow users to manage IoT devices, configure alert preferences, and receive multi-modal notifications.
- Developed a cloud-based backend architecture using Amazon Web Services (AWS) EC2 to receive emergency alerts via APIs from alerting authorities, translate them into MQTT messages, and distribute them to connected IoT devices in real time.
- Collaborated with faculty advisors to translate the system design and research findings into a work-in-progress paper, accepted at **ISCRAM 2025**.

Mumbai University

Vidyalankar Institute of Technology

Student Researcher

Advisors: Prof. Amit Aylani

May 2020 - June 2021

Research Domain: Agricultural Technology, Artificial Intelligence, Human-Centered Computing

Research Contribution:

- Investigated the technological readiness and economic constraints of small-scale farmers in rural regions of Maharashtra state to understand barriers to adopting modern agricultural technologies.
- Conducted field-level needs assessment through interactions with local farmers and government agricultural officers, identifying that over 90% of farmers lacked access to expensive Agri-tech solutions and lived in remote areas with limited infrastructure.
- Analyzed findings to inform the design of a low-cost, accessible AI-based intervention aimed at improving agricultural yield and financial outcomes beyond monocropping practices such as sugarcane farming.
- Designed and developed Krushi Mitra, a conversational chatbot providing government recommended farming practices, crop experimentation guidance, and policy information through a simple, voice-enabled interface in local languages.
- Prioritized accessibility and affordability by eliminating the need for specialized hardware; leveraged the emergence of low-cost smartphones and widespread 4G/5G connectivity to deploy the chatbot via Google Assistant, telegram app and web app.
- Implemented the chatbot using Google Dialog flow, enabling natural language interaction for farmers with low digital literacy.
- Collaborated with local government agricultural officers to iteratively refine content accuracy, usability, and relevance based on real-world feedback.

PUBLICATION

Kshirsagar, U., Oh, T., Tomaszewski, B., & Behm, G. (2025). *Inclusive Emergency Alerts: A Cloud- Based Haptic and Visual Notification System for the Deaf and Hard of Hearing*. Proceedings of the Information Systems for Crisis Response and Management (ISCRAM) conference.

Kshirsagar, U., Parte, J., Patil, M., & Aylani, A. (2020). *Krushu Mitra: A review of agriculture bots*. International Journal of Computer Sciences and Engineering, 8(6), 45–50.

WORK EXPERIENCE (3+ years)

National Technical Institute for Deaf, RIT

Rochester, NY

Center of Access Technology Lab

Full Stack Engineer, Sep 2024 – Present

- Designed and developed accessible web applications using the React frontend stack with Firebase backend services, emphasizing usability and maintainability in academic and accessibility driven contexts.

- Core developer of frontend enhancements for NTID supported applications, including the development of automated report generation systems for a national-level math competition. Improved user interfaces across multiple applications by addressing font inconsistencies, color contrast, layout uniformity, and overall visual hierarchy to align with RIT design and accessibility standards.
- Contributed to the modernization of Tiger Chat, an internal communication platform at RIT, through CSS upgrades and interface refinements to ensure a consistent look and feel.
- Collaborated with and mentored student developers through code reviews, coding standards, and version control best practices while supporting agile workflows and project deployments.
- Supported applied system deployment and frontend engineering for accessibility-focused alerting platforms.

Capgemini Pvt Ltd

Mumbai, India

Senior Software Engineer, Jul 2021 – Jul 2023

- Contributed to enterprise-scale software development projects, including a major engagement for Vanguard, where Angular-based feature development improved code quality and increased test coverage to approximately 90%.
- Developed mobile UI components and design prototypes for an HDFC Bank project using Flutter Flow, supporting the modernization of an existing mobile banking application.
- Collaborated with globally distributed teams under Agile Scrum methodologies, consistently achieving high on-time delivery rates.

MENTORING

Sungkyunkwan University (SKKU)

South Korea

Research Mentor,

Guided undergraduate students on the *Context-Aware Access Control for the SSH Protocol: Beyond Zero-Trust* project, providing guidance on research problem formulation, system design, and implementation. Nov 2024 – Present

Rochester Institute of Technology (RIT)

Rochester, NY

Peer Advisor Leader (PAL), May 2024

Supported incoming undergraduate and graduate students in adapting to academic life in the U.S., navigating cultural transitions, and accessing institutional resources.

Kamdhenu University

Gujarat, India

Hackathon Mentor, Mar 2022

Mentored veterinary science students during a hackathon on *Smart and Remunerative Farming*, advising on interdisciplinary technology solutions and AI-based approaches to raise awareness among farmers about animal husbandry, common diseases, precaution measures, and vaccinations. The team went on to **win second place at a national-level competition**.

AWARDS

Capgemini Pvt Ltd

Helping Hand Award, May 2022

Received during the May Town Hall Meeting for extraordinary contributions to an American client project.

National level Hackathon on “Smart and Remunerative Farming

Second position, 5 March 2022

Awarded to the Kamdhenu University student team mentored for designing a sustainable AI solution for farmer awareness in animal husbandry.

Letter of Appreciation - District Agriculture Officer, 19 May 2021

Recognized for doing research and assisting farmers in Maharashtra via the Krushi Mitra Bot.

SKILLS

Programming Languages: JavaScript, TypeScript, Python, Java

Frontend Frameworks: React, Vue.js, Angular, Vuetify, Material-UI, Bootstrap

Backend Technologies: Node.js, Express.js, REST APIs, WebSocket, MQTT

Databases: MongoDB, MySQL, PostgreSQL, Redis, PL/SQL

Cloud & DevOps: AWS (EC2, S3, CloudWatch), Google Cloud Platform, Azure DevOps, Git, GitHub, Bitbucket, Jira

Specialized Skills: Accessibility Design (WCAG 2.1), Human-Centered Design, IoT Systems

Architecture, Data Analysis & Visualization

Research Methods: Qualitative interviews, focus groups, survey design, usability testing, participatory design, thematic analysis, mixed-methods research, human-centered design, ethnographic fieldwork

Languages: American Sign Language (Elementary/Intermediate)