

Saad Hassan

STUDENT RESEARCHER AT GOOGLE · GRADUATE RESEARCH ASSISTANT AND PH.D. CANDIDATE AT RIT

Department of Computing and Information Sciences, Rochester Institute of Technology, Rochester, NY

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Research Interests

My research interests include AR/VR, Human Computer Interaction, User Experience Design, Accessibility, Natural Language Processing, and Applied Artificial Intelligence.

Education

Rochester Institute of Technology (RIT)

Rochester, NY, USA

DOCTOR OF PHILOSOPHY (PH.D.) IN COMPUTING AND INFORMATION SCIENCES

September 2019 - Exp. May 2024

- **Advisor:** Matt Huenerfauth
- **CGPA:** 4.0/4.0
- **Selected Coursework:** Research Methods in Human-computer Interaction, Qualitative Research Methods, Quantitative Research Methods, Statistical Machine Learning, Natural Language Processing, Computational Linguistics, Foundations of Software Engineering

Lahore University of Management Sciences (LUMS)

Lahore, Pakistan

BACHELOR OF SCIENCE (B.S.) IN COMPUTER SCIENCE

August 2015 - May 2019

- Graduated with Merit
- **Selected Coursework:** Topics in Interactive Computing, Artificial Intelligence, Human Computer Interaction, Advanced Programming, Data Science, Human Behavior, Social Psychology Statistics, Fundamentals of Computer Systems, Databases, Operating Systems
- **Undergraduate Thesis:** An m-health Tool for Assisting Diagnosis and Rehabilitation of Adolescents with Major Depressive Disorder

Research Work Experience

Google

Mountain View, California

STUDENT RESEARCHER

September 2021 - Present

- Working on sign-language recognition on developing model and enhancing the performance using machine learning and NLP techniques
- Data collection, and UI/UX design for sign-language based text-entry

Google

Mountain View, California

RESEARCH INTERN

May 2021 - August 2021

- Developed and evaluated a phrase level sign-language recognition model and used NLP techniques to further increase the performance.
- Designed a user-interface (UI) to support a phrase-level fingerspelling recognizer
- Implemented 4 prototypes for an experimental study with 12 Deaf and hard of hearing (D/HH) users to understand the utility of fingerspelling as a text-entry method by comparing it to QWERTY typing
- Initial user-study results revealed performance and user-satisfaction benefits for D/HH users
- Created a 5 times faster pipeline for collection, annotation, and post processing of sign-language data

Rochester Institute of Technology

Rochester, New York

GRADUATE RESEARCH ASSISTANT

August 2018 - Present

- Conducting research on Accessibility and Human Computer Interaction at the **Center for Accessibility and Inclusion Research** and designing education technology for people who are trying to learn American Sign Language at the **Linguistics and Assistive Technology Lab**.
- Working on the user-centric design and experimental evaluation of sign-language-based tools, as well as the evaluation metrics of the performance of underlying AI technologies.
- Engaged in other research projects spanning live television captioning, search datasets of human movements through performance, detecting and removing social biases in NLP systems, and language acquisition

Computer Human Interaction and Social Experience Lab at LUMS

Lahore, Pakistan

UNDERGRADUATE RESEARCHER

May 2018 - May 2019

- Conducted research on language acquisition assistive technologies at the **Computer Human Interaction and Social Experience Lab (CHISEL)**
- Designed, implemented, and evaluated gamified solutions for mental health monitoring and second language acquisition

Association for Computing Machinery

Lahore, Pakistan

INTERN

May 2017 - July 2017

- Worked on programming projects that involved object-oriented design, tree and graph problems, recursion and memoization, complexity analysis of algorithms, and android development

Publications

PEER-REVIEWED JOURNAL ARTICLES

- J.1 **Saad Hassan**, Oliver Alonzo, Abraham Glasser, and Matt Huenerfauth. (Journal Article Submitted). Effect of Sign-Recognition Performance on the Usability of Sign-Language Dictionary Search. ACM Transaction on Accessible Computing, 33 pages. 2021.

PEER-REVIEWED CONFERENCE PAPERS BOOK CHAPTERS

- P.6 **Saad Hassan***, Akhter Al Amin*, Alexis Gordon, Sooyeon Lee, and Matt Huenerfauth. 2022. Design and Evaluation of Hybrid Search for American Sign Language to English Dictionaries: Making the Most of Imperfect Sign Recognition. In CHI Conference on Human Factors in Computing Systems (CHI '22), April 29-May 5, 2022, New Orleans, LA, USA. ACM, New York, NY, USA, 13 pages
- P.5 Akhter Al Amin*, **Saad Hassan***, Sooyeon Lee, Matt Huenerfauth. 2021. Watch It, Don't Imagine It: Creating a better caption-occlusion metric by collecting more ecologically valid judgments from DHH viewers. In CHI '22: The ACM CHI Conference on Human Factors in Computing Systems, April 30-May 6, 2022, New Orleans, LA. ACM, New York, NY, USA, 19 pages
- P.4 **Saad Hassan**, Matt Huenerfauth, Cecilia, Ovesdotter Alm. 2021. Unpacking the Interdependent Systems of Discrimination: Ableist Bias in NLP systems through an Intersectional Lens. In Findings of the 2021 Empirical Methods in Natural Language Processing. 7th – 11th November 2021. Online and in the Barceló Bávaro Convention Centre, Punta Cana, Dominican Republic.
- P.3 Akhter Amin*, **Saad Hassan***, Matt Huenerfauth. Effect of Occlusion on Deaf and Hard of Hearing Users' Perception of Captioned Video Quality. Universal Access in Human-Computer Interaction. HCII 2021. Lecture Notes in Computer Science. Springer, Cham, 2021.
- P.2 Akhter Al Amin*, **Saad Hassan***, and Matt Huenerfauth. 2020. Caption-Occlusion Severity Judgments across Live-Television Genres from Deaf and Hard-of-Hearing Viewers. In Proceedings of The 18th International Web for All Conference (Web4All '21). ACM, New York, NY, USA, 12 pages.
- P.1 **Saad Hassan**, Aiza Hasib, Suleman Shahid, Sana Asif, and Arsalan Khan. 2019. Kahaniyan-Designing for Acquisition of Urdu as a Second language. In IFIP Conference on Human-Computer Interaction. Springer, 207–216.

PEER-REVIEWED WORKSHOP PAPERS

- W.3 Akhter Al Amin, **Saad Hassan**, Cecilia Alm, and Matt Huenerfauth. 2022. Using BERT Embeddings to Model Word Importance in Conversational Transcripts for Deaf and Hard of Hearing Users. Proceedings of the Second Workshop on Language Technology for Equality, Diversity and Inclusion. Association for Computational Linguistics at ACL 2022. Dublin, Ireland.
- W.2 **Saad Hassan**, Oliver Alonzo, Abraham Glasser, Matt Huenerfauth. 2020. Effect of Ranking and Precision of Results on Users' Satisfaction with Search-by-Video Sign-Language Dictionaries. In Sign Language Recognition, Translation and Production (SLRTP) at European Conference on Computer Vision (ECCV '20) Workshop-Extended Abstracts.
- W.1 **Saad Hassan**, Larwan Berke, Elahe Vahdani, Longlong Jing, Yingli Tian, and Matt Huenerfauth. 2020. An Isolated-Signing RGBD Dataset of 100 American Sign Language Signs Produced by Fluent ASL Signers. In Proceedings of the LREC2020 9th Workshop on the Representation and Processing of Sign Languages. European Language Resources Association (ELRA), Marseille, France, 89–94.

Guest Lectures and Research Talks

- T.2 Designing Technologies with Underlying AI Components for Deaf and Hard of Hearing Individuals, RIT REU Graduate Study and Research Symposium, July 2021
- T.1 Designing Ubiquitous Devices with Underlying AI Component for People with Disabilities, Guest Lecture in HCIN 722: Human-Computer Interaction with Mobile, Wearable, and Ubiquitous Devices, April 2021

Skills

Programming	Python (5 years), MATLAB (3 years), C++ (2 years), Kotlin, Bash, C, C#, Haskell, GoLang, JavaScript, Java, R, Y86 assembly
Research	Experimental evaluations with human participants, Natural Language Processing, Predictive Modeling, BERT
UX research	User testing, Interviews, Journal studies, Surveys, Ethnography, A/B tests, Contextual inquiry, Eye-tracking, WCAG 2.1
Front-end/UX Design Tools	Figma, React Native, MongoDB, Android Studio, Firebase, Expo, Proto.io, Axure, Sketch, Balsamiq Mockups
Other Tools	MS-Office, LaTeX, LibreOffice Calc, Prezi, PTC Creo, NVivo, Rstudio, Jupyter Notebook, Google Docs
Spoken Languages	English, Urdu, Hindi, Punjabi, American Sign Language

Research Projects

American Sign Language (ASL) Search Via Webcam

Rochester, New York

DISSERTATION RESEARCH, CO-PI

August 2019 - Present

- National Science Foundation (NSF) funded project with a larger goal of designing an American Sign Language (ASL) dictionary that allows users to record a video of a sign in front of a webcam to search for an unfamiliar words.
- Investigating user behavior in search interfaces that take video-based input by conducting lab-based studies in order to make the task of sign lookup easier for users
- Collecting a large annotated dataset of ASL signs from fluent signers to support sign-language-recognition research

Caption Evaluation Metric for Live Television

Rochester, New York

RESEARCH PROJECT AT CENTER FOR ACCESSIBILITY AND INCLUSION RESEARCH

January 2020 - Present

- National Institutes of Health (NIH) funded project with a larger goal of designing a caption evaluation metric that automatically evaluates the quality of a captioning in live television
- Collecting and analyzing datasets of Deaf and Hard of Hearing (DHH) users' judgements regarding placement and presentation of caption across different genres of live television to develop an automatic caption evaluation metric

Intersectional Social Biases against People with Disabilities in Large-Scale NLP Models

Rochester, New York

RESEARCH PROJECT WITH LANGUAGE DEPARTMENT AT RIT COLLEGE OF LIBERAL ARTS

January 2021 - Present

- Conducted analyses on the output of a large-scale BERT language model for word prediction task
- Designed a new approach based on sentiment analysis and topic modeling to evaluate the output of BERT for intersectional ableist biases

American Sign Language Learner Feedback

Rochester, New York

RESEARCH PROJECT AT CENTER FOR ACCESSIBILITY AND INCLUSION RESEARCH

August 2019 - Present

- Conducted lab-based study to evaluate user preferences about getting feedback on ASL homework assignments
- Conducted formative study using interviews to explore the utility of various ways of providing feedback, including side-by-side video of novice and fluent signers and face swapping

Kinect based American Sign Language Education Tool

Rochester, New York

RESEARCH PROJECT AT CENTER FOR ACCESSIBILITY AND INCLUSION RESEARCH

August 2020 - Present

- National Science Foundation (NSF) funded project with a larger goal of designing an educational tool that automatically provides feedback to people learning American Sign Language
- Designing and experimentally evaluating technology that can automatically recognize aspects of American Sign Language signing and provides instant feedback to students, giving them a time-flexible way to practice and improve their signing skills

Emojis and Emotional Well-being

Rochester, NY

INDEPENDENT RESEARCH

August 2018 - August 2019

- Investigated how to use emoji usage data to understand user's emotional well-being
- Designed a prototype of an emoji usage tracker that allows self-monitoring of emoji usage and obtained feedback from college students

Automatic Classification and Reviewer Selection of Research Papers

Rochester, NY

INDEPENDENT RESEARCH

August 2018 - August 2019

- Developed a supervised learning algorithm that predicts the Computing Classification System (CCS) concepts of papers submitted to an Association for Computing Machinery (ACM) conference
- Developed an unsupervised learning algorithm that predicts the appropriate reviewer committee for a paper submitted to an ACM conference

Designing Game Based Learning Solutions for Urdu as Second Language

Lahore, Pakistan

RESEARCH PROJECT AT COMPUTER HUMAN INTERACTION AND SOCIAL EXPERIENCE LAB

August 2018 - August 2019

- Created a story-based game framework tailored to assist acquisition of a second language
- Empirically investigated the suitability of the use of gamification to assist second language learning within the context of interactive storytelling in an experimental study
- Investigated how psychological and linguistic aspects of language learning coupled with contextual task analysis can be used to inform of the design of a language learning tool

Assisting Diagnosis and Rehabilitation of Adolescents with Major Depressive Disorder

Lahore, Pakistan

UNDERGRADUATE THESIS, RESEARCH PROJECT AT COMPUTER HUMAN INTERACTION AND SOCIAL EXPERIENCE LAB

August 2018 - August 2019

- Conducted semi-formal interviews and diary study to understand how psychiatrists treat adolescents with Major Depressive Disorder (MDD) and how they employ technological solutions
- Co-designed a tool with psychiatrists that allowed better verbalization of symptoms of major depressive disorder (MDD) in adolescents by the use of a game-based solution.
- Investigated how to best incorporate aspects of Cognitive Behavior Therapy and Narrative Therapy into the gamified solution to help assist in rehabilitation of adolescents with MDD

Certification

Teach Access: Accessible Technology Design and Development

Rochester, NY

STUDENT

March 2021 - May 2021

- Learned designing Assistive technology, Web/app accessibility, Accessible events, Racial justice, intersectionality, disability rights, Accessible design, Inclusive marketing, and storytelling

Honors & Awards

2020-2021 **Student Excellence Award**, 2021 Language Science & Computational Linguistics Student Excellence Award

Rochester, NY

2019-2024 **Merit-based Ph.D. scholarship**, Financial support that covers tuition fee and a living stipend

Rochester, NY

Teaching Experience

Lahore University of Management Sciences

Lahore, Pakistan

TEACHING ASSISTANT: CS 360 - SOFTWARE ENGINEERING

December 2018 - May 2019

- Assisted in preparation of course materials including lectures, tutorials, grading rubrics, and exams for a Software Engineering course
- Conducted tutorials to familiarize students with different front-end development tools and good interface design practices
- Supervised six student teams in their semester long projects and assisted the instructor with grading at the end of the course

Alumni Development Program, The Citizen Foundations

Lahore, Pakistan

TEACHER AND LEARNING COACH

May 2016 - August 2016

- Conducted classes of assigned subjects (Mathematics and Problem Solving, English)
- Completed scheduled coursework, tests and exams, and correcting them
- Managed students - attendance, complaint resolution, result tabulation, and recording, and handling on-ground challenges
- Served as the focal point with Alumni Department at TCF for on-ground crisis management
- Executed and monitored the programme for assigned schools

Community Service and Mentoring

Center for Accessibility and Inclusion Research

Rochester NY

COMMUNICATION CHAIR

May 2020 - Present

- Assisted in preparation of course materials including lectures, tutorials, grading rubrics, and exams for a Software Engineering course
- Conducted tutorials to familiarize students with different front-end development tools and good interface design practices
- Supervised six student teams in their semester long projects and assisted the instructor with grading at the end of the course

OzCHI, CHI, HRI

Remote

REVIEWER

May 2020 - Present

- Reviewer for several different tracks of papers

References

R.1 **Matt Huenerfauth**, Ph.D. Advisor, Email: matt (dot) huenerfauth (at) rit (dot) edu

Rochester, NY

R.2 **Cecilia (Cissi) O. Alm**, Email: coagla (at) rit (dot) edu

Rochester, NY

R.3 **Thad Starner**, Current host at Google, Email: thadstarner (at) google (dot) com

Georgia, ATL

R.4 **George Sung**, Past host at Google, Email: gsung (at) google (dot) com

Mountain View, CA