Amama Mahmood

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Research Overview

My research, situated at the intersection of HCI, AI and Robotics, focuses on enhancing human-machine interactions to support health and well-being. Specifically, I develop conversational agents-powered by LLMs-that enable seamless, adaptive interactions by understanding user behaviors in various real-world contexts. With a focus on empowering older adults in managing their health to facilitate aging in place, my work emphasizes situated, long-term, "in the wild" human-machine interactions.

Keywords: Human-AI Interaction, Human-Computer Interaction, Human-Centered AI, Human-Robot Interaction, Assistive Technologies, Conversational Agents, Large Language Models, Human-Subjects Research

Education

Doctor of Philosophy in Computer Science, *Johns Hopkins University* **August 2020 — Present**

- Advised by Dr. **Chien-Ming Huang**

Master of Science in Engineering (Computer Science), *Johns Hopkins University* **May 2022**

Master of Science in Engineering (Robotics), *Johns Hopkins University* **May 2020**

Bachelors in Electrical Engineering, *National University of Sciences & Technology (NUST)* **June, 2017**

Honors/Awards

Creel Family Engineering Fellowship, *Johns Hopkins University* **August 2020**

- Fellowship awarded to one graduate student a year.

Computer Science Department Fellowship, *Johns Hopkins University* **August 2020**

- Awarded by the CS PhD Admissions Committee for a prospective CS PhD student who has shown exceptional promise.

Fulbright Scholar **2018-2020**

- A prestigious scholarship awarded to select students in the world for their graduate degrees.

Publications

Google Scholar

Submitted / In Preparation

Amama Mahmood, Shiye Cao, Maia Stiber, Victor Antony, and Chien-Ming Huang - Voice Assistants for Health Self-Management: Designing for and with Older Adults **[Under review,** arXiv**]** **2024**

Amama Mahmood, Junxiang Wang, and Chien-Ming Huang - Situated Understanding of Older Adults' Interactions with Voice Assistants **[Under review,** arXiv**]** **2024**

Sally Cao**,** Jiwon Moon, **Amama Mahmood**, Victor Antony, Ziang Xiao, Anqi Liu, and Chien-Ming Huang **–** "Let Me Finish My Thought'": Interruption Handling for Conversational Robots **[Under review]** **2024**

Szeyi Chan, Jiachen Li, Bingsheng Yao, **Amama Mahmood**, and Chien-Ming Huang, Holly Jimison, Elizabeth D Mynatt, Dakuo Wang - "How to Let The Lettuce Dry Without A Spinner?": Explore The Advantages And Challenges When Employing An LLM-Based Voice Assistant in Cooking Scenarios **[Major revision**, arXiv**]** **2024**

Kaitlynn Taylor Pineda, **Amama Mahmood**, and Chien-Ming Huang - "You Might Like It": How People Respond to Small Talk in Human-Robot Collaboration **[Under review**, arXiv**]** **2024**

Published

Amama Mahmood, Junxiang Wang, Bingsheng Yao, Dakuo Wang, and Chien-Ming Huang **-** LLM-Powered Conversational Voice Assistants: Interaction Patterns, Opportunities, Challenges, and Design Guidelines In *International Journal of Human-Computer Studies* **[Accepted,** arXiv**]** **2024**

Amama Mahmood and Chien-Ming Huang - From Our Lab to Their Homes: Learnings from Longitudinal Field Research with Older Adults In *AAAI Fall Symposium on Aging in Place* [arXiv] **2024**

Drew Prinster*, **Amama Mahmood***, Suchi Saria, Jean Jeudy, Cheng Ting Lin, Paul Yi, Chien-Ming Huang - Care to Explain? AI Explanation Types Differentially Impact Physician Diagnostic Performance and Trust in AI In *Radiology* ***equal contribution** **2024**

Amama Mahmood and Chien-Ming Huang - Gender Biases in Error Mitigation by Voice Assistants In *ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW)* **2024**

Carlos Aguirre, Shiye Cao, **Amama Mahmood**, and Chien-Ming Huang - Crowdsourcing Thumbnail Captions: Data Collection and Validation. Invited article at *ACM Transactions on Interactive Intelligent Systems (TIIS)* **2023**

Amama Mahmood, Jeanie W Fung, Isabel Won, and Chien-Ming Huang - Owning Mistakes Sincerely: Strategies for Mitigating AI Errors In *CHI Conference on Human Factors in Computing Systems* **2022**

Amama Mahmood and Chien-Ming Huang - Effects of Rhetorical Strategies and Skin Tones on Agent Persuasiveness in Assisted Decision-Making In *Proceedings of the ACM International Conference on Intelligent Virtual Agents* **2022**

Carlos A Aguirre, **Amama Mahmood**, and Chien-Ming Huang - Crowdsourcing Thumbnail Captions Using Time-Constrained Methods In *27th International Conference on Intelligent User Interfaces* **2022**

Amama Mahmood, Gopika Ajaykumar, Chien-Ming Huang - How Mock Model Training Enhances User Perceptions of AI Systems In *Human Centered AI (HCAI) workshop at NeurIPS* [workshop, arXiv] **2021**

Amama Mahmood, Balazs P Vagvolgyi, Will Pryor, Louis L Whitcomb, Peter Kazanzides, and Simon Leonard - Visual Monitoring and Servoing of a Cutting Blade during Telerobotic Satellite Servicing In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* **2020**

Amama Mahmood, Rida Zainab, Rushda Basir Ahmad, Maryam Saeed, and Awais Mehmood Kamboh - Classification of Multi-class Motor Imagery EEG Using Four Band Common Spatial Pattern In *39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society* (EMBC) **2017**

Zohaib Amjad Khan, Nabeel Kamal, Asad Hameed, **Amama Mahmood**, Rida Zainab, Bushra Sadia, Shamyl Bin Mansoor, and Osman Hasan - SmartSIM - A Virtual Reality Simulator for Laparoscopy Training Using a Generic Physics Engine In *The International Journal of Medical Robotics and Computer Assisted Surgery* **2017**

Research/Work Experience

Research Assistant, *Johns Hopkins University* **August 2019 — Present**

- Conducts research in Laboratory for Computation Sensing and Robotics and Intuitive Computing Lab.
- Currently exploring user interactions with advanced conversational agents powered by LLMs focusing on the longitudinal aspects of user experience in personal spaces to support health and well-being for older adults.

Research Assistant, *Satellite Servicing Mission NASA Project-Johns Hopkins University* **March 2019 — Dec 2019**

- Employed computer vision techniques on video stream of blade cutting through multilayer insulation hat on the satellite body to get an estimate of forces acting on blade.

Research Assistant, *Signal, Image and Video Processing lab, LUMS, Pakistan* **Oct 2017 — July 2018**

- Worked on applications of brain computer interfacing. Presented feasibility analysis of existing multiclass motor imagery systems for real-time applications.

Undergraduate Researcher, *National University of Sciences and Technology, Pakistan* **Feb 2016 — Sept 2017**

- Worked on brain computer interface to drive a telepresence robot with motor imagery EEG commands.
- Worked on SmartSIM, a virtual reality simulator for training in laparoscopic surgery.

Teaching and Mentoring

Teaching Assistant, *Johns Hopkins University* **Fall 2021**
- Graded and held office hours EN.601. 490/690 **Introduction to Human-Computer Interaction**
- Guest lecture on Human-AI Interaction

Course Assistant, *Johns Hopkins University* **Spring 2020**
- Graded and held office hours EN.601.491/691 **Human-Robot Interaction**

Reading Group Organizer, *Johns Hopkins University* **Summer 2020 – Spring 2020**
- Organized weekly reading group for members of research lab on various topics of Human-AI and Human-Robot Interaction

Student Mentor, *Johns Hopkins University* **2020-present**
- Mentored 2 local high school students
- Mentored 5 undergraduates, 1 graduate and 1 PhD student at Johns Hopkins University
- Currently mentoring 3 graduate students at Johns Hopkins University for research projects to support health and well-being

Service

Peer Reviewer **2020 — Present**
- Peer reviewed 3 papers (2 special mentions) for ACM Conference on Human Factors in Computing Systems – **CHI 2024**
- Peer reviewed paper for ACM Transactions on Human-Robot Interaction – **THRI 2021**
- Peer reviewed full paper for ACM/IEEE International Conference on Human-Robot Interaction – **HRI 2021**
- Peer reviewed paper for ACM International Conference on Multimodal Interaction - **ICMI 2020**

Organizer Lab Hackathon **Summer 2023**
- Organized hackathon for research group on integrating LLMs into voice assistants and robots

Organizer Lab Hackathon **Summer 2023**
- Organized hackathon for research group on integrating LLMs into voice assistants and robots

Member of Robotics Graduate Student Association, *Johns Hopkins University* **2020 — 2024**

Skills

Programming Alexa skills kit, Web API, JavaScript, HTML, CSS, ASP.NET, Python, C#, C, C++, R, MySQL, MATLAB, Mathematica, Verilog HDL, G, Assembly and Embedded C for Microcontrollers

Research Empirical research, Qualitative methods, Quantitative methods, Fundamental lab studies, Longitudinal field studies, Co-design, Human-centered design, Statistical analysis, Hypothesis testing

Software ROS, JMP, SPSS

Simulation Gazebo, Rviz, Cadence, Simulink, Orcad Pspice, AutoCAD, Proteus, Keil, Xilinx, MPLAB, Arduino, ADS, OpenVibe

References

Dr. Chien-Ming Huang **Ph.D. Advisor**	Assistant Professor CS, Johns Hopkins University	chienming.huang@jhu.edu
Dr. Dakuo Wang	Associate Professor CS, Northeastern University	d.wang@northeastern.edu
Dr. Paul Yi	Associate Member Radiology, St. Jude Faculty	paulyimd@gmail.com