

# Amama Mahmood

(410) 508-5727 • [amama.mahmood@jhu.edu](mailto:amama.mahmood@jhu.edu) • <https://amamamahmood.github.io/>

## Research Overview

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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

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<b>Doctor of Philosophy in Computer Science</b> , Johns Hopkins University	<b>August 2020 — Present</b>
<ul style="list-style-type: none"><li>Advised by Dr. <b>Chien-Ming Huang</b></li></ul>	
<b>Master of Science in Engineering (Computer Science)</b> , Johns Hopkins University	<b>May 2022</b>
<b>Master of Science in Engineering (Robotics)</b> , Johns Hopkins University	<b>May 2020</b>
<b>Bachelors in Electrical Engineering</b> , National University of Sciences & Technology (NUST)	<b>June, 2017</b>

## Honors/Awards

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<b>Creel Family Engineering Fellowship</b> , Johns Hopkins University	<b>August 2020</b>
<ul style="list-style-type: none"><li>Fellowship awarded to one graduate student a year.</li></ul>	
<b>Computer Science Department Fellowship</b> , Johns Hopkins University	<b>August 2020</b>
<ul style="list-style-type: none"><li>Awarded by the CS PhD Admissions Committee for a prospective CS PhD student who has shown exceptional promise.</li></ul>	
<b>Fulbright Scholar</b>	<b>2018-2020</b>
<ul style="list-style-type: none"><li>A prestigious scholarship awarded to select students in the world for their graduate degrees.</li></ul>	

## Publications

[Google Scholar](#)

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### Submitted / In Preparation

<b>Amama Mahmood</b> , Shiye Cao, Maia Stiber, Victor Antony, and Chien-Ming Huang - Voice Assistants for Health Self-Management: Designing for and with Older Adults [ <b>Under review</b> , <a href="#">arXiv</a> ]	<b>2024</b>
<b>Amama Mahmood</b> , Junxiang Wang, and Chien-Ming Huang - Situated Understanding of Older Adults' Interactions with Voice Assistants [ <b>Under review</b> , <a href="#">arXiv</a> ]	<b>2024</b>
Sally Cao, Jiwon Moon, <b>Amama Mahmood</b> , Victor Antony, Ziang Xiao, Anqi Liu, and Chien-Ming Huang - "Let Me Finish My Thought": Interruption Handling for Conversational Robots [ <b>Under review</b> ]	<b>2024</b>
Szeyi Chan, Jiachen Li, Bingsheng Yao, <b>Amama Mahmood</b> , 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 [ <b>Major revision</b> , <a href="#">arXiv</a> ]	<b>2024</b>
Kaitlynn Taylor Pineda, <b>Amama Mahmood</b> , and Chien-Ming Huang - "You Might Like It": How People Respond to Small Talk in Human-Robot Collaboration [ <b>Under review</b> , <a href="#">arXiv</a> ]	<b>2024</b>

## 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 - Owing 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, Shamy 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

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- 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

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- 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 2023**
- 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 2 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

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- 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 Community Outreach Expo** **Summer 2024**
- Organized a community outreach exhibition at a local senior living center
- Member of Robotics Graduate Student Association**, *Johns Hopkins University* **2020 — 2024**

## Skills

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**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

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<b>Dr. Chien-Ming Huang</b> Ph.D. Advisor	Assistant Professor CS, Johns Hopkins University	<a href="mailto:chienming.huang@jhu.edu">chienming.huang@jhu.edu</a>
<b>Dr. Dakuo Wang</b>	Associate Professor CS, Northeastern University	<a href="mailto:d.wang@northeastern.edu">d.wang@northeastern.edu</a>
<b>Dr. Paul Yi</b>	Associate Member Radiology, St. Jude Faculty	<a href="mailto:paulyimd@gmail.com">paulyimd@gmail.com</a>

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