

AMAMA MAHMOOD

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Objective

Seeking to attain excellence in research and apply my skills to solve challenging real-life problems.

Education

Ph.D. Computer Science, Johns Hopkins University, Baltimore MD, USA 2020-present

Advised by **Dr. Chien-Ming Huang**. Collaborators: Dr. Dakuo Wang, Dr. Paul Yi

Research topics: **Human-AI Interaction, HCI, HRI, Voice Assistants, LLM-powered Voice Assistants, Virtual Assistants, Social Biases, Error Mitigation**

MSE Robotics, Laboratory for Computational Sensing and Robotics (LCSR), 2018-2020

Whiting School of Engineering, Johns Hopkins University (JHU), Baltimore MD, USA CGPA 3.95/4.0

(Track: Perception and Cognitive Science: **Computer Vision, Deep Learning, Artificial intelligence, Algorithms for Sensor-based Robotics, Cognitive Science, Human-Robot Interaction, Haptics**)

Bachelors in Electrical Engineering, School of Electrical Engineering and Computer 2013-2017

Science (SEECS), National University of Sciences & Technology (NUST), Pakistan CGPA

(Major courses: Embedded System Design, **Digital Signal and Image Processing**, 3.87/4.00

Machine Learning, Electronics, Control Systems, Communication Systems, VLSI, Rank: 4/146
Object-Oriented Programming, Data Structures and Algorithms)

Selected Awards & Achievements

- Johns Hopkins University Departmental **Creel Family Engineering Fellowship** (2020-2021)
- **Fulbright Scholar** (2018-2020)
- **LCSR Faculty Scholarship** (2018-2020), Awarded with admission at JHU
- ICRA RoboMaster AI Challenge (team) - 3rd place: ranked 8 in 39 finalist teams from all world.
- Rhodes Scholarship – Finalist, 2017
- Finding Innovative and Creative Solutions, 2017 (FICS'17) winners, Team "AVATUM" – A motor imagery EEG based stroke rehabilitation system.
- Team AVATUM won Falling Walls Lab Pakistan and nominated for **Global Falling Walls** Competition in Berlin. AVATUM selected in top 20 ideas for opinions poster session of **7th Graz BCI Conference 2017**, Graz, Austria.

- Among top 2 candidates for Rectors **Gold Medal** in Senior Design Project, out of 146 students
- Recipient of high achievers' scholarship from NUST in all semesters of B.E (Electrical).
- Awarded scholarships for outstanding performance in the college and school since grade 5.

Experience

PhD Student, Intuitive Computing Lab, Johns Hopkins University (June 2020 – present)

- Exploring **user interactions** with **smart speaker-based voice assistants** powered by Large Language Models (LLMs). Investigating the **longitudinal aspects of user experience** with such assistants in users' (especially **older adults'**) personal spaces.
- Worked on designing effective strategies for **voice assistants to mitigate AI errors and curb gender biases** informed by **human response and behavior**.
- Explored how to facilitate intuitive and productive **Human-AI Interactions** in multiple domains such as **intelligent personal assistance** and **radiology**.
- Explored how to regulate people's expectation of AI agents by tapping into people's perceptions. Shaping human expectations and behavior through **mock model training**.

Graduate Researcher, Intuitive Computing Lab, Johns Hopkins University (Aug 2019 – May 2020)

- Designed implicit vs. explicit feedback for one-on-one session with a child where a robot tutor helps the child in a spatial visualization task. Developed a perception system to track progress.

Graduate Research Assistant, Teleoperation group, NASA Project (Mar 2019 – Dec 2019)

- Worked on satellite servicing mission project. 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.

Research Student, Neuro-informatics lab, SECS-NUST, Pakistan (June 2016 – Sep 2017)

- Worked on **brain computer interface** to drive a **telepresence robot** with motor imagery EEG commands. The assembly can potentially be used as a stroke rehabilitation system.

Research Student, Sigma lab, SECS-NUST, Pakistan (Feb 2016 – July 2017)

- Worked on **Machine Learning** and Automatic Speech Recognition (ASR) using Kaldi.

Research Student, SMART lab SECS-NUST, Pakistan (Nov 2015 – June 2017)

- Worked on **SmartSIM**, a virtual reality simulator for training in laparoscopic surgery.
- Worked on **Phantom Omni**, a forced feedback haptic device.

Director of Operations, CyKiq, Startup of Green Lab at NUST, Pakistan (Nov 2014 – July 2015)

- Administration, Business plans and Human Resources.

Publications

Mahmood A., Wang J., Yao B., Wang, D. Huang C.M. [Under review CHI'24, [arXiv](#)]

[LLM-Powered Conversational Voice Assistants: Interaction Patterns, Opportunities, Challenges, and Design Guidelines](#)

Chan S., Li J., Yao B., **Mahmood A.**, Huang C.M., Jimison H., Mynatt E.D., Wang, D. [Under review CHI'24]
[“How to Let The Lettuce Dry Without A Spinner?”: Explore The Advantages And Challenges When Employing An LLM-Based Voice Assistant in Cooking Scenarios](#)

Pineda K.T., **Mahmood A.**, Huang C.M. [Under review HRI'24]

[“You Might Like It”: How People Respond to Small Talk in Human-Robot Collaboration](#)

Mahmood A., Huang C.M. (Just accepted to appear in CSCW'24)

[Gender Biases in Error Mitigation by Voice Assistants](#)

In *ACM Conference on Computer-Supported Cooperative Work and Social Computing (2024)*

Carlos A., Shiye C., **Mahmood A.**, Huang C.M. (2023, February)

[Crowdsourcing Thumbnail Captions: Data Collection and Validation](#)

Invited journal at *ACM Transactions on Interactive Intelligent Systems (TIIS)*

Mahmood A., Huang C.M. (2022, September)

[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)*

Mahmood A., Fung J., Won I., Huang C.M. (2022, May)

[Owning Mistakes Sincerely: Strategies for Mitigating AI Errors](#)

In *CHI Conference on Human Factors in Computing Systems (pp. 1-11)*.

Carlos A., **Mahmood A.**, Huang C.M. (2022, March)

[Crowdsourcing Thumbnail Captions Using Time-Constrained Methods](#)

In *27th International Conference on Intelligent User Interfaces (pp. 36-48)*.

Mahmood A., Ajaykumar G., Huang C.M. (December, 2021)

[How Mock Model Training Enhances User Perceptions of AI Systems](#)

In *Human Centered AI (HCAI) workshop at NeurIPS (2021)*, *arXiv preprint arXiv:2111.08830*.

Mahmood, A., Vagvolgyi, B. P., Pryor, W., Whitcomb, L. L., Kazanzides, P., & Leonard, S. (2020, Oct)

[Visual Monitoring and Servoing of a Cutting Blade during Telerobotic Satellite Servicing.](#)

In *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*.

Mahmood, A., Zainab, R., Ahmad, R. B., Saeed, M., & Kamboh, A. M. (2017, July).

[Classification of Multi-class Motor Imagery EEG Using Four Band Common Spatial Pattern](#)

In *2017 39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'17) (pp. 1034-1037)*. IEEE.

Khan, Z. A., Kamal, N., Hameed, A., **Mahmood, A.**, Zainab, R., Sadia, B., ... & Hasan, O. (2017).

[SmartSIM-A Virtual Reality Simulator for Laparoscopy Training Using a Generic Physics Engine.](#)

In *The International Journal of Medical Robotics and Computer Assisted Surgery*, 13(3), e1771.

Teaching and Mentoring

- Teaching Assistant, EN.601.490/690 **Introduction to Human-Computer Interaction** Fall 2021
Department of Computer Science, Johns Hopkins University
- Teaching Assistant, EN.601.491/691 **Human-Robot Interaction** Spring 2020
Department of Computer Science, Johns Hopkins University
- Reading group lead** for members of Intuitive Computing Lab on various topics of **Human-AI** and **Human-Robot Interaction** Summer 2020 – Spring 2023
- Have mentored 2 local high school students and 4 undergraduates at Johns Hopkins Fall 2020 – Present

Academic Service

- 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**

Grad School Projects

- MSE Thesis: **Robot Assisted 3D Block Building to Augment Spatial Visualization Skills in Children - An exploratory study**
- Single-cell refreshable braille display for people with visual impairments
- Effect of **Robot Tutor** Coaching Levels on Trust and Comfortability of Kids: A Pilot Study
- Comparison of various neural networks on food datasets, used **ResNet**, **Inception-v3** and ensemble of both
- American Sign Language Classification and Prediction, based on computer vision, deep learning and NLP

Undergrad Projects

- Autonomous Telepresence Robot
- Smart Semester Planner, based on concepts of object-oriented programming
- Density Calculator based on digital logic design
- Mobile controlled table tennis trainer, used microcontrollers knowledge
- Agriculture Precision (Research and Implementation), used image processing
- P300 Speller Program Feature Extraction

Key Skills

Programming	Alexa skills kit, Web API, JavaScript, HTML, CSS, ASP.NET, Python, C#, C, C++, MySQL, MATLAB, Mathematica, Verilog HDL, G, Assembly and Embedded C for Microcontrollers
Simulation	Gazebo, Rviz, Cadence, Simulink, Orcad Pspice, AutoCAD, Proteus, Keil, Xilinx, MPLAB, Arduino, ADS, OpenVibe
Miscellaneous	ROS, Linux, LaTeX, Inkscape, Illustrator

Extracurricular Activities

- **Organized lab hackathon on integrating LLMs into voice assistants and robots**, Summer 2023
- **LCSR Graduate Student Association (GSA) Representative**, 2020-present.
- **HopkinsAI, October, 2018 - May, 2019**, For ICRA [RoboMaster AI Challenge](#), 2019.
- **Community Service Learning, Merit certificate, 2017**, SEECS NUST. Volunteer work at Street Store, Chadar.
- **Visits to Orphanage for teaching and interaction, 2017**, Ghonsla Orphanage, Islamabad, Pakistan.
- **Instructor and Event Head, EEG Data acquisition training workshop series, 2017**, 7 training sessions were conducted along with a two-day workshop, SEECS – NUST H-12 Islamabad, Pakistan.
- **Active Participant, Sports Gala, 2016-17**, Cricket (Winners), Basketball (1st Runner up) and Dodge the ball (winners).
- **Event Head, Tech Talk 2015**, NUST H-12 Islamabad, Pakistan.
- **Volunteer, Workshop for Children of NUST Staff by TABA Youth 2015**, NUST
- **Organizer and Start up booth, Change Pakistan Conference 2015**, FAST NU Lahore, Pakistan
- **Director Logistics, Chinese Day Celebration, 2015**, SEECS, NUST H-12 Islamabad, Pakistan
- **Participant, Robotics workshop and competitions including line tracking, robo-wrestling and speed racing, CSP 2013**, NUST H-12 Islamabad, Pakistan
- **Tutoring Mathematics, at school and college, 2012**, productive experience of teaching Mathematics for three months in my college to 11 graders. The topics covered in class included algebra, trigonometry and probability.
- **Head of Disciplinary Committee, 2011-2013**, in High school.
- **Lab In-charge, 2009-2011**, in High school.