Huanghao (Howard) Feng — Curriculum Vitae

Ph.D. Candidate   2020. 3
Computer Vision and Social Robotics Lab
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RESEARCH INTERESTS

Robotics; affective computing; computer music; emotion analysis; music emotion analysis; music technology; acoustic audio analysis; human-robot/machine social interaction design; music game design; human-in-the-loop artificial intelligence in emotional music composing and customization; robotics, arts and humanities in STEM education; virtual reality and augmented reality in interactive music game design; computer vision; autism spectrum disorders.

EDUCATION

Degree	Institution	Date	Field
Ph.D.	University of Denver Department of Electrical and Computer Science Thesis: *Xylo-Bot: An Automated Music Teaching Robot Platform System for Children with Autism (In Progress)* Advisor: Mohammad H. Mahoor	2020 Expected	Electrical and Computer Engineering
M.S.	University of Denver Department of Electrical and Computer Science Thesis: *Studying Eye Gaze of Children with Autism Spectrum Disorders in Interaction with a Social Robot* Advisor: Mohammad H. Mahoor	2014	Electrical and Computer Engineering
B.S	Suzhou University of Science and Technology Department of Electrical and Information Technology Senior Design: *A Mobile App: Car Information Searching System in Android OS* Advisor: Huijuan Gu	2011	Information and Technology
High School	Suzhou No.1 High School, Suzhou, Jiangsu, China	2005	STEM Major

WORKS: DESIGN, PUBLICATIONS AND POSTERS

Design: *Xylo-Bot: A Toy Musical Robot and Beyond*
Chief designer. 2017 - present | A real-time feedback social dynamic music learning/composing system designed for teaching basic music knowledge/skills to children/adults without professional music training. In this system, various melodic music can be easily customized and played/taught by a humanoid robot. Both acoustic and digital sound can be performed by using a friendly color-coded toy xylophone (we call it X-elophone). See video here. This platform has been demonstrated at Denver International Festival of Arts & Technology Symposium for the very first time, and achieved positive feedbacks from digital music giants Jordan Rudess (one of the world greatest keyboardist from the heavy metal music band Dream Theater) and Ge Wang (Associate Professor at Stanford University, Artful Designer and Digital Giant).

Design: *X-elophone: A Revolution of Xylophone*
Chief designer. 2019 – present | With simply ten keys and a portable size, this new style of xylophone produces both major and minor scales in any keys by client demand. This particular xylophone can be used not only for beginners who wants to learn basic music knowledge, but also for advanced user who would like to have creative performance. See video here. X-elophone has been demonstrated at Denver International Festival of Arts & Technology Symposium for the very first time and currently being used in a Music, Robot and Autism research with Xylo-Bot system.

Peer-reviewed Journal Articles, Conference Paper and Posters

Journals:

Mihalache, D., Feng, H., Askari, F., Sokol-Hessner, P., Moody, E.J., Mahoor, M.H. and Sweeny, T.D., 2019.
"Perceiving gaze from head and eye rotations: An integrative challenge for children and adults."
Developmental science, p.e12886.

Huanghao Feng, Hosein Golshan, Mohammad H. Mahoor, 2018. "A wavelet-based feature extraction approach for emotion classification using the EDA signals", *Journal of Expert Systems and Applications,* 112, pp.77-86.

Conferences:

Farzaneh Askari, Haunghao Feng, Timothy D. Sweeny, Mohammad H. Mahoor, 2018. "A Pilot Study on Facial Expression Recognition Ability of Autistic Children Using Ryan, A Rear-Projected Humanoid Robot", *The 27th IEEE-RAS International Conference on Humanoid Robots*, NanJin-Tai'an, China, pp. 790-795.

Farzaneh Askari, Huanghao Feng, Mohammad H. Mahoor, Timothy Sweeny and Anibal Gutierrez, 2018. "How children with autism spectrum disorder recognize facial expressions displayed by a rear-projection humanoid robot", *INSAR 2018 Annual Meeting (formerly IMFAR)*, Rotterdam, Netherlands

S.M.Mavadati, Huanghao Feng, M.Salvador, S.Silver, A.Gutierrez, M.Mahoor, "Robot-Based Therapeutic Protocol for Training Children, with Autism", 2016. *25th International Symposium on Robot and Human Interactive Communication, IEEE RO-MAN*, pp. 855-860, New York, NY (RSJ/KROS Distinguished Interdisciplinary Research Award)

S. Mohammad Mavadati, Huanghao Feng, Peyten Sanger, Sophia Silver, Anibal Gutierrez, Mohammad H. Mahoor, 2015. "Using Robots as Therapeutic Agents to Teach Children with Autism Recognize Facial Expression", *International Meeting for Autism Research (IMFAR)*

Mavadati, S Mohammad; Feng, Huanghao; Gutierrez, Anibal; Mahoor, Mohammad H, 2014. "Comparing the gaze responses of children with autism and typically developed individuals in human-robot interaction", Humanoid Robots (Humanoids), *2014 14th IEEE-RAS International Conference on Humanoid Robots*, pp. 1128-1133, Madrid, Spain

S.M.Mavadati, Huanghao Feng, A.Gutierrez and M.Mahoor, 2014. "Modeling Eye Gaze of Children with Autism During a Robot-based Therapy Setting", Proceeding of *IEEE Engineering in Medicine and Biology Society (EMBS)*, Chicago, IL

S.M.Mavadati, Huanghao Feng, S.Silver, A.Gutierrez and M.Mahoor, 2014. "Children-Robot Interaction: Eye Gaze Analysis of Children with Autism during Social Interactions", *International Meeting for Autism Research (IMFAR)*, Atlanta, GA

Huanghao Feng, Anibal Gutierrez, Jun Zhang, Mohammad H Mahoor, 2013. "Can NAO robot improve eye-gaze attention of children with high functioning autism?", *IEEE International Conference on Healthcare Information (ICHI),* pp. 484-484, Philadelphia, PA

Posters and Oral Presentations:

Farzaneh Askari, Huanghao Feng, Mohammad H. Mahoor, Timothy Sweeny and Anibal Gutierrez, 2018. "How children with autism spectrum disorder recognize facial expressions displayed by a rear-projection humanoid robot", *INSAR 2018 Annual Meeting (formerly IMFAR)*, abstract and poster presentation at Rotterdam, Netherlands

Huanghao Feng, Farzaneh Askari, Mohammad H. Mahoor, 2017. "Socially Assistive Robotics Helps Children with Autism", DU-EXPO, poster presentation at University of Denver, Denver, CO

S.M.Mavadati, Huanghao Feng, S.Silver, A.Gutierrez and M.Mahoor, 2014. "Children-Robot Interaction: Eye Gaze Analysis of Children with Autism during Social Interactions", *International Meeting for Autism Research (IMFAR)*, abstract and poster presentation at Atlanta, GA

Huanghao Feng, M.Mahoor, A.Gutierrez, Marry.Kustner and Jun Zhang, 2013. "Using Social Robots at Improving Eye Gaze Attention of Children with Autism Spectrum Disorders", Proceeding of *International Meeting for Autism Research (IMFAR)*, poster presentation at Donostia, San Sebastian, Basque County, Spain

Huanghao Feng and A.Gutierrez, 2013. "Using Social Robots to Improve Directed Eye Gaze of Children with Autism Spectrum Disorders", oral presentation at *Texas Autism Research Conference (TARRC)*, San Marcos, TX

INVITED TALKS & DEMONSTRATIONS & PRESS

March 2018. "Robots becoming social companions thanks to advanced AI, emotional recognition", CGTN America interview and news report. See video here

July 2017. "Robotics STEM Night, Robots in 3D Opening Event", keynote speaker and demonstration at University of Colorado South Denver

October 2017. "Ryan: The Companion Bot for Elderly with Depression and Dementia Problems", a live TV interview with Hojjat Abdollahi and Prof. Mohammad Mahoor at 9NEWS TV station. See video here

June 2016. "Robots 3D", keynote speaker and panel discussion with Michelle Salvador at Denver Museum of Nature and Science

March 2016. "DU Robot Night", robot demonstration at Denver Museum of Nature and Science

October 2015. "Psych Research Night", robot demonstration with Prof. Mohammad Mahoor at University of Denver.

September 2015. "How Robots Could Improve Social Skills in Kids with Autism", Forbes news report. See report here

March 2015. "Robot helps children with autism by teaching them social skills", FOX31 Denver TV interview with Sophie Silver and Prof. Mohammad Mahoor. See video here

August 2013. "Robot May Help Kids with Autism Become More Sociable", robot demonstration with Prof. Mohammad Mahoor at Colorado Public Radio Station

WORK EXPERIENCE

Research Experience (Advisor: Prof. Mohammad.Mahoor)

2019 – Present | Developing a programmable electronic xylophone (we call it X-elophone) which can easily be changed of keys and timbers for both beginners and advanced user.

2018 – Present | Developing an automated Robot-Music system using Music Therapy to teach instrument play for children with autism to improve social skills, such as turn taking, emotion recognition, motor control. Using OpenCV for robot visualization; invers-kinematics modeling for robot motion control; Fast-Furrier Transform and Short-Time-Furrier Transform for robot real-time audio feedback and interact with clients.

2017 – 2018 | Developed an automated method for emotion classification in children using electrodermal activity (EDA) signals. A continuous wavelet transform has been applied on the recorded EDA signals using the complex Morlet (C-Morlet) wavelet.

2017 – 2018 | Assisted a pilot study on comparing the facial expression recognition abilities of children with Autism Spectrum Disorder (ASD) with typically developing (TD) children using a rear-projected humanoid robot called Ryan.

2015 – Present | Collaborated with DU Psychology department, one of the co-programmers and main experiment executor for eye-gaze study using humanoid robot Zeno. Provides a novel framework (NetBeans IDE and Java based programing) for examining gaze as it is perceived with sensitivity for capturing differences between individuals and groups.

2012 – 2014 | Using NAO robot to improve social behaviors (eye gaze attention) of children diagnosed with autism. Pre-program the therapy session on NAO and use it to interact with children with autism spectrum disorders. Implemented a Hidden Marcov Model (HMM) to eye gaze pattern for predict autistic and normal children.

2011 | Implemented a facial expression recognition algorithm in NAO. The algorithm was implemented using C# and OpenCV. Four facial expressions (joy, sadness, surprise and angry) have been tested using our algorithm with 80% recognition rate.

Teaching Experience

2019 – Present | Adjunct Lecturer | University of Denver | Denver, CO
   Introduction to VLSI Circuits and System
   HDL Modeling & Synthesis

2015 – Present | Teaching Assistant | University of Denver | Denver, CO
   Support learning activities in multiple courses crossing Electrical, Computer, Mechanical fields. Help students troubleshooting during labs. Provide great assistive help section during office hours. Instead of providing solution, using design thinking method to inspire students solving problems. Excellent reputation among students and professors.
   Available courses:
- Matlab Programming
- Intro to Mechatronics System
- Intro to Mechanical Engineering
- Circuits
- Digital Design
- Engineering, Science and Design
- Embedded System Programming

2014 – 2015 | Instructor and Technology Consultant | Innovation Center at SVVSD | Longmont, CO
Designed and implemented design thinking style curriculums for wide age groups using innovative teaching material in STEM teaching subjects. Provided solid technical support for multiple robotics projects. Trained and leaded students for multiple robotics competitions, and also managed/hosted region wise robotics competitions such as Vex, VexIQ, LEGO, FIRST and BEST. Assisted and hosted international visitors from Japan for STEM education communication. Presented on local TV channel's STEM night event and Discovery Channel.

Technical Experience

2010 – 2011 | Software Developer | Suzhou University of Science and Technology | Suzhou, Jiangsu, China
- Developed a mobile application using Java in Android operation system.
- XML is used for user interface configuration.
- Assisted to develop an accessible database using mySQL.
- The design won an Excellence Award in Senior Design.

2010 | IT Support Internship | China Telecom Suzhou Branch | Suzhou, Jiangsu, China
Worked as technical support with a summer internship, help trouble shooting with clients.

HONORS AND AWARDS

2018-2019 Electrical and Computer Engineering Department Chair's Award
2018-2019 Academic Year Teaching/Research Assistant Scholarship
2017-2018 Academic Year Teaching/Research Assistant Scholarship
2017 Best Instructor and Consultant at Innovation Center
2016-2017 Academic Year Teaching/Research Assistant Scholarship
2016 RSJ/KROS Distinguished Interdisciplinary Research Award
2015-2016 Academic Year Teaching Assistant Scholarship
2014 Boulder Badminton Tournament Men's Single Group A (Professional) Bronze
2013-2014 Academic Year Research Assistant Scholarship
2012-2013 Academic Year Research Assistant Scholarship
2011 Senior Design, Excellent Award
2010 Excellent Student Leadership Award
2010 First Tier Scholarship
2009 Excellence team award, Jiangsu College Students Street Dancing Competition (Popping)
2008 Third Tier Scholarship
2007 Talent Star at College May Festival

ACADEMIC AND PROFESSIONAL SERVICE

Reviewer, Expert Systems with Applications	2018 – present
Reviewer, International Conference on Robotics and Automation (ICRA)	2018 – present
Reviewer, Journal of Intelligent & Robotic Systems	2016 – present
Tour Guide for Social Robots and Computer Vision Lab	2015 - present

ADDITIONAL SKILLS AND ART PERFORMANCE

2019 | Interpreter of Animal Care Systems at *American Association for Laboratory Animal Science* (AALAS)

2015 – Present | DU ROBOCUP Club - Vice President

2012 – 2016 | DU Club Badminton - Founder, President
2007 – 2011 | Guitar Club - Band Lead and Talent Star award
2008 – 2010 | Student Association - Entertainment Department Director
2011 – 2012 | Late Night @ DU "Unpluged", Special Guest, FingerStyle Acoustic Guitar Solo
2007 – 2011 | All Festival Entertainment Show Coordinator and Music Band Rhythm Guitar

REFERENCES

- Prof. Mohammad H. Mahoor
  Professor, Dept. of Electrical and Computer Engineering, University of Denver
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- Prof. Kimon P. Valavanis
  Professor, Dept. of Electrical and Computer Engineering, University of Denver
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- Prof. Amin Khodaei
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- Prof. Timothy D. Sweeny
  Assist. Professor, Dept. of Psychology, University of Denver
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- Prof. Anibal Gutierrez
  Assoc. Professor, Assistant Director, Center of Autism and Related Disabilities, University of Miami
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- Jeffrey Lund
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  Instruction Program Consultant, Innovation Center, ST. Vrain Valley School District
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