

2021 BOARD NOMINEE

# Ayanna Howard

Dean-Designate, College of Engineering  
The Ohio State University



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## Awards and Honors and Year Received

- IEEE Early Career Award in Robotics and Automation, 2005
- NSBE Janice Lumpkin Educator of the Year Award, 2009
- A. Richard Newton Educator ABIE Award, Anita Borg Institute, 2014
- Computing Research Association's A. Nico Habermann Award, 2016
- AAI and IEEE Fellow, 2021

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## Involvement in CRA Activities

- Board Member - Computing Research Association (CRA) (2018 - present)
- Board Member - CRA Committee on Widening Participation in Computing (CRA-WP) (2014 - present)
- Co-Chair - CRA-W Grad Cohort Workshop for Women (2014 - 2018)
- Co-Chair - CRA Grad Cohort Workshop for Underrepresented Minorities + Persons with Disabilities (URMD) (2017 - present)
- Speaker - CRA-W Career Mentoring Workshops, CRA-W Grad Cohort Workshops

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## Other Relevant Experience

- National Boards - DARPA Information Science and Technology (ISAT) Study Group, AAAS Committee on Opportunities in Science (COOS) Board, AAI Executive Council, and National Research Council studies.
- Graduate student educational initiatives in computing - AAI Doctoral Consortium, IEEE Robotics Ph.D. Forum
- Broadening Participation in Computing initiatives - Popularizing Computing in the Mainstream (PC2MAIN) , created interventions to engage underrepresented minorities in the computing field; Advancing Robotics for Societal Impact Alliance (ARTSI) - provided traineeship and mentorship to computer science faculty and students at HBCUs; Accessible Robotic Programming for Students with Disabilities (AroPability) - develop curriculum to engage K-12 students with disabilities in robotics and computing

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## Research Interests

Socially interactive robot coaches  
Mitigating Bias and Trust in Intelligent Systems

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Completed ballots must be returned to CRA by **March 17, 2021**  
<https://cra.org/about/board/ballot>

2021 BOARD NOMINEE

# Ayanna Howard

Chair and Professor, School of Interactive Computing  
Georgia Institute of Technology

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Adaptive serious games for therapy/education  
Human behavioral and cognitive modeling  
Interactive human-robot systems

## Personal Statement

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Over the past decade, my leadership, research, teaching, and service record reflects a strong dedication to the advancement of the computing profession. During my career, I have succeeded in developing internationally recognized research programs, all while ensuring the outcomes are relevant to society. Coupling that with my personal passion for increasing the diversity of those who pursue computing as a career, I believe I am an excellent candidate for continued membership on the CRA board. I aim to continue bringing my experience and vision to help CRA engage the entire community as computing continues its growth.

## Bio

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Dr. Ayanna Howard is the newly appointed Dean for the College of Engineering at The Ohio State University. Previously she was Professor and Chair of the School of Interactive Computing in the College of Computing at the Georgia Institute of Technology. As an educator, researcher, and innovator, Dr. Howard's career focus is on intelligent technologies that must adapt to and function within a human-centered world. Her work, which encompasses advancements in artificial intelligence (AI), assistive technologies, and robotics, has resulted in over 250 peerreviewed publications in a number of projects - from healthcare robots in the home to AIpowered STEM apps for children with diverse learning needs. She has over 25 years of R&D experience covering a number of projects that have been supported by various agencies including: National Science Foundation, NewSchools Venture Fund, Procter and Gamble, NASA, and the Grammy Foundation. Dr. Howard received her B.S. in Engineering from Brown University, and her M.S. and Ph.D. in Electrical Engineering from the University of Southern California. To date, her unique accomplishments have been highlighted through a number of awards and articles, including highlights in USA Today, Upscale, and TIME Magazine, as well as being named a MIT Technology Review top young innovator. In 2013, she also founded Zyrobotics, which develops STEM educational products to engage children of all abilities. From 1993-2005, Dr. Howard was at NASA's Jet Propulsion Laboratory, California Institute of Technology. She has also served as the Associate Director of Research for the Georgia Tech Institute for Robotics and Intelligent Machines and as Chair of the multidisciplinary Robotics Ph.D. program at Georgia Tech.

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# Ayanna Howard, Ph.D.

Dean-Designate, College of Engineering  
The Ohio State University

Chair, School of Interactive Computing, College of Computing  
Linda J. and Mark C. Smith Chair Professor  
School of Interactive Computing/ School of Electrical and Computer Engineering  
Georgia Institute of Technology

## I. EARNED DEGREES

*B.S. Computer Engineering*, Brown University, May 1993.

*M.S. Electrical Engineering*, University of Southern California, December 1994.

*Ph.D. Electrical Engineering (Minor: Computer Science)*, University of Southern California, May 1999.

- Dissertation: *Recursive Learning for Deformable Object Manipulation*; Thesis advisor: George A. Bekey, Gordon Marshall Professor of Engineering and University Professor

*M.B.A.* (Masters of Business Administration, concentration in Strategy), Claremont Graduate University, May 2005.

*Certification*, Certificate in Assistive Technology Applications (ATACP), California State University, Northridge - College of Extended Learning, September 2014.

## II. PROFESSIONAL

### IIA. Academic Positions

- **Associate Professor**, Georgia Institute of Technology 7/05-7/12  
School of Electrical and Computer Engineering (Adjunct in College of Computing, School of IC)
- **Motorola Foundation Professor**, Georgia Institute of Technology 7/12-8/15  
School of Electrical and Computer Engineering (Adjunct in College of Computing, School of IC)
- **Linda J. and Mark C. Smith Chair Professor** 8/15-present  
Georgia Institute of Technology, School of Interactive Computing, College of Computing (1/18-present)  
School of Electrical and Computer Engineering, College of Engineering

### IIB. Administrative Positions

- **Deputy Manager**, NASA's Jet Propulsion Laboratory 9/03-6/05  
Strategic University Research Partnership Office, Office of Chief Scientist
- **Founder and Director**, Human-Automation Systems (HumAnS) Lab 7/05-present  
Georgia Institute of Technology, <http://humanslab.ece.gatech.edu/>
- **Program Chair – Robotics PhD Program**, Georgia Institute of Technology 8/10-8/13  
College of Engineering and College of Computing
- **Chief Technology Officer and Founder**, Zyrobotics, LLC. 9/13-present  
<http://www.zyrobotics.com>
- **Associate Director of Research**, Institute for Robotics and Intelligent Machines (IRIM) 11/13-11/15  
Georgia Institute of Technology, <http://robotics.gatech.edu>
- **Associate Chair for Faculty Development**, School of Electrical and Computer Engineering 4/16-12/17  
Georgia Institute of Technology

- **Chair of the School of Interactive Computing**, College of Computing  
Georgia Institute of Technology 1/18-2/21
- **Incoming Dean**, College of Engineering  
The Ohio State University 3/21-

### ***IIC. Advisory Board and Nominated Positions***

- Scientific Advisory Committee, National Research Council Study on the Scientific Context for the Exploration of the Moon 2006-2007
- Scientific Advisory Committee, National Research Council Study on NASA's Exploration Technology Development Programs 2007-2008
- Advisory Board, University of Washington On-Ramps into Academia Program 2009-2012
- Scientific Board, NASA's Mars Exploration Rover/Spirit Review Board 2009
- Advisory Board, CEISMC Science, Learning, Design, Engineering, and Robotics Program 2011-2014
- Scientific Review Committee, WTEC Study on the International Assessment of R&D in Human-Robot Interaction (HRI) 2011-2012
- Board Member, CRA Committee on Widening Participation in Computing (CRA-WP) 2014 - present
  - Previously: CRA Committee on the Status of Women in Computing Research (CRA-W)
- Steering Committee, CRA Committee on Widening Participation in Computing (CRA-WP) 2018 - present
  - Previously: CRA Committee on the Status of Women in Computing Research (CRA-W)
- Scientific Review Committee & Vehicle Intelligence Group Leader, National Academies Panel on Mechanical Science and Engineering at the Army Research Laboratory 2015-2016
- Advisory Board Member, Medtech Women @ Southeastern Medical Device Association 2016-2019
- Advisory Member, DARPA Information Science and Technology (ISAT) Study Group 2016-2019
- Advisory Board Member, American Association for the Advancement of Science (AAAS) Committee on Opportunities in Science (COOS) Board 2017-2022
- AnitaB.org Academic Advisory Council 2017-2020
- Board of Directors Member, Computing Research Association (CRA) 2018-2021
- Board Member, Georgia State Workforce Development Board 2018-2021
- AAAI Executive Councilor, Association for the Advancement of Artificial Intelligence (AAAI) 2018-2021
- Board of Directors Member, Partnership on AI (PAI) 2019-present
- Board of Directors Member, Autodesk 2019-present

### ***IID. Industry/Research Lab Positions***

- **Computer Scientist**, Advanced Technology Section  
NASA's Jet Propulsion Laboratory, Pasadena, California 6/93-12/96
- **Information Systems Engineer**, Information Technologies Research Section  
NASA's Jet Propulsion Laboratory, Pasadena, California 1/97-2/99
- **Robotics Researcher**, Telerobotics Research and Applications Group  
NASA's Jet Propulsion Laboratory, Pasadena, California 2/99-9/02
- **Senior Robotics Researcher**, Mobility Systems Concept Development Section  
NASA's Jet Propulsion Laboratory, Pasadena, California 9/02-6/05
- **Visiting Researcher**, Microsoft Research  
Microsoft, Seattle, WA 6/16-7/16

### **III. HONORS AND RECOGNITIONS**

1. JPL Technology and Applications Program (TAP) Honor Award, 2000
2. Low Allen Award of Excellence for significant technical contributions, 2001

3. San Francisco Airport Museum Honoree, African-American technology trailblazers in Calif., 2002
4. Best Paper Award, 9th International Symposium on Robotics and Applications, 2002
5. JPL Edward Stone Award for Best Journal Publication, 2003
6. NASA Space Act Award for Path Planning Graphical User Interface, 2003
7. MIT Technology Review Top 100 Young Innovators of the Year, 2003
8. Engineer of the Year Award, Los Angeles Council of Engineers and Scientists, 2004
9. Allstate Insurance Distinguished Honoree for achievement in science, 2004
10. Selected participant, NAE Symposium on Frontiers of Engineering, 2004
11. NASA Space Act Award for Fuzzy Logic Engine for Space Applications, 2004
12. Selected presenter, National Academy of Science Frontiers of Science Symposium, 2005
13. California Women in Business Award for Science and Technology, 2005
14. IEEE Early Career Award in Robotics and Automation, 2005
15. 2006 Class of Young Global Leaders, 2006
16. Selected participant, NAE German-American Frontiers in Engineering Symposium, 2007
17. GT-ECE Outreach Award, 2008
18. GT-Faculty Woman of Distinction Award, 2008
19. NSBE Janice Lumpkin Educator of the Year Award, 2009
20. NAE Gilbreth Lectureship, 2010
21. GT Class of 1934 Outstanding Interdisciplinary Activities Award, 2013
22. GT Residential Life Cornerstone Award for Outstanding Contributions to the Community, 2013
23. A. Richard Newton Educator ABIE Award, Anita Borg Institute, 2014
24. The Root 100 Honoree, 2015
25. 23 of the most powerful women engineers in the world, Business Insider, 2015
26. Computer Research Association's A. Nico Habermann Award, 2016
27. Brown Engineering Alumni Medal, 2016
28. AAAS-Lemelson Invention Ambassador, 2016-2017
29. Atlanta Magazine's Women Making a Mark, 2017
30. Walker's Legacy #WLPower25 Atlanta Award, 2017
31. Women's Empowerment Ministry Innovator of the Year Award, 2018
32. Richard A. Tapia Achievement Award, 2018
33. Top 50 U.S. Women in Tech, Forbes, 2018
34. Thinkers50 Radars Class of 2019
35. Georgia Tech Outstanding Achievement in Research Innovation Award 2020
36. World's 50 Renowned Women in Robotics, Analytics Insight, 2020

## **IV. TEACHING**

### ***IV.A. Individual Student Guidance***

#### *IV.A.1. Ph.D. Students*

##### *Graduated*

1. Brian Smith (co-advisor), "Automatic Coordination and Deployment of Multiple-Robot Systems," Graduation: Spring 2009, Place of Employment: NASA's Jet Propulsion Laboratory, Google.
2. Sekou Remy, "How to Teach a New Robot New Tricks-An Interactive Learning Framework Applied to Service Robotics," Graduation: Fall 2009, Place of Employment: Clemson University, IBM Research.
3. Stephen Williams, "Vision-Based Robot Navigation in Arctic Terrain," Graduation: Summer 2011, Place of Employment: Bossa Nova Robotics.
4. Douglas Brooks, "Towards Quantifying Upper-Arm Rehabilitation Metrics for Children through Interaction with a Humanoid Robot," Graduation: Summer 2012, Place of Employment: Southwest Research Institute.
5. Chung Hyuk Park, "Robot-Based Haptic Perception and Telepresence for the Visually Impaired," Graduation: Summer 2012, Place of Employment: New York Institute of Technology, George Washington University.
6. Lonnie Parker, "Science-Centric Sampling Approaches of Geo-Physical Environments for Realistic Robot Navigation," Graduation: Summer 2012, Place of Employment: Naval Undersea Warfare Center (NUWC)
7. Gregorio Drayer, "Situation-Oriented Integration of Humans and Automation for the Operation of Regenerative Life Support Systems," Graduation: Fall 2013, Place of Employment: Mathworks.
8. Hae Won Park, "Robot Learners: Interactive Instance-Based Learning with Social Robots," Graduation: Spring 2014, Place of Employment: MIT.
9. Richard Coogle, "Using Multiple Agents in Uncertainty Minimization of Ablating Target Sources," Graduation: Fall 2014, Place of Employment: Georgia Tech Research Institute (GTRI).

10. Anthony Spears, “Localization Approaches for Under-Ice Autonomous Robotics Vehicles,” Graduation: Fall 2015, Place of Employment: Prioria Robotics.
11. Paul Robinette, “Developing Robot Behaviors that Impact Human-Robot Trust in Emergency Evacuation,” Graduation: Fall 2015, Place of Employment: Georgia Tech Research Institute (GTRI).
12. LaVonda Brown, “Developing an Engagement and Social Interaction Model for a Robotics Educational Agent,” Graduation: Fall 2015, Place of Employment: Louisiana State University.
13. Kevin DeMarco, “Underwater Human-Robot Interaction (UHRI) to Enable Human-Robot Teaming,” Graduation: Fall 2016, Place of Employment: Georgia Tech Research Institute (GTRI).
14. Sergio Garcia, “Coupling of an Objective and Quantifiable Methodology for Assessing Upper-Body Movements with Virtual Reality Gaming Platforms” Graduation: Spring 2017, Place of Employment: Georgia Tech Research Institute (GTRI).
15. Brittney English, “Designing an In-Home Scalable Robotic Arm and Tablet Gaming Suite for Rehabilitation Exercises for Neurological Disorders,” Graduation: Fall 2018, Place of Employment: SoarTech.
16. Giancarlo Valentin (co-advisor) “Wearable Interfaces for Symbolic Communication between Humans and Working Dogs,” Graduation: Spring 2019, Place of Employment: Intel.

#### *Current*

1. Jin Xu, Spring 2017 – present, “Mitigating Human Overtrust in Robotic Systems” Qualifier Passed: Spring 2019, Expected Graduation: Fall 2021.
2. Katelyn Fry, Summer 2017 – present, “Methodology for Assessment of Infant Kicking Patterns to Enable Early Diagnosis of Infants at Risk for Cerebral Palsy,” Qualifier Passed: Fall 2018, Expected Graduation: Fall 2021.
3. De’Aira Bryant, Fall 2017 – present, “Gender and Racial Bias Mitigation in AI,” Qualifier Passed: Spring 2019, Expected Graduation: Spring 2022.
4. Kantwon Rogers, Fall 2018 – present, “Deception and Trust in Socially Interactive Agents,” Qualifier Passed: Spring 2020, Expected Graduation: Spring 2023.
5. Shray Bansal (co-advisor), Spring 2019 – present, “A Bayesian Framework for Inferring Human-Robot Parallel Play,” Proposal Passed: Fall 2020, Expected Graduation: Fall 2021.
6. Victor Emeli, Spring 2019 – present, “Small Sample Size Learning of Spontaneous Kicking Motions of Infants,” Expected Graduation: Spring 2022.

#### *IV.A.2. M.S. Thesis Students*

1. Byron Johns, “Design and Control of a New Reconfigurable Robotic Mobility Platform,” M.S. Thesis Graduation: Spring 2007. Place of Employment: Lockheed Martin Missiles and Fire Control, Orlando, FL.
2. Antidio Viguria, “Deployment and Reconfiguration of Multi-Robotic Systems via Distributed Task Allocation Methods,” M.S. Thesis Graduation: Summer 2008. Place of Employment: Center for Aerospace Technology, Seville, Spain.
3. Matt Livianu, “Human-in-the-loop Neural Network Control of a Planetary Rover on Harsh Terrain,” M.S. Thesis Graduation: December 2008. Place of Employment: Boston Dynamics, Boston, MA.
4. Morenike Ajulo, “Interactive Text Response for Assistive Robotics in the Home,” M.S. Thesis Graduation: August 2010. Place of Employment: U.S. Air Force, Utah.
5. Douglas Brooks, “Control of Reconfigurability and Navigation of A Wheel-Legged Robot Based on Active Vision,” M.S. Thesis Graduation: Fall 2008. Place of Employment: Southwest Research Institute (SwRI).
6. Mason Nixon, “Utilization of Auditory Cues to Enhance Therapy for Children with Cerebral Palsy,” M.S. Thesis Graduation: August 2013. Place of Employment: Space and Missile Defense Command, Huntsville, AL.
7. Bi Ge, “Identifying Engagement from Joint Kinematics Data in Robot Therapy Prompt Interventions for Children with Autism Spectrum Disorder,” M.S. Thesis Graduation: Spring 2016. Place of Employment: Amazon, Seattle, WA.
8. Rabeya Jamshad, “Design of a crib mobile to support studies in the early detection of cerebral palsy,” M.S. Thesis Graduation: Spring 2019.

*IV.A.3. Undergraduate Research Students – Over 75 undergraduate students; Awards - 1<sup>st</sup> place – NSBE regional poster competition, Best Undergraduate Research Proposal – ECE Fair, People’s Choice Award – Intel Scholars competition, President's Undergraduate Research Awards, RESNA Design Competition Finalist, Intel-Cornell Cup Competition Finalists*

#### *IV.B. Other Teaching Activities*

1. Instruction Software: Artificial Intelligence Toolkit (Released in 2003) - An educational software package developed to train future scientists and engineers on advanced autonomy technologies and to enhance understanding and knowledge of three soft computing methods, namely fuzzy logic, neural networks, and genetic

algorithms. [http://www.openchannelsoftware.com/projects/AI\\_Toolkit](http://www.openchannelsoftware.com/projects/AI_Toolkit)

2. New Graduate Course Development: Implementation and Control of Robotic Systems - This graduate-level course was first developed and taught in Spring 2006. The focus of the course is to train students on some of the fundamental issues associated with robot control, from a biological perspective that forms the basis of many current developments in robotics. In the course design, students are immersed in understanding current state-of-the-art in autonomy, machine learning techniques, and human-robot interaction, to name a few.
3. Educational Software: Mars2020 Robotic Adventure Game - A futuristic game/simulation environment developed to introduce middle and high school students to the fundamentals of robotic programming. Over 80 middle school children were trained through various summer workshops during the active grant years 2007–11.
4. I-Natural Vertically Integrated Project Team – Instructed/Managed a multi-year multidisciplinary research team of undergraduate students tasked to design, build, and test interfaces that enable humans to naturally interact with robots (whether physical or virtual) in performing activities of daily living. Long-term goal was to enable significant advancement of large-scale design projects for eventual product commercialization (Jan 2011-May 2016). Awards include: 2012 Cornell Cup Finalist (<http://www.systemseng.cornell.edu/intel/>), 2016 Robot Art Honorable Mention (<http://robotart.org/>)
5. Techie-Trekie Living-Learning Community – Faculty host of living-learning community that focused on exploring space exploration opportunities and the limitations/hazards associated with future space colonization (Sept 2010-May 2013).
6. Opportunity Research Scholars (ORS) Faculty Advisor – Faculty advisor to undergraduate research team that focused on projects to challenge them in developing innovative software and hardware solutions to address robotic challenges (Aug 2010-May 2016).
7. IEEE Real World Engineering Projects – Accessible Apps: Decoding of the World for the Visually Impaired (Released in 2012). Designed curriculum for first year students that illustrates the real-world contributions engineers make to society by showcasing how they can improve the quality of life for individuals with visual impairments. This real world-engineering project enables students to expand access to the world for the visually impaired by coupling mobile device applications with auditory modality. <http://www.realworldengineering.org/index.php?page=project&n=1&project=20>
8. NSF Innovation Corps (I-Corps) Adjunct Faculty – Member of teaching team focused on helping university-led teams foster entrepreneurship that will lead to the commercialization of technology that has been supported previously by NSF-funded research. The I-Corps curriculum provides real-world, hands-on, immersive learning about what it takes to successfully transfer knowledge into products and processes that benefit society. ([http://www.nsf.gov/news/special\\_reports/i-corps/](http://www.nsf.gov/news/special_reports/i-corps/)) (April 2016 – June 2016).

## V. SCHOLARLY ACCOMPLISHMENTS

*\* Boldface font is used to identify co-authors who were students being advised by Professor Howard*

### **V.A. Published Books and Parts of Books**

1. E. Tunstel, H. Seraji, A. Howard, Chapter 11: “Soft Computing Approach to Safe Navigation of Autonomous Planetary Rovers,” *Intelligent Control Systems Using Soft Computing Methodologies*, Eds. Zilouchian and Jamshidi, CRC Press, 2001.
2. E. Tunstel, A. Howard, T. Huntsberger, A. Trebi-Ollenu, J. Dolan, “Applied Soft Computing Strategies for Autonomous Field Robotics,” *Autonomous Robotic Systems: Soft Computing and Hard Computing Methodologies and Applications*, Eds. Zhou, Moravall, and Ruan, vol. 116, pgs. 75-102, Physica-Verlag, 2003.
3. A. Howard, E. Tunstel, “Using Geospatial Information for Autonomous Systems Control,” *Frontiers of Geographic Information Technology*, Eds. Rana and Sharma, Springer Science, Dec. 2005.
4. A. Howard, E. Tunstel, “A Self-Contained Traversability Sensor for Safe Mobile Robot Guidance in Unknown Terrain,” *Applied Soft Computing Technologies: The Challenge of Complexity*, Abraham, A.; Baets, B.D.; Köppen, M.; Nickolay, B. (Eds.), Springer, May 2006.
5. A. Howard, E. Tunstel (Editors), *Intelligence for Space Robotics*, TSI Press, San Antonio, Texas, July 2006.
6. A. Howard, **S. Remy**, **C.H. Park**, **H.W. Park**, and **D. Brooks**, “Intelligent robotics for assistive healthcare and therapy,” *The Path to Autonomous Robots*; G. Sukhatme (Ed.), Springer Science, November 2008.
7. **S. Williams**, **D. Brooks**, A. Howard, “Robot Vision for Science-Driven Navigation in Challenging Arctic Environments,” *Robot Vision: New Research*; T. Matsuda (Ed.), Nova Science, 2009.
8. **S. García-Vergara**, **L. Brown**, **H.W. Park**, and Ayanna M. Howard, “Engaging Children in Play Therapy: The Coupling of Virtual Reality (VR) Games With Social Robotics,” *Serious Games, Alternative Realities, and Play Therapy*; A. Brooks, S. Braham, L. Jain (Eds.), Studies in Computational Intelligence (Springer SCI), 2013.

9. **G. E. Drayer** and A.M. Howard, "A Granular Sensor-Fusion Method for Regenerative Life Support Systems," *Multisensor Data Fusion: From Algorithms and Architectural Design to Applications*; H. Fourati (Ed.), CRC Press, 2015.
10. J. Borenstein, A. Howard, A. Wagner, "Pediatric Robotics and Ethics: The Robot is Ready to See You Now But Should It Be Trusted?" *Robot Ethics 2.0*, P. Lin, K. Abney, G. Bekey (Eds.), Oxford University Press, 2017.
11. **P. Robinette**, A.R. Wagner, A. Howard, "Investigating Human-Robot Trust in Emergency Scenarios: Methodological Lessons Learned," In R. Mittu, D. Sofge, A. Wagner, & W. Lawless, *Robust Intelligence and Trust in Autonomous Systems* (pp. 143-166). Boston: Springer, 2016.
12. **P. Robinette**, A. Howard, A.R. Wagner, "Conceptualizing Overtrust in Robots: Why Do People Trust a Robot That Previously Failed?," *Autonomy and Artificial Intelligence: A threat or savior?*, F. Lawles, R. Mittu, D. Sofge, S. Russell (Eds), Springer, November 2017.
13. A. Howard, Y.P. Chen, **C. H. Park**, "From Autism Spectrum Disorder to Cerebral Palsy: State-of-the-Art in Pediatric Therapy Robots," *Encyclopedia of Medical Robotics*, J. P. Desai (Ed.), World Scientific Publishing Company, pp. 241-261 (2018).
14. A. Howard, *Sex, Race, and Robots: Being Human in the Age of AI*, Amazon Audible, Sept. 2020.

## **V.B. Refereed Publications**

### *V.B.1. Refereed Journal Publications*

1. A. Howard, C. Padgett, "A generalized approach to real-time pattern recognition in sensed data," *Pattern Recognition*, vol. 32:12, pgs. 2069-2071, Dec. 1999.
2. A. Howard, G. Bekey, "Intelligent Learning for Deformable Object Manipulation," *Autonomous Robots*, 9 (1): pgs. 51-58, August 2000.
3. A. Howard, H. Seraji, "Vision-Based Terrain Characterization and Traversability Assessment," *Journal of Robotic Systems*, 18(10), pgs. 577-587, 2001.
4. A. Howard, H. Seraji, "An Intelligent Terrain-Based Navigation System for Planetary Rovers," *IEEE Robotics and Automation Magazine*, vol. 8, no. 4, pgs. 9-17, December 2001.
5. H. Seraji and A. Howard, "Behavior-Based Navigation on Challenging Terrain: A Fuzzy Logic Approach," *IEEE Transactions on Robotics and Automation*, 18(3), pgs. 308-321, June 2002.
6. E. Tunstel, A. Howard, H. Seraji, "Rule-based reasoning and neural network perception for safe off-road robot mobility," *Expert Systems*, 19(4), pgs. 191-200, Sept. 2002.
7. E. Tunstel, A. Howard, "Approximate Reasoning for Safety and Survivability of Planetary Rovers," *Fuzzy Sets and Systems*, vol. 134, no. 1, pgs. 27-46, Feb. 2003.
8. A. Howard, C. Padgett, "An Adaptive Learning Methodology for Intelligent Object Detection in Novel Imagery Data," *NeuroComputing*, vol. 51, pgs. 1-11, March 2003.
9. A. Howard, H. Seraji, "Multi-Sensor Terrain Classification for Safe Spacecraft Landing," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 40, Issue 4, pgs. 1122-1131, October 2004.
10. A. Howard, H. Seraji, B. Werger, "Global and Regional Path Planners for Integrated Planning and Navigation," *Journal of Robotic Systems*, vol. 22, no. 12, pgs. 767-778, December 2005.
11. Z. Dodds, L. Greenwald, A. Howard, S. Tejada, J. Weinberg, "Components, Curriculum, and Community: Robots and Robotics in Undergraduate AI Education," *AI Magazine*, Vol. 27, pgs. 11-22, Spring 2006.
12. A. Howard, "A Systematic Approach to Predict Performance of Human-Automation Systems," *IEEE Transactions on Systems, Man, and Cybernetics--Part C*, Vol. 37, No. 4, July 2007.
13. A. Howard, **L. Parker**, **B. Smith**, "A Learning Approach to Enable Locomotion of Multiple Robotic Agents Operating in Natural Terrain Environments," *International Journal of Intelligent Automation and Soft Computing*, Vol. 14(1), pgs. 47-59, 2008.
14. A. Howard, **S. Remy**, "Utilizing Virtual Environments to Enable Learning in Human-Robot Interaction Scenarios," *International Journal of Virtual Reality*, Vol. 7(1), pgs. 9-14, 2008.
15. **S. Remy**, A. Howard, "Learning Approaches Applied to Human-Robot Interaction for Space Missions," *International Journal of Intelligent Automation and Soft Computing*, Vol. 14, No. 3, pgs. 249-262, 2008.
16. **B. Smith**, M. Egerstedt, A. Howard, "Automatic Generation of Persistent Formations for Multi-Agent Networks Under Range Constraints," *ACM/Springer Mobile Networks and Applications Journal*, Vol. 14, No. 3, pgs. 322 – 335, 2009.
17. **B. Smith**, A. Howard, J. McNew, Jiuguang-Wang, M. Egerstedt, "Multi-robot deployment and coordination with Embedded Graph Grammars," *Autonomous Robots*, Vol. 26 (1), pgs. 79-98, January 2009.
18. **A. Viguria**, A. Howard, "An Integrated Approach for Achieving Multi-Robot Task Formations," *IEEE/ASME Transactions on Mechatronics*, Vol. 14 (2), pgs. 176-186, April 2009.



19. **S. Williams**, A. Howard, "Developing Monocular Visual Odometry and Pose Estimation for Arctic Environments," *Journal of Field Robotics*, Vol. 27(2), pgs. 145-157, March 2010.
20. **A. Viguria**, A. Howard, "Probabilistic Analysis of Market-Based Algorithms for Initial Robotic Formations," *International Journal of Robotics Research*, Vol. 29, No. 9, pgs. 1154–1172, August 2010.
21. **S. Williams**, **L. Parker**, A. Howard, "Calibration and Validation of Earth-observing Sensors using Deployable Surface-based Sensor Networks," *IEEE Journal of Selected Topics in Earth Observations and Remote Sensing*, Vol. 3, No. 4, pgs. 427-432, Dec. 2010.
22. **A. Howard**, **B. Jones**, N. Serrano, "An Integrated Sensing Approach for Entry, Descent, and Landing of a Robotic Spacecraft," *IEEE Trans. on Aerospace and Electronic Systems*, Vol. 47(1), pgs. 295-304, Jan. 2011.
23. M.B. Blake, **S. Remy**, A. Howard, "Towards Robotic Access to WWW Resources Using Service-Oriented Computing and Web Interfaces," *IEEE Robotics and Automation Magazine*, Vol. 18(2), pgs. 33-43, June 2011.
24. **D. Brooks**, A. Howard, "Quantifying Upper-Arm Rehabilitation Metrics for Children through Interaction with a Humanoid Robot," *Applied Bionics and Biomechanics*, Vol. 9(2), pgs. 157-172, 2012.
25. A. Howard, **C.H. Park**, **S. Remy**, "Using Haptic and Auditory Interaction Tools to Engage Students with Visual Impairments in Robot Programming Activities," *IEEE Transactions on Learning Technologies*, Vol. 5(1), pgs. 87-95, Jan 2012.
26. **S. Williams**, **L. Parker**, A. Howard, "Terrain Reconstruction of Glacial Surfaces via Robotic Surveying Techniques," *IEEE Robotics and Automation Magazine*, Vol. 10(4), pgs. 59-71, December 2012.
27. **C. H. Park**, A. M. Howard, "Telepresence Robotic Technology for Individuals with Visual Impairments Through Real-time Haptic Rendering," *Journal of Korea Robotics Society*, vol. 8(3), Sept. 2013.
28. R. Dorsey, **C.H. Park**, A. Howard "Developing the Capabilities of Blind and Visually Impaired Youth to Build and Program Robots," *Journal on Technology and Persons with Disabilities*, Vol. 1, pg. 57-69, 2014.
29. G. Drayer, A. Howard, "Modeling and Simulation of an Aquatic Habitat for Bioregenerative Life Support Research," *Acta Astronautica*, Volume 93, Pages 138–147, January 2014.
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103. **L. Brown**, A. Howard, "Engaging Children in Math Education using a Socially Interactive Humanoid Robot," *IEEE-RAS International Conference on Humanoid Robots*, Atlanta, GA, Oct. 2013.
104. **L. Brown**, A. Howard, "The Positive Effects of Verbal Encouragement in Mathematics Education Using A Social Robot," *IEEE Integrated STEM Education Conference*, Princeton, NJ, March 2014 (*Best Paper Award; 2020 Top 5 cited papers in 10-year history*).
105. **A. Spears**, M. West, T. Collins, A. Howard, "Determining Underwater Vehicle Movement from Sonar Data in Relatively Featureless Seafloor Tracking Missions," *IEEE Winter Applications of Computer Vision Conference*, Steamboat Springs, CO, March 2014.
106. **S. García-Vergara**, A. Howard, "Three-Dimensional Fitt's Law Model used to Predict Movement Time in Serious Games for Rehabilitation," *Human-Computer Interaction (HCI) International Conference*, Crete, Greece, June 2014.
107. **H. W. Park**, **R. Coogle**, A. Howard, "Using a Shared Tablet Workspace for Interactive Demonstrations during Human-Robot Learning Scenarios," *IEEE Int. Conf. on Robotics and Automation (ICRA)*, Hong Kong, China, June 2014.
108. **C.H. Park**, A. Howard, "Haptic Visualization of Real-World Environmental Data for Individuals with Visual Impairments," *Human-Computer Interaction (HCI) International Conference*, Crete, Greece, June 2014.
109. **G. Dreyer**, A. Howard, "Evaluation of an Introductory Embedded Systems Programming Module using Hands-on Learning Methods," *121st American Society for Engineering Education (ASEE) Annual Conference*, Indianapolis, IN, June 2014.
110. **L. Brown**, A. Howard, "A Real-Time Model to Assess Student Engagement during Interaction with Intelligent Educational Agents," *121st American Society for Engineering Education (ASEE) Annual Conference*, Indianapolis, IN, June 2014.

111. **H. W. Park**, A. Howard, "Engaging Children in Social Behavior: Interaction with a Robot Playmate Through Tablet-Based Apps," *Rehabilitation Eng. and Technology Society of North America (RESNA) Annual Conference*, Indianapolis, IN, June 2014.
112. J. MacCalla, A. Howard, "A Plush Switch for Accessing Tablet-Based Applications for Children with Mild to Severe Motor Limitations," *Rehabilitation Eng. and Technology Society of North America (RESNA) Annual Conference*, Indianapolis, IN, June 2014.
113. **L. Brown**, A. Howard, "Gestural Behavioral Implementation on a Humanoid Robotic Platform for Effective Social Interaction," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, Edinburgh, Scotland, August 2014.
114. **P. Robinette**, A. Wagner, A. Howard, "Assessment of Robot Guidance Modalities Conveying Instructions to Humans in Emergency Situations," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, Edinburgh, Scotland, August 2014.
115. **S. Garcia-Vergas**, M. Serrano, Y.P. Chen, A. Howard, "Developing a Baseline for Upper-Body Motor Skill Assessment using a Robotic Kinematic Model," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, Edinburgh, Scotland, August 2014.
116. C.H. Park, K. Wilson, A. Howard, "Pilot Study: Supplementing Surgical Training for Medical Students Using a Low-Cost Virtual Reality Simulator," *26th IEEE Int. Symposium on Computer-Based Medical Systems*, New York, May 2014.
117. **A. Spears**, M. West, B. Schmidt, T. Collins, and A. M. Howard, "Modification of the Yellowfin Autonomous Underwater Vehicle for Use in Under-Ice Missions," *AUVSI's Unmanned Systems*, Orlando, FL, May 2014.
118. **A. Spears**, M. West, T. Collins, and A. M. Howard, "Evaluation of Sonar and Video Data Collection Efforts in an Under-Ice Environment Using an Unmanned Underwater Vehicle," *IEEE Int. Conf. on Systems, Man, and Cybernetics*, San Diego, CA, May 2014.
119. **K. DeMarco**, M. West, and A. M. Howard, "Underwater Human-Robot Communication: A Case Study with Human Divers," *IEEE Int. Conf. on Systems, Man, and Cybernetics*, San Diego, CA, May 2014.
120. **A. Spears**, M. West, T. Collins, and A. M. Howard, "Acoustic Sonar and Video Sensor Fusion for Landmark Detection in an Under-Ice Environment," *IEEE OCEANS Conference*, St. John's, New Newfoundland, September 2014.
121. **A. Spears**, M. West, T. Collins, M. Meister, B. Schmidt, and A. M. Howard, "Design and Development of an Under-Ice Autonomous Underwater Vehicle for use in Polar Regions" *IEEE OCEANS Conference*, St. John's, New Newfoundland, September 2014.
122. **K. DeMarco**, M. West, and A. M. Howard, "Autonomous Robot-Diver Assistance through Joint Intention Theory," *IEEE OCEANS Conference*, St. John's, New Newfoundland, September 2014.
123. **B. English**, A. Howard, "Engagement Study of an Integrated Rehabilitation Robotic Tablet-Based Gaming System," *IEEE Int. Workshop on Advanced Robotics and its Social Impacts*, Evanston, IL, Sept. 2014.
124. A. Howard, J. MacCalla, "Pilot Study to Evaluate the Effectiveness of a Mobile-Based Therapy and Educational App for Children," *ACM Sensys Workshop on Mobile Medical Applications – Design and Development*, Memphis, TN, Nov. 2014.
125. **B. English**, A. Howard, "Encouraging Specific Intervention Motions via a Robotic System for Rehabilitation of Hand Function," *IEEE Symp. on Computational Intelligence in Robotic Rehabilitation and Assistive Technologies*, Orlando, Florida, Dec. 2014.
126. H. W. Park, A. Howard, "Robot Learners: Interactive Instance-Based Learning and Its Application to Therapeutic Tasks," *AI for Human-Robot Interaction, 2014 AAAI Fall Symposium*, Arlington, VA, Nov. 2014.
127. L. Conrad, A. Howard, "The Impact of a Robotics Summer Undergraduate Research Experience on Increasing the Pipeline to Graduate School," *American Society for Engineering Education (ASEE) Annual Conference*, Seattle, WA, June 2015.
128. **S. García-Vergara**, H. Li, A. Howard, "Increasing Super Pop VR™ Users' Intrinsic Motivation by Improving the Game's Esthetics," *Human-Computer Interaction (HCI) International Conference*, Los Angeles, CA, August 2015.
129. J. MacCalla, J. Xu, A. Howard, "Enhancing Self-Motivation through Design of an Accessible Math App for Children with Special Needs," *Human-Computer Interaction (HCI) International Conference*, Los Angeles, CA, August 2015.
130. C. H. Park, N. Pai, J. Bakthavatchalam, Y. Li, M. Jeon, A. Howard, "Robotic Framework for Music-based Emotional and Social Engagement with Children with Autism," *AAAI-15 Workshop on Artificial Intelligence Applied to Assistive Technologies and Smart Environments*, Austin, TX, Jan. 2015.

131. J. MacCalla, J. Xu, A. Howard, "Integration of Common Core Math Standards into Gaming Apps for Children with Motor Limitations," *Rehabilitation Eng. and Technology Society of North America (RESNA) Annual Conference*, Denver, CO, June 2015.
132. **A. Moreno**, C. Rozell, A. Howard, "Restricting Vocabulary Size in Pediatric Augmentative and Alternative Communication," *Rehabilitation Eng. and Technology Society of North America (RESNA) Annual Conference*, Denver, CO, June 2015.
133. H.W. Park, A. Howard, "Retrieving Experience: Interactive Instance-based Learning Methods for Building Robot Companions," *IEEE Int. Conf. on Robotics and Automation (ICRA)*, Seattle, WA, May 2015.
134. **L. Brown**, **S. Garcia-Vergas**, A. Howard, "Evaluating the Effect of Robot Feedback on Motor Skill Performance in Therapy Games," *IEEE Int. Conf. on Systems, Man, and Cybernetics*, Hong Kong, Oct. 2015.
135. C. H. Park, M. Jeon, A. Howard, "Robotic Framework with Multi-Modal Perception for Physio-Musical Interactive Therapy for Children with Autism," *5th Int. Conf. on Development and Learning and on Epigenetic Robotics*, Providence, RI, Aug 2015.
136. **P. Robinette**, A. Howard, and A. R. Wagner, "Timing is Key for Robot Trust Repair," *7th International Conference on Social Robotics (ICSR 2015)*, Paris, France, Oct. 2015.
137. **A. Spears**, M. West, M. Meister, C. Walker, J. Buffo, T. Collins, A. Howard, B. Schmidt, "Design and Antarctic Testing of the Icefin Vehicle," *IEEE OCEANS Conference*, Washington, DC., Oct. 2015.
138. **A. Spears**, M. West, T. Collins, A. Howard, "Automatic Texture and Anomaly Mapping in Under-Ice Video Datasets," *IEEE OCEANS Conference*, Washington, DC., Oct. 2015.
139. **A. Spears**, M. West, T. Collins, A. Howard, "Sonar and Video Fusion for Vehicle Trajectory Estimation in Under-Ice Environments," *IEEE OCEANS Conference*, Washington, DC., Oct. 2015.
140. **G. Valentin**, J. Alcaininho, M. Jackson, A. Howard, T. Starner, "Towards a canine-human communication system based on head gestures," *12th International Conference on Advances in Computing Entertainment (ACE)*, Malaysia, Nov. 2015.
141. **P. Robinette**, W. Li, R. Allen, A. Howard, A. Wagner, "Overtrust of Robots in Emergency Evacuation Scenarios," *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, New Zealand, March 2016.
142. **P. Cloutier**, H. W. Park, J. MacCalla, A. Howard, "It's All in the Eyes: Designing Facial Expressions for an Interactive Robot Therapy Coach for Children," *8th Cambridge Workshop on Universal Access and Assistive Technology*, Cambridge, UK, March 2016.
143. R. Zhang, J. Barnes, J. Ryan, M. Jeon, C. H. Park and A. Howard, "Musical Robots for Children with ASD using a Client-Server Architecture," *22nd Annual Int. Conference on Auditory Display*, Canberra, Australia, July 2016.
144. **P. Robinette**, A. Wagner, A. Howard, "Assessment of Robot to Human Instruction Conveyance Modalities Across Virtual, Remote and Physical Robot Presence," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, New York, NY, August 2016.
145. **S. Garcia-Vergara**, **L. Brown**, Y.P. Chen, A. Howard, "Increasing the Efficacy of Rehabilitation Protocols for Children via a Robotic Playmate Providing Real-time Corrective Feedback," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, New York, NY, August 2016.
146. M. Serrano, Y.P. Chen, A. Howard, P. Vela, "Automated Feet Detection for Clinical Gait Assessment," *Annual Int. Conf. of the IEEE Engineering in Medicine and Biology Society (EMBC'16)*, Orlando, FL, August 2016.
147. M. Serrano, Y.P. Chen, A. Howard, P. Vela, "Lower Limb Pose Estimation for Monitoring the Kicking Patterns of Infants," *Annual Int. Conf. of the IEEE Engineering in Medicine and Biology Society (EMBC'16)*, Orlando, FL, August 2016.
148. **G. Valentin**, "Creating Collar-sensed Motion Gestures for Dog-Human Communication in Service Applications," *20th International Symposium on Wearable Computers (ISWC)*, Heidelberg, Germany, Sept. 2016.
149. **K. DeMarco**, N. Toit, A.M. Howard, "Tracking Multiple Fragmented Objects with 2D Imaging Sonar," *IEEE Oceans Conference*, Monterey, CA, Sept. 2016.
150. **K. DeMarco**, A.M. Howard, "Classifying Objects in 2D Imaging Sonar via Tracking of Diver Fins," *IEEE Oceans Conference*, Monterey, CA, Sept. 2016.
151. **A. Spears**, M. West, B. Schmidt, T. Collins, A. Howard, "Under-ice Camera and Sonar Simulation for Visual Navigation," *IEEE Oceans Conference*, Monterey, CA, Sept. 2016.
152. **B. Ge**, H.W. Park, A. Howard, "Identifying Engagement from Joint Kinematics Data for Robot Therapy Prompt Interventions for Children with Autism Spectrum Disorder," *8th International Conference on Social Robotics (ICSR 2016)*, Kansas City, MO, Nov. 2016.



153. **D. Bryant, J. Boyd, J. Harris, M. Smith, S. García-Vergara,** Y-P. Chen, A. Howard, "An Infant Smart-Mobile System to Encourage Kicking Movements in Infants At-Risk of Cerebral Palsy," *IEEE International Workshop on Advanced Robotics and its Social Impacts*, Austin, TX, March, 2017.
154. A. Howard, C. Zhang, E. Horvitz, "Addressing Bias in Machine Learning Algorithms: A Pilot Study on Emotion Recognition for Intelligent Systems," *IEEE International Workshop on Advanced Robotics and its Social Impacts*, Austin, TX, March, 2017.
155. **B. English,** A. Howard, "The Effects of Musical Cues on Motor Learning Using a Robotic Wrist Rehabilitation System," *IEEE International Workshop on Advanced Robotics and its Social Impacts*, Austin, TX, March, 2017.
156. **J. Xu,** A. Howard, "Pilot Study for Examining Human-Robot Trust In Healthcare Interventions Involving Sensitive Personal Information," Rehabilitation Eng. and Technology Society of North America (RESNA) Annual Conference, New Orleans, LA, June 2017.
157. J. Barnes, M. FakhrHosseini, M. Jeon, C-H. Park, A. Howard, "The Influence of Robot Design on Acceptance of Social Robots," *International Conference on Ubiquitous Robots and Ambient Intelligence*, Korea, June 2017.
158. M FakhrHosseini, D. Lettinga, E. Vasey, Z. Zheng, M. Jeon, C-H. Park, A. Howard, "Both 'Look and Feel' Matter: Essential Factors for Robotic Companionship," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, Lisbon, Portugal, August 2017.
159. M. FakhrHosseini, J. Barnes, S. Hilliger, M. Jeon, C-H. Park, A. Howard, "Love at First Sight: Mere Exposure to Robot Appearance Leaves Impressions Similar to Interactions with Physical Robots," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, Lisbon, Portugal, August 2017.
160. **B. English,** A. Howard, "The Effects of Auditory and Visual Cues on Timing Synchronicity for Robotic Rehabilitation," *IEEE-RAS-EMBS International Conference on Rehabilitation Robotics (ICORR)*, July 2017.
161. E. Vasey, M. S. FakhrHosseini, Z. Zheng, C-H. Park, A. Howard, M. Jeon, "Development and Usability Testing of a Remote Control App for an Interactive Robot," *Human Factors and Ergonomics Society Annual Meeting*, Austin, Texas, Oct. 2017.
162. **B. English, A. Coates,** A. Howard, "Recognition of Gestural Behaviors Expressed by a Humanoid Robotic Platform for Teaching Affect Recognition to Children with Autism - A Healthy Subjects Pilot Study," *9th International Conference on Social Robotics*, Tsukuba, Japan, Nov. 2017.
163. **B. A. English,** A. Howard, "The Effects of Adjusting Task Difficulty on Learning Motor and Cognitive Aspects of a Multitasking Task," *IEEE Symposium Series on Computational Intelligence*, Honolulu, HI, Nov. 2017.
164. **B. Lee, J. Xu,** A. Howard, "Does Appearance Matter? Validating Engagement in Therapy Protocols with Socially Interactive Humanoid Robots," *IEEE Symposium Series on Computational Intelligence*, Honolulu, HI, Nov. 2017.
165. **J. Xu, D. Bryant,** Y.P. Chen, A. Howard, "Robot Therapist versus Human Therapist: Evaluating the Effect of Corrective Feedback on Human Motor Performance," *2018 International Symposium on Medical Robotics (ISMR)*, Atlanta, Georgia, March 2018.
166. **K. Fry,** Y.P. Chen, A. Howard, "Detection of Infant Motor Activity During Spontaneous Kicking Movements for Term and Preterm Infants Using Inertial Sensors," *Annual Int. Conf. of the IEEE Engineering in Medicine and Biology Society (EMBC'18)*, Honolulu, HI, July 2018.
167. **T. Ogunyale, D. Bryant,** A. Howard, "Does Removing Stereotype Priming Remove Bias? A Pilot Human-Robot Interaction Study," *5th Workshop on Fairness, Accountability, and Transparency in Machine Learning (FAT/ML 2018)*, Stockholm, Sweden, July 2018.
168. **J. Xu,** A. Howard, "The Impact of First Impressions on Human-Robot Trust During Problem-Solving Scenarios," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, Nanjing, China, August, 2018.
169. **J. Xu, D. Bryant,** A. Howard, "Would You Trust a Robot Therapist? Validating the Equivalency of Trust in Human-Robot Healthcare Scenarios," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, Nanjing, China, August 2018.
170. **J. Xu,** A. Howard, "Investigating the Relationship between Believability and Presence during Collaborative Cognitive Tasks with a Socially Interactive Robot," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, Nanjing, China, August 2018.
171. **D. Das, K. Fry,** A. Howard, "Vision-Based Detection of Simultaneous Kicking for Identifying Movement Characteristics of Infants At-Risk for Neuro-Disorders," *2018 IEEE Machine Learning and Applications Conference (IEEE ICMLA)*, Orlando, FL, December 2018.
172. **D. Bryant,** A. Howard, "A Comparative Analysis of Emotion-Detecting AI Systems with Respect to Algorithm Performance and Dataset Diversity," *AAAI/ACM Conference on AI, Ethics and Society*, Honolulu, HI, January 2019.

173. **R. Jamshad, K. Fry, Y.P Chen, A. Howard**, "Design of a Robotic Crib Mobile to Support Studies in the Early Detection of Cerebral Palsy," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, New Delhi, India, October 2019.
174. S. Ye, G. Neville, **M. Schrum**, M. Gombolay, S. Chernova, A. Howard "Human Trust After Robot Mistakes: Study of the Effects of Different Forms of Robot Communication," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, New Delhi, India, October 2019.
175. **D. Bryant**, J. Bornstein, A. Howard, "Why Should We Gender? The Effect of Robot Gendering and Occupational Stereotypes on Human Trust and Perceived Competency," *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Cambridge, UK, March 2020.
176. S. Bansal, **J. Xu**, A. Howard, C. Isbell, "Planning for Human-Robot Parallel Play via Bayesian Nash Equilibrium Inference," *Robotics: Science and Systems 2020*, July 2020.
177. **V. Emeli, K. Fry, A. Howard**, "Infant Kick Quality Detection to Support Physical Therapy and Early Detection of Cerebral Palsy: A Pilot Study," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, Aug. 2020
178. **J. Xu**, A. Howard, "Would you Take Advice from a Robot? Developing a Framework for Inferring Human-Robot Trust in Time-Sensitive Scenarios," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, Aug. 2020.
179. S. Ye, K. Feigh, A. Howard, "Learning in Motion: Dynamic Interactions for Increased Trust in Human-Robot Interaction Games," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, Aug. 2020.
180. **V. Emeli, K. Fry, A. Howard**, "Robotic System to Motivate Spontaneous Infant Kicking for Studies in Early Detection of Cerebral Palsy: A Pilot Study," *IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob)*, Nov. 2020.
181. **V. Emeli, K. Fry, A. Howard**, "Towards Long-Term Learning to Motivate Spontaneous Infant Kicking for Studies in Early Detection of Cerebral Palsy using a Robotic System: A Preliminary Study," *IEEE International Conference on Systems, Man, and Cybernetics*, Oct. 2020.
182. **J. Xu**, A. Howard, "How much do you Trust your Self-Driving Car? Exploring Human-Robot Trust in High-Risk Scenarios," *IEEE International Conference on Systems, Man, and Cybernetics*, Oct. 2020.

*V.B.3. Refereed Conference Short Papers, Late Breaking Reports and Posters*

1. A. Howard, H. Seraji, B. Werger, "Fuzzy Terrain-Based Path Planning for Planetary Rovers," *9<sup>th</sup> International Symposium on Robotics and Applications*, Honolulu, HI, May 2002.
2. E. Graham, A. Howard, "An Internship Model for Culturally Relevant Success for Native American High School Students," *American Geophysical Union (AGU) Fall Meeting*, San Francisco, CA, December 2004.
3. J. Walls, A. Howard, A. Homaifar, B. Kimiaghalam, "A Generalized Framework for Autonomous Formation Reconfiguration of Multiple Spacecrafts," *IEEE Aerospace Conference*, pgs. 397-406, Big Sky, Montana, March 2005.
4. A. Howard, E. Graham, "Crossing the technology gap between higher-learning and the classroom environment," *American Association for Higher Education National Conference*, Atlanta, March 2005.
5. R. Dorsey, A. Howard, "Examining the Effects of Technology-Based Learning on Children with Autism: A Case Study," *IEEE Intern. Conf. on Advanced Learning Technologies*, Athens, GA, July 2011.
6. **H.W. Park**, A. Howard, "Understanding child's play by sequencing play primitives and planning turn-taking strategy for a therapeutic robot playmate," *Pediatric Research Retreat: Frontiers in Pediatric Science*, Jan. 2012.
7. **D. Brooks**, A. Howard, "Quantifying physical therapy metrics through robotic assistance," *Pediatric Research Retreat: Frontiers in Pediatric Science*, January 2012.
8. A. Howard, **L. Roberts, S. Garcia**, R. Quarells, "Using Mixed Reality to Map Human Exercise Demonstrations to a Robot Exercise Coach," *Int. Symposium on Mixed and Augmented Reality*, Atlanta, GA, Nov. 2012.
9. **H. W. Park**, A. Howard, "Providing tablets as collaborative-task workspace for human-robot interaction," *8th ACM/IEEE International Conference on Human-Robot Interaction*, pgs: 207-208, Tokyo, Japan, March 2013.
10. Y-P Chen, S-Y Lee, A. Howard, "Effect of Virtual Reality on Upper Extremity Function in Children with Cerebral Palsy: A Meta-Analytic Review," *APTA Combined Sections Meeting 2014*, Nevada, February 2014.
11. **P. Robinette**, A. R. Wagner, and A. M. Howard, "Evaluating Social Responses of Humans to Evacuation Guidance Robots Using Web-Based Experiments," *Atlanta Workshop on Computational Social Science*, Atlanta, GA, 2013.
12. **S. Garcia-Vergara**, A. Howard, "An Objective Measure of Upper Extremity Kinematics in Children during Rehabilitation Sessions," *Atlanta Chapter Society for Neuroscience*, November 2013.
13. J. MacCalla, A. Howard, "A Mobile Device to Enable Access to Pediatric Therapy Apps for School-Age Children with Upper-Body Motor Impairments," *Pediatric Research Conference*, Atlanta, GA, April 2014.

14. Y-P Chen, **S. Garcia-Vergara**, A. Howard, "Test-retest reliability and minimal detectable change in the Super Pop VR™ game: A reaching kinematics movement analysis game," *APTA Combined Sections Meeting 2015*, Indiana, February 2015.
15. R. Zhang, M. Jeon, C. H. Park, A. Howard, "Robotic Sonification for Promoting Emotional and Social Interactions of Children with ASD," *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Portland, OR, March 2015.
16. Y-P Chen, **S. Garcia-Vergara**, A. Howard, "Effect of a home-based virtual reality intervention for children with cerebral palsy using SuperPop VR™ evaluation metrics – A feasibility study," *APTA NEXT Conference and Exposition*, National Harbor, MD, June 2015.
17. **B. Ge**, H.W. Park, A. Howard, "Learning Spatio-temporal Features of Prompting during Robot Intervention for Children with Autism," *IEEE Int. Conf. on Robotics and Automation (ICRA)*, Seattle, WA, May 2015.
18. H. J. Kim, T. Azad, C. H. Park, M. Jeon, and A. M. Howard, "Towards Physio-Musical Interactive Robotic Therapy for Children with Autism," *ICRA 2015 Workshop on Rehabilitation Robotics and Human-Robot Interaction*, Seattle, WA, May 2015.
19. E. Bermudez, M. Layman, E. Shepard, Y-P Chen, **S. Garcia-Vergara**, A. Howard, "Test-retest reliability and minimal detectable change in the Super Pop VR™ game in healthy children," *APTA Combined Sections Meeting*, Anaheim, CA, February 2016.
20. C.H. Park, M. Jeon, A. Howard, "Interactive Robotic Framework for Multi-sensory Therapy for Children with Autism Spectrum Disorder," *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, New Zealand, March 2016.
21. E. Danish, S. Epling, N. Smelser, Y. Zhang, Y. Chen, S. Garcia-Vergara, A. Howard, B. Weissman, J. Hallman-Cooper, "Virtual Reality Gaming System can be Used in Home Based Treatment in Children with Cerebral Palsy: A Case Study." *NEXT Conference*, American Physical Therapy Association, Nashville, TN, June 2016.
22. R. Bevill, C.H. Park, A. Howard, M. Jeon, "Behavioral Analysis Automation for Music-Based Robotic Therapy for Children with Autism Spectrum Disorder," *IEEE Int. Symp. on Robot and Human Interactive Communication (RO-MAN)*, New York, NY, August 2016.
23. **S. Garcia-Vergara**, **P. Robinette**, Y-P Chen, and A. Howard, "Validation of a Physical Rehabilitation Game using Markerless versus Marker-Based Motion Capture Systems," *Annual Int. Conf. of the IEEE Engineering in Medicine and Biology Society (EMBC'16)*, Orlando, FL, August 2016.
24. **A. Coates**, A. Howard, "Employing Gestural Behaviors and Visual Cues on a Humanoid Robot to Increase Affect Recognition among Children with Autism," *Annual Int. Conf. of the IEEE Engineering in Medicine and Biology Society (EMBC'16)*, Orlando, FL, August 2016.
25. C. Beegle, A. Rollins, J. Tyra, Y-P Chen, **S. Garcia-Vergara**, A. Howard, "Test-retest reliability and minimal detectable change in the Super Pop VR™ game: A reaching kinematics movement analysis game," *APTA Combined Sections Meeting 2017*, San Antonio, TX, February 2017.
26. Y. Chen, **S. Garcia-Vergara**, A. Howard, "Examining the Effect of Feedback from a Humanoid Robot on Reaching Kinematics in Children with Cerebral Palsy," *NEXT Conference*, American Physical Therapy Association, Boston, MA, June 2017, June 2017 (*Special Recognition Award*).
27. L Clackum, F. Fayyza, T. Gordon, K. Lansing, Y-P. Chen, **S. Garcia-Vergara**, A. Howard, B. Weissman, J. Hallman-Copper, "Effect of Rhythmic Auditory Stimulation in Virtual Reality Games to Improve Arm Function in Children with Cerebral Palsy: A Case Study," *NEXT Conference*, American Physical Therapy Association, Boston, MA, June 2017.
28. J. Borenstein, A. Wagner and A. Howard, "A Case Study in Caregiver Overtrust of Pediatric Healthcare Robots," *RSS Morality and Social Trust in Autonomy Workshop*, Boston, MA, July 2017.
29. L. Clackum, F. Fayyaz, T. Gordon, K. Lansing, Y.P. Chen, **S. Garcia-Vergara**, A. Howard, B. Weissman, J. Hallman-Cooper, "Effect of Functional Strength Training to Improve Arm Function in Children with Cerebral Palsy: A Case Study," *APTA Combined Sections Meeting*, New Orleans, LA, February 2018.
30. Y.P. Chen, **S. Garcia-Vergara**, A. Howard, "Evaluation of trials necessary to achieve performance stability in a reaching kinematics movement analysis game," *APTA Combined Sections Meeting*, New Orleans, LA, Feb. 2018.
31. **D. Bryant**, **J. Xu**, Y.P. Chen, A. Howard, "The Effect of Robot vs. Human Corrective Feedback on Children's Intrinsic Motivation," *ACM/IEEE International Conference on Human-Robot Interaction (HRI 2019) - LBR*, Daegu, Korea, March 2019.
32. **M. Schrum**, C.H. Park, A. Howard, "Humanoid Therapy Robot for Encouraging Exercise in Dementia Patients," *ACM/IEEE International Conference on Human-Robot Interaction (HRI 2019) - LBR*, Daegu, Korea, March 2019 (*Reviewer's Choice Award*).
33. **K. Rogers**, **D. Bryant**, A. Howard, "Robot Gendering: Influences on Trust, Occupational Competency, and Preference of Robot Over Human," *ACM CHI Conference on Human Factors in Computing Systems (CHI 2020) – LBR*, Honolulu, HI, April 2020.

34. M. Das, D. Marghitu, F. Jamshidi, A. Howard, M. Mandala, “Maximizing the Inclusiveness of Students with Disabilities in K 12 Formal and Informal STEM Education,” *HCI International 2020*, Copenhagen, Denmark, July 2020.

## **V.C. Other Publications**

### *V.C.1. Blog Posts and Invited Papers*

1. *Advanced Manufacturing Technology*, “Robotics Become Capable of Handling a Rubber Ball,” by Ayanna Howard and George Bekey, Nov. 2000
2. *The Hechinger Report*, “Why there’s no such thing as an ‘F’ in computer science,” by Ayanna Howard and Alison Derbenwick Miller, <https://hechingerreport.org/theres-no-thing-f-computer-science/>, December 2014.
3. *Science*, “Building the Bionic Women,” <http://www.sciencemag.org/careers/2014/10/building-bionic-woman>, October 2014.
4. *CIO Review*, “Big Data and Cloud Computing – The Next Step for Robot Intelligence,” <https://robotics.cioreview.com/cxoinsight/big-data-and-cloud-computing-the-next-step-for-robot-intelligence-nid-6018-cid-75.html>, 2015.
5. *American Scientist*, “Trust and Bias in Robots,” by Ayanna Howard and Jason Bornstein, <https://www.americanscientist.org/article/trust-and-bias-in-robots>, March-April 2019.
6. *NEXT Magazine*, “AI: The Fear, the Bias, and the Rewards,” <https://www.nutanix.com/go/next-magazine>, May 2019.
7. *TechTalks*, “Artificial intelligence: Where’s it going and where it’s not,” <https://bdtechtalks.com/2019/07/10/ai-opportunities-challenges/>, July 2019.
8. *MIT Sloan Management Review*, “The Regulation of AI — Should Organizations Be Worried?,” <https://sloanreview.mit.edu/article/the-regulation-of-ai-should-organizations-be-worried/>, July 2019.
9. *MIT Sloan Management Review*, “Demystifying the Intelligence of AI,” <https://sloanreview.mit.edu/article/demystifying-the-intelligence-of-ai/>, November 2019.
10. *MIT Sloan Management Review*, “AI, Robots, and Ethics in the Age of COVID-19,” by Ayanna Howard and Jason Bornstein, <https://sloanreview.mit.edu/article/ai-robots-and-ethics-in-the-age-of-covid-19/>, May 2020.
11. *MIT Sloan Management Review*, “Diversity in AI: The Invisible Men and Women,” by Ayanna Howard and Charles Isbell, <https://sloanreview.mit.edu/article/diversity-in-ai-the-invisible-men-and-women/>, Sept. 2020.
12. *Science Robotics*, “Robots are not immune to bias and injustice,” by A. Howard and M. Kennedy III, *Science Robotics* 18 Nov 2020: Vol. 5, Issue 48, DOI: 10.1126/scirobotics.abf1364

## **V.D. Presentations**

### *V.D.1 Invited Keynotes, Lectures, and Presentations*

1. *Tutorial*: “Robotics in the 21st Century,” Society of Women Engineers Regional Conference, Santa Monica, CA, February 2000.
2. *Tutorial*: “Hybrid Systems: Effective ways to combine genetic algorithms, neural networks, and fuzzy systems for real-world applications,” World Automation Congress, Maui, HI, June 2000.
3. *Speaker*: “Robotics and Artificial Intelligence,” Santa Monica City College, March/Sept. 2000.
4. *Speaker*: “Robotics Research at JPL,” North Carolina A&T Computer Science Colloquium, Greensboro, NC, Sept. 2001.
5. *Speaker*: “Neural Networks, Robotics, Fuzzy Logic, Machine Vision, What’s It All About?” 2<sup>nd</sup> Annual Careers in Math, Science, and Technology Conference, Pasadena, CA, Jan 2003.
6. *Panelist*: “Women Working on Mars,” National Engineers Week WebCast, Pasadena, CA, Jan 2003.
7. *Panelist*: “Doing Business with Private and Governmental Space Agencies,” California Space Authority, San Luis Obispo, CA, Feb. 2003.
8. *Invited Keynote*: Tinker AFB: “The Souls of Black Folk (100th Anniversary),” Oklahoma, March 2003.
9. *Speaker*: “Robots in Space,” Astronomy Guest Lecture Series, Santa Monica College, CA, May 2003.
10. *Workshop*: “Going to Mars ... JPL Style,” National Society of Black Engineers National Conference, Anaheim, CA, March 2003.
11. *Speaker*: “Autonomous Systems for Space Exploration,” Astronomy Colloquium, California State University, Los Angeles, CA, October 2003.
12. *Workshop*: “Space Explorers-Exploring the Universe,” Young African American Women’s Conf., Nov. 2003.
13. *Invited Speaker*: “Smart Robots for Space Exploration,” Pacific Science Center Space Lecture Series, Seattle,

- Dec. 2003.
14. *Invited Speaker*: “Robots for Space Exploration,” Chabot Science Center Distinguished Lecture Series, Oakland, CA, Feb. 2004.
  15. *Speaker*: “Artificial Intelligence for Space Robotics: How Smart is Smart?” University of Southern California, March 2004.
  16. *Speaker*: “Artificial Intelligence for Autonomous Control in Space,” von Karmen Lecture Series, Pasadena, CA, April 2004.
  17. *Speaker*: “Human-Inspired Techniques for Exploring Space,” Mt. Wilson Observatory Lecture Series, CA, April 2004.
  18. *Invited Speaker*: “Research in Behavior-Based Navigation Strategies for Planetary Robots,” Robotics, Controls, and Mechatronics Colloquium, University of Washington, May 2004.
  19. *Panelist*: “The Supersmart Robots are Coming,” Technology Summit for Business Solutions, Los Angeles, CA, June 2004.
  20. *Invited Panelist*: “Innovation and Transformation: Big New Ideas,” ideaFestival, Lexington, KY, Sept. 2004.
  21. *Invited Keynote*: Lexmark Corp: “From the Spacecraft to the Desktop - Technological Advances in Everyday Life,” Kentucky, Sept. 2004.
  22. *Invited Keynote*: UC San Diego: “Preparing for the Excitement in Engineering,” California, Oct. 2004.
  23. *Panelist*: “Life after High School Panel,” Governor’s Conference on Women and Families, CA, Dec. 2004.
  24. *Invited Speaker*: “Applying Human-Based Intelligence Techniques to Space Robotics,” Rowan University, Dec. 2004.
  25. *Invited Speaker*: “Robot Learning: Human-Inspired Techniques for Space and Field Robotics,” Annual National Academy of Engineering Meeting, April 2006.
  26. *Speaker*: “Human-Inspired Techniques for Robotic Control,” Neuromorphic Engineering Workshop, Telluride, CO, July 2006.
  27. *Invited Speaker*: “Human-Inspired Techniques: Smart Robots for Space Exploration,” Buena Vista University, Storm Lake, IA, Nov. 2006.
  28. *Invited Speaker*: “Robot Learning: Humanized Intelligence for Space and Field Robotics,” NAE German-American Frontiers of Engineering Conference, Hamburg, Germany, April 2007.
  29. *Speaker*: “Career Choice – Research in Space Robotics,” California Institute of Technology Targeted Minority Student Education Speaker Series, Nov. 2007.
  30. *Invited Speaker*: “The Design of Robotics and Their Societal Usefulness,” CUSP Conference, Chicago, Illinois, September 2008.
  31. *Invited Keynote*: “Traversing Through the Robotics World of Research,” Louis Stokes Alliance for Minority Participation Research Symposium, Roanoke, WV, April 2009.
  32. *Speaker*: “Intelligent robotics for assistive healthcare and therapy,” Morehouse MBRS Lecture Series, Atlanta, GA, Oct. 2009.
  33. *Invited Keynote*: “Lessons Learned Traversing Through the Robotics World of Research,” HBCU-UP National Research Conference, Atlanta, GA, Oct 2009.
  34. *Invited Speaker*: “Robots and Climate Change: Using a Science Network of Mobility Operators that Explore in Snow (SnoMotes),” University of Seville, Seville, Spain, Nov. 2009.
  35. *Invited Panel Speaker*: “Work-Life Flexibility for Faculty,” University of Washington, On-Ramps into Academia Workshop, Seattle, WA, Oct. 2009.
  36. Gilbreth Lectureship: “Robot Learning: Humanized Intelligence for Space and Field Robotics,” National Academy of Engineering’s National Meeting, Washington, DC, Feb 2010.
  37. *Invited Keynote*: “SnoMotes - Robotic Scientific Explorers for Understanding Climate Change,” Carolinas Women in Computing Conference (CRA-W/CDC Distinguished Lecturer), Columbia, SC, Nov. 2010.
  38. Virtual Scientist Series: “SnoMotes” Boston Public High School (Match, English, John O’Bryant), May 2010.
  39. *Invited Speaker*: “Sciencemakers - Dinosaurs Unearthed,” Detroit Science Museum, Detroit, MI, Feb. 2011.
  40. *Invited Panel Speaker*: “Navigating the Tenure and Promotion Process,” NSF Academic Career Mentoring Workshop, Los Angeles, CA, Feb. 2011.
  41. *Invited Keynote*: “Robotic Scientific Explorers for Understanding Climate Change,” Tapia Celebration of Diversity in Computing Conference, April 2011.
  42. *Invited Panel Speaker*: “Building Your Teaching Program,” University of Washington, On-Ramps into Academia Workshop, Seattle, WA, May 2011.
  43. *Invited Speaker*: “Robotic Scientific Explorers for Understanding Climate Change,” National Security Agency (NSA), Fort Meade, MD, Oct. 2011.
  44. *Invited Speaker*: “Atlanta: Connections in Science,” Fernbank Science Center, Atlanta, GA, Feb. 2012.
  45. *Invited Speaker*: “Roving the Icy Planet: Robotic Explorers for Understanding Climate Change,” JHU Applied Physics Laboratory, Laurel, MD, Feb. 2012.

46. *Panel Speaker*: “Launching a Research Program,” NSF Academic Career Mentoring Workshop, Atlanta, GA, March 2012.
47. *Invited Speaker*: “Roving the Icy Planet: Robotic Explorers for Understanding Climate Change,” John Hopkins University, Baltimore, MD, April 2012.
48. *Invited Keynote*: “Intelligent Robotics for Assistive Healthcare and Therapy,” IEEE Atlanta Section Regional Conference, Atlanta, GA, April 2012.
49. *Seminar Lecture*: “Assistive Robotics for Health and Education,” Morehouse College Pre-Freshmen Summer Science Program, Atlanta, GA, June 2012.
50. *Speaker*: “Music-Induced Interventions for Children with Cerebral Palsy,” Grammy Foundation - Atlanta Board Meeting, Atlanta, GA., September 2012.
51. *Invited Panel Speaker*: “Work-Life Balance for Faculty,” University of Washington, On-Ramps into Academia Workshop, Seattle, WA, Oct. 2012.
52. *Invited Keynote*: “Pediatric Robotics@Home, Work, Play,” Peach State LSAMP - 7th Annual Fall National Symposium and Research Conference, Athens, GA, Oct. 2012.
53. *Invited Speaker*: “Making Robots Smart(er),” TedTalk – TedYouth Day, New York, NY, Nov. 2012.
54. *Invited Speaker*: “Intelligent robotics for healthcare applications,” University of Arkansas-Little Rock Fall Colloquium, Little Rock, AK, Nov. 2012.
55. *Invited Keynote*: “Pediatric Robotics@Home, Work, Play,” MESA Conference, Georgia Perimeter College, Atlanta, Feb. 2013.
56. *Invited Speaker*: “Multi-Modal Communication Schemes for Human-Robot Interaction,” National Security Agency (NSA), Fort Meade, MD, March 2013.
57. *Traveling Speaker – U.S. Embassy Speaker and Specialist Program*: “Women in STEM, IT, and High Technology,” U.S. Embassy, Tel Aviv, Israel, April 19-24, 2013.
58. *Invited Speaker*: “Robots in Play: Human-Robot Interaction Schemes for Pediatric Therapy,” CMU Robotics Institute Seminar Series, Pittsburgh, PA, April 2013.
59. *Invited Speaker*: “Robots in Play: Human-Robot Interaction Schemes for Pediatric Therapy,” Marquette University, Milwaukee, WI, April 2013.
60. *Invited Keynote*: “Robotics and Assistive Technologies: Their Emerging Role in Healthcare,” 26th International FLAIRS Conference, St. Pete Beach, FL, May 2013.
61. *Invited Panel Speaker*: “Creating Robotic Systems That Assist Humanity,” SACNAS Annual Conference, San Antonio, TX, October 2013.
62. *Invited Panel Speaker*: “Building Your Professional Persona,” 2014 CRA-W Graduate Cohort Program, Santa Clara, CA, April 2014.
63. *Invited Speaker*: “Robotics and Assistive Technologies: Their Emerging Role in Healthcare,” Florida State University, Tallahassee, FL, April 2014.
64. *Invited Speaker*: “Robotics and Assistive Technologies: Their Emerging Role in Healthcare,” (IGERT) Seminar Series, University of Pittsburgh, Pittsburgh, PA, April 2014.
65. *Invited Session Speaker*: FiRST (Frontiers in Rehabilitation Science and Technology) : Bioengineering, American Physical Therapy Association Next Conference, Charlotte, NC, June 2014.
66. *Traveling Speaker – U.S. Embassy Speaker and Specialist Program*: “Robotics – Opportunities in the 21 century economy,” U.S. Embassy, India (Mumbai, Hyderabad, Chennai), August 31-Sept. 4th, 2013.
67. *Invited Technology Demonstrator*: Workshop on virtual reality, video games, and physical disabilities, Annual Meeting - American Academy for Cerebral Palsy and Developmental Medicine, San Diego, CA, Sept. 2014.
68. *Invited Session Keynote*: “Robots and Gaming – Therapy for Children with Disabilities,” IROS, Chicago, IL, Sept. 2014.
69. *Speaker*: “Breaking the Glass Ceiling: Lessons Learned Traversing Through the Robotics World,” IEEE RAS Women in Engineering Leadership Luncheon, Chicago, IL, Sept. 2014.
70. *Speaker*: “Real-Life Challenges for the Deployment of Healthcare Robotics,” IROS Workshop: Assistive Robotics for Individuals with Disabilities: HRI Issues and Beyond, Chicago, IL, Sept. 2014.
71. *Speaker*: “Research from the Academic Lab to Startup: The Growth Pains of Tech Transfer,” IROS Industry Forum: Perspectives on Entrepreneurship in Robotics and Automation, Chicago, IL, Sept. 2014.
72. *Invited Speaker*: “Robotics and Assistive Technologies: Their Emerging Role in Healthcare,” Brown University, Providence, RI, November 2014.
73. *Invited Speaker*: “Robotics and Assistive Technologies: Their Emerging Role in Healthcare,” Tufts University, Medford, MA, November 2014.
74. *Invited Speaker*: “Robot-Assisted Therapy for Children with Cerebral Palsy,” Texas A&M Robotics Symposium, College Station, TX, January 2015.
75. *Invited Speaker*: “Robot-Assisted Therapy for Children with Physical Disabilities,” University of Pennsylvania GRASP Seminar, Philadelphia, PA, February 2015.

76. *Invite Speaker*: “Robots – Their Role in Healthcare,” Seminar: Robot Invasion: Are Smart Products Running Your Life?, Cooper Hewitt, Smithsonian Design Museum, New York, NY, February 2015.
77. *Invited Keynote*: “Designing Robots for Real People,” HybridConf, Dublin, Ireland, August 2015.
78. *Panel Speaker*: “Undergraduate research: Making the most of a summer experience,” 2015 Southeast Women in Computing Conference, October 2015
79. *Speaker*: “The Problem with the Economy is that it Doesn’t Need You Anymore,” Platform Summit 2015, Atlanta, GA., October 2015.
80. *Invited Keynote*: “Breaking the Glass Ceiling: Lessons Learned Traversing Through the Robotics World,” Southeast Women in Computing Conference, Atlanta, GA, November 2015.
81. *Invited Keynote*: “Socially Assistive Robotics for Pediatric Therapy,” IEEE Conference on Research on Equity and Sustained Participation in Engineering, Computing, and Technology, Atlanta, GA, August 2016.
82. *Invited Speaker*: “Robots: The Mind in The Machine,” City Arts & Lectures, San Francisco, CA, Feb. 2016.
83. *Invited Speaker*: “The Role of Robotics for Engaging Children with Special Needs in Therapy,” University of Delaware, Newark, DE, March 2016.
84. *Invited Panel Speaker*: “What Can Every Entrepreneur Learn from Robots?” IEEE Global Entrepreneurship Summit (IEEE N3XT), Austin, TX, September 2016.
85. *Panel Speaker*: “Recent Winners – If I Only Knew Then, What I Know Now,” Small Business Innovation Research (SBIR) New England Regional Summit, Boston, MA, October 2016.
86. *Invited Keynote*: “Robotics and Artificial Intelligence,” Technical College System of Georgia Annual Leadership Conference, Savannah, GA, October 2016.
87. *Invited Panel Speaker*: “Furthering the Role of Women as Leaders in High Tech Small Businesses,” 2016 SBIR New England Regional Summit @ MIT, Boston, MA, October 2016.
88. *Invited Panel Speaker*: “The Implications of AI,” Chicago Ideas Festival, Chicago, IL, Oct. 2016.
89. *Panel Speaker*: “Paths and Strategies to Successful and Fulfilling Careers in Academia,” IEEE-WIE Leadership Summit Women, Atlanta, GA, November 2016.
90. *Invited Keynote*: “The Future of Robotics and Intelligent Machines”, California Educational Technology Professionals Association Annual Conference, Sacramento, CA, November 2016.
91. *Invited Panel Speaker*: “Ensuring your Visibility”, CRA-W Career Mentoring Workshop, Washington, D.C., November 2016.
92. *Invited Speaker*: “Bridging your interests: Combining Skills and Passion to Enable Innovation,” Women Empowered in Science, Technology, Engineering, and Mathematics Conf., Urbana-Champaign, IL, Jan. 2017.
93. *Invited Keynote*: “Designing Assistive Robots and Technologies for Pediatric Care,” AAAI Symposium on Educational Advances in Artificial Intelligence, San Francisco, CA, Feb. 2017.
94. *Invited Speaker*: “Socially Interactive Robots for Pediatric Therapy,” College of Computer and Information Science Talk - Northeastern University, Boston, MA, February 2017.
95. *Invited Panel Speaker*: “Personal Technologies for Aging,” TechSage State of the Science Conference, Atlanta, GA, March 2017.
96. *Invited Speaker*: “Robots – Improving our Future or Leading us to Doom,” Presidential Colloquium Series - Brown University, Providence, RI, March 2017.
97. *Invited Speaker*: “Socially Interactive Robots for Pediatric Therapy,” George Washington University BME Distinguished Lecture Series, Washington DC, April 2017.
98. *Invited Speaker*: “Designing Robots for the Inevitable Future,” Le Moyne College, Syracuse, NY, April 2017.
99. *Invited Workshop*: “AI and Its Social Impact,” Bloomberg Breakaway Summit, New York, NY, May, 2017.
100. *Invited Keynote*: “Research at the Intersection Between Robots and Play: Designing Robots for Children’s Healthcare,” *IEEE Int. Conf. on Robotics and Automation*, Singapore, May 2017
101. *Invited Speaker*: “The Engineers: Rise of the Robots,” Science Museum in London, London, June 2017.
102. *Invited Panel Speaker*, “Fairness, accountability and transparency in algorithmic decision making,” ACM Richard Tapia Celebration of Diversity in Computing, Atlanta, GA, October 2017.
103. *Invited Speaker*: “Designing Robots for the Future - A Journey from Innovation to Entrepreneurship,” Chambers Family Entrepreneurial Lectureship - Vanderbilt University, Nashville, TN, September 2017.
104. *Invited Keynote*: “The Value of You (U) in Computing: A Robot Story,” *Grace Hopper Celebration of Women in Computing*, Orlando, FL, October 2017.
105. *Invited Speaker*: “Engaging Children in STEM Education Through Interactive Robots, Tangibles, and Games,” *Learning and the Brain Conference*, Boston, MA, November 2017.
106. *Invited Panel Speaker*: “Distinguished Scholars Panel,” American Congress of Rehabilitation Medicine Conference – Early Career Development Course, October 2017.
107. *Invited Speaker*, “Research at the Intersection Between Robots and Play: Designing Robots for Children’s Healthcare,” Oregon State University, Corvallis, OR, November 2017.
108. *Invited Keynote*: “An Investigative Report: Examining Trust in Human-Robot Interaction Scenarios,”

- International Symposium on Multi-robot and Multi-Agent Systems*, Los Angeles, CA, December 2017.
109. *Invited Speaker*: “Pediatric Robotics: A Journey from Lab Innovations to Social Impact,” Carnegie Capital Science Evening Lecture, Washington D.C., December 2017.
  110. *Invited Keynote*: “The Value of Inclusive STEM Education: Robots and their Role in our Future”, The National Future of Education Technology Conference (FETC), Orlando, FL, January 2018.
  111. *Invited Speaker*: “Robots and Play: Designing Robots for Pediatric Healthcare.,” Clemson University, Clemson, SC, February 2018.
  112. *Panelist*: “Hacking the Racial Bias in Artificial Intelligence,” South by Southwest (SxSW), Austin, TX, March 2018.
  113. *Panelist*: “Founders Get Real,” YURHOUSE@South by Southwest (SxSW), Austin, TX, March 2018.
  114. *Invited Speaker*: “Pediatric Robotics – A Journey from the Lab to a Child’s Home,” Cray Distinguished Speaker - University of Minnesota, Minneapolis, MN, April 2018.
  115. *Invited Speaker*: “HCI & Robotics,” blackcomputeHER, Atlanta, GA, April 2018.
  116. *Invited Speaker*: “Should We Trust Robots and Should They Trust Us? Overtrust and Bias in the Modern Age,” Maurice and Yetta Glicksman Forum - Brown University, Providence, RI, May 2018.
  117. *Invited Panel Speaker*: “Can’t We All Just Get Along?” TechCrunch Robotics, San Francisco, CA, May 2018.
  118. *Speaker*: “Trust and Bias – Why should roboticists care?” ICRA 2018 Ethics Forum, Brisbane, Australia, May 2018.
  119. *Invited Speaker*: “Strategies for Developed Ethical AI,” Consortium for Socially Relevant Philosophy of/in Science and Engineering Conference, Atlanta, GA, June 2018.
  120. *Invited Speaker and Compère*: “Where Does the Social Responsibility lie in Human-Robot Interaction?” Deep Learning for Robotics Summit, San Francisco, CA, June 2018.
  121. *Invited Panelist*: “Plenary Panel: Diversity in Leadership,” CRA Conference at Snowbird, Snowbird, UT, July 2018.
  122. *U.S. Embassy Speaker and Specialist Program*: “Women in Tech,” U.S. Embassy, Cambodia and The Philippines, August 31-Sept. 8, 2018.
  123. *Invited Speaker*: “Should we trust robots and should they trust us?” TEDxBermuda, Bermuda, September 2018.
  124. *Invited Inaugural Speaker*: “The Impact of Robotics in Pediatric Health Care,” University of Kansas IHAWKE engineering lecture series, October 2018.
  125. *Invited Panelist*: “Generation Robot: What Does the Pervasive Growth of Robots in Society Mean for the Electronic Component Industry?” ECIA Executive Conference, October 2018.
  126. *Invited Speaker*: “Robots and Bias,” TEDWomen, [https://www.ted.com/talks/ayanna\\_howard\\_tedwomen\\_2018](https://www.ted.com/talks/ayanna_howard_tedwomen_2018), Palm Spring, CA, November 2018.
  127. *Invited Talk*: “Investigations into the Human-AI Trust Phenomenon,” NeurIPS, Montreal, QC, Dec. 2018.
  128. *Invited Keynote*: “Lessons Learned Traversing Through the Robotics World of Research,” NSF EFRI REM (Research Experience and Mentoring) Program, Washington, DC, March 2019.
  129. *Invited Talk*: “Are We Trusting our Robots Too Much? Examining Human-Robot Interactions in the Real World,” UCLA EE Speaker Seminar Series, May 2019.
  130. *Invited Talk*: “Roving for a Better World,” Apple World Wide Developer Conference (WWDC 2019), San Jose, CA, June 2019.
  131. *Invited Talk*: “Human-AI Collaboration for Decision-Making,” Microsoft Research Faculty Summit, Seattle, WA, July 2019.
  132. U.S. Embassy Speaker and Specialist Program: “MoonShot Morocco,” U.S. Embassy, Morocco, July 2019.
  133. *Invited Talk*: “Roving for a Better World,” Harvard CS Colloquium, September 2019.
  134. *Invited Talk*: “AI and The Future of Work – Making Us and AI Smarter Together,” AnitaB.org Technical Executive Forum (TEF), September 2019.
  135. U.S. Embassy Speaker and Specialist Program, U.S. Embassy - Brunei/Singapore, Oct. 2019.
  136. *Invited Keynote*: “Designing Socially Interactive Agents for Healthcare,” BayLearn Conference, Oct. 2019
  137. *Invited Talk*: “Roving for a Better World,” UW Allen School Distinguished Lecture, Seattle, December 2019.
  138. *Invited Keynote*: “Hacking the Human Bias in AI,” ACM FAT\*, Barcelona, Spain, January 2020.
  139. *Invited Plenary Panelist*: “COVID-19: How Roboticists Can Help,” ICRA 2020 Plenary Panel, May 2020.
  140. *Invited Panelist*: “How Artificial Intelligence and big data are playing a critical role in combating COVID-19,” United Nations – Habitat Webinar, June 2020.
  141. *Invited Panelist*: “The Ethical Questions Raised by the Rise of AI,” Reimagine the Future of Artificial Intelligence Virtual Summit, June 2020.
  142. *Invited Keynote*: “Designing Socially Interactive Robots for Early Intervention,” Cerebral Palsy Foundation/New Frontiers 2020 e-Health Summit, Aug. 2020.
  143. *Keynotes (through STERN Speaker Agency)*: <https://sternspeakers.com/speakers/ayanna-howard/> Nasper Global Leadership meeting, New Delhi, India, Sept. 2018; DevLearn Conference, Las Vegas, NV, October



2018; EdTechTeacher Innovation Summit, Boston, MA, Nov. 2018; HIMSS 2019, Orlando, FL, Feb. 2019; AUTM 2019 Annual Meeting, Dallas, TX, Feb. 2019; ATLAS 2019 Annual Conference, Dallas, TX, April 2019; .NEXT Conference, Anaheim, CA, May 2019; Baker McKenzie Global Employer Forum, New York, May 2019; Dealmaker New York, June 2019; Intelligent Automation Conference, Chicago, August 2019; HireVue Horizon 2019, San Diego, Sept. 2019; Devos Party, Ohio, Oct. 2019; TagTech, Florida, Nov. 2019.

#### *V.D.2. Media Interviews, Podcasts, and Highlights*

1. Science@NASA, "Brainy 'Bots," [http://science.nasa.gov/headlines/y2001/ast29may\\_1.htm](http://science.nasa.gov/headlines/y2001/ast29may_1.htm), May 2001.
2. Space Daily, "Send in the Robots," <http://www.spacer.com/news/robot-01b.html>, May 2001.
3. NASA Tech Briefs, "Who's Who at NASA," August 2001.
4. Mars Exploration Program, Mars Today, "JPL's Bionic Woman, Dr. Ayanna Howard," <http://marsprogram.jpl.nasa.gov/spotlight/ayannaHoward01.html>, August 2002.
5. Imagiverse Online Interview, "An Interview with Ayanna Howard," [http://www.imagiverse.org/interviews/ayannahoward/ayanna\\_howard\\_16\\_08\\_02.htm](http://www.imagiverse.org/interviews/ayannahoward/ayanna_howard_16_08_02.htm), August 2002.
6. NASA TV Live Interview, "JPL's Mechanical Women: Dr. Ayanna Howard," March 2003.
7. NASA First Person, "JPL robotics engineer Dr. Ayanna Howard," <http://www.jpl.nasa.gov/news/profiles/first-person.cfm>, August 2003.
8. MIT Technology Review Magazine, "Top 100 Young Bold Innovators of 2003," Oct. 2003.
9. Apogee Book Space Series, "Women of Space: Cool Careers on the Final Frontier," October 2003.
10. Brown University Daily Herald, "Brown graduate bridges human-machine divide," Nov. 2003.
11. Science Next Wave Online Magazine, "Fuzzy Logic: Adventures in Artificial Intelligence," Nov. 2003.
12. Diversity Careers Magazine, "Dr. Ayanna Howard, JPL Robotics Expert," January 2004.
13. NSBE Magazine, "JPL Engineer in a Class of Her Own," January/February 2004.
14. NASA Connect Video Series, "PSA: The Astronaut's Helper," <http://connect.larc.nasa.gov/programs/2003-2004/psa/index.html>, January 2004.
15. PBS Dragonfly TV, "Episodes of Scientific Adventures: Space", <http://pbskids.org/dragonflytv>, May 2004.
16. NASA Space Science and Technology Series, "Robots with Brains," [http://www.nasa.gov/missions/science/f\\_robotics.html](http://www.nasa.gov/missions/science/f_robotics.html), June 2004.
17. TIME Magazine, "Innovators/Artificial Intelligence: Forging the Future," <http://www.time.com/time/magazine/article/0,9171,1101040614-646372,00.html>, June 14, 2004.
18. IEEE Spectrum, "Dream Jobs 2005," February 2005.
19. CRISIS Magazine, "The Visionaries," May/June 2006.
20. CEISMC Gazette, "Georgia Tech's Bionic Woman," [http://www.ceismc.gatech.edu/gazette/2006\\_11/2006\\_11\\_howard.aspx](http://www.ceismc.gatech.edu/gazette/2006_11/2006_11_howard.aspx), November 2006.
21. PBS (KCTS Television), "The Innovators: Designing the Future," September 2007.
22. Associated Press, "New breed of robots could soon wander Antarctica" (recast at CNN, Washington Post, NPR, Fox News, Discovery Channel, Wired, CBSNews.com, and most popular read item at Yahoo!News in late May), Press Release: <http://www.gatech.edu/newsroom/release.html?id=1905&ga=1>, May 2008.
23. USA Today, "SnoMotes go to Ends of the Earth," November 2008.
24. Diverse Issues in Higher Education, "Emerging Scholars," January 2009.
25. GT Alumni Magazine, "Faculty Profile: Office Space," July 2009.
26. Upscale Magazine, "Design Essentials," Sept/Oct 2009.
27. CNN, "Robots to the Rescue: Search-and-rescue bots," March 2011.
28. Fox News 8 Cleveland, "Visually Impaired Children Learn to Program Robots," February 2012.
29. ASEE Prism Magazine, "Robots Unlimited: An Engineer Reaches for Mars, the Arctic, and Pediatrics," April 2012.
30. "Device Helps Children with Disabilities Access Tablets" (recast at CNET, Science360, Disability Scoop, Mobile & Apps, Engadget, The Engineer, ASEE First Bell, MedGadget), Press Release: <http://www.gatech.edu/newsroom/release.html?nid=176061>, Dec 2012.
31. MobileDIA, "This Scientist Shows Us How to Unlock Our Superpowers," November 2013.
32. Euroweb: Electronic Urban Report, "Aio Wireless: Tech Savvy & Proud: Dr. Ayanna Howard," Feb. 2014.
33. VIBE.com, "Interview: Dr. Ayanna Howard Talks 'RoboCop,' Coding And The Future Of Technology," <http://www.vibe.com/article/inteview-dr-ayanna-howard-talks-robocop-coding-and-future-technology>, Feb. 2014.
34. Sloan Science and Film, "Real Science: Robocop," <http://scienceandfilm.org/articles/reel-science-robocop/>, Feb. 2014.
35. VentureWell, "Profile: I-Corps Team Zyrobotics," <http://venturewell.org/profile-i-corpsteam-zyrobotics>, Sept. 2014.

36. Startup Directory, “Zyrobotics: A Tech Startup Enabling Freedom through Technology,” <http://startup.directory/zyrobotics-georgia-tech-startup>, September 2014.
37. Robohub, “25 Women in Robotics You Need to Know About,” <http://robohub.org/25-women-in-robotics-you-need-to-know-about-2014>
38. Georgia Tech Research Horizons, “VentureLab helps Georgia Tech faculty, staff, and students launch companies,” <http://www.rh.gatech.edu/features/hatched>, November 2014.
39. Business Insider, “23 of the most powerful women engineers in the world,” <http://www.businessinsider.com/most-powerful-women-engineers-in-2015-2015-5?#no-19-zyrobotics-ayanna-howard-5/>, May 2015.
40. Hansel Minutes, “March Is For Makers: Learning Robots with Dr. Ayanna Howard of Zyrobotics,” <http://hanselminutes.com/467/march-is-for-makers-learning-robots-with-dr-ayanna-howard-of-zyrobotics>, March 2015.
41. Hypepotamus, “Robotics Entrepreneur Helps Children With Disabilities,” <http://www.hypepotamus.com/companies/zyrobotics>, May 2015.
42. Google Economic Report, “The Web is Working for Georgia Businesses,” <http://www.google.com/economicimpact/reports/ga.html>, May 2015.
43. NPR – Atlanta, “Ga. Tech Engineer Creates Robotic Therapist Of The Future,” <http://wabe.org/post/ga-tech-engineer-creates-robotic-therapist-future>, June 2015.
44. The Internet of Unintended Consequences, “Radio Show: Robots with Dr. Ayanna Howard,” <http://tiouc.com/radio-show-082615-robots-with-dr-ayanna-howard>, September 2015.
45. The Root 100, [http://www.theroot.com/articles/lists/2015/09/the\\_root\\_100\\_2015/ayanna\\_howard.html](http://www.theroot.com/articles/lists/2015/09/the_root_100_2015/ayanna_howard.html), September 2015
46. GeorgiaTrend, “Trendsetters: Smart Fun” <http://www.georgiatrend.com/January-2016/Trendsetters-Smart-Fun>, January 2016.
47. Beyond Classically Beautiful, “Meet 5 Fearless Black Women Who Are Entrepreneurial Powerhouses,” <http://beyondclassicallybeautiful.com/2016/01/meet-5-fearless-black-women-who-are-entrepreneurial-powerhouses>, January 2016.
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106. Smart Business Dealmakers, “Robots, Automation And AI, Oh My!,” <https://www.smartbusinessdealmakers.com/articles/topic/drive-capital-robotics-and-automation-summit/>, Nov. 2019
107. Robohub, “Humanized Intelligence in Academia and Industry, with Ayanna Howard,” <https://robohub.org/humanized-intelligence-in-academia-and-industry/>, Sept. 2020
108. The Robot Report, “Black in Robotics’ Ayanna Howard, Monroe Kennedy on diversity and inclusion,” <https://www.therobotreport.com/black-in-robotics-ayanna-howard-diversity/>, Sept. 2020
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110. IEEE Computer Society, “Women in STEM with Ayanna Howard,” <https://www.computer.org/publications/tech-news/events/women-in-stem-ayanna-howard>, October 2020.

### *V.D.3. Conference Presentations with Proceedings (non-refereed)*

1. A.M. Howard, G.A. Bekey, “Prototype system for automated sorting and removal of bags of hazardous waste,” *Intelligent Robots and Computer Vision XV: Algorithms, Techniques, Active Vision and Materials Handling*, Proc. SPIE 2904, pgs. 271-277, Boston, MA, Nov. 1996.
2. A. Howard, **A. Viguria**, “Controlled Reconfiguration of Robotic Mobile Sensor Networks using Distributed Allocation Formalisms,” *NASA Science Technology Conference (NSTC)*, Adelphi, Maryland, June 2007.
3. A. Howard, “A Virtual Tutor to Promote Learning of Artificial Intelligence Techniques,” *International Workshop on Virtual Instructors*, Washington, DC, May 2007.
4. **S. Williams**, **A. Viguria**, A. M. Howard, “A Robotic Mobile Sensor Network for Achieving Scientific Measurements in Challenging Environments,” *NASA Science Technology Conference*, Maryland, June 2008.
5. **L. Parker**, A. M. Howard, “Real-Time Robotic Surveying for Unexplored Arctic Terrain,” *NASA Science Technology Conference*, Maryland, June 2010.

6. A. Howard, "Robots Learn to Play: Robots Emerging Role in Pediatric Therapy," *26th Int. Florida Artificial Intelligence Research Society Conference*, May 2013.
7. H. Javed, R. Bevill, M. Jeon, A. Howard, C.H. Park, "A Robotic Framework to Overcome Sensory Overload in Children on the Autism Spectrum: A Pilot Study," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vancouver, Canada, Sept. 2017.
8. R. Bevill, H. Javed, M. Jeon, A. Howard, C.H. Park, "An Interactive Robotic System for Promoting Social Engagement," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Vancouver, Canada, Sept. 2017.

#### *V.D.4. Conference Presentations without Proceedings*

1. "NASA Mars Rover: Behind the Scenes @JPL," National Society of Black Engineering National Conference, Dallas, TX, March 2004.
2. "Knowledge Transfer in the Classroom: Bridging the Gap Between Technology and Education...As Only NASA Can," National Organization for the Professional Advancement of Black Chemists and Chemical Engineers Annual Conference, San Diego, CA, April 2004.
3. **S. Williams**, A. Howard, "Evaluation of Visual Navigation Methods for Lunar Polar Rovers in Analogous Environments," IEEE ICRA Planetary Rovers Workshop, Anchorage, AL, May 2010.
4. A. Howard, "Intelligent Robotics for Assistive Healthcare and Therapy," SJTU-GT Bilateral Workshop, Shanghai Jiao Tong University, June 2010.
5. R. Dorsey, A. Howard, "AutiSTEM: Using Scratch to Explore Computational Thinking through Game-Design and Robotics for Students with Autism," Scratch@MIT 2012, Boston, MA, July 2012.
6. R. Dorsey, A. Howard, "Aropability: Accessible Robot Programming for Students with Disabilities," 30th Annual Closing The Gap Conference, Minneapolis, MN, October 2012.
7. R. Dorsey, **C.H. Park**, A. Howard, "Robotics for Youth with Visual Impairments," *28th Annual International Technology and Persons with Disabilities Conference*, San Diego, CA, February 2013.
8. A. Howard, **H.W. Park**, "Using Tablets and Robots to Engage Children with Disabilities in STEM," 31st Annual Closing The Gap Conference, Minneapolis, MN, October 2013.
9. D. Marghitu, T. Mitrano, A. Howard, "Bringing Accessibility into the Classroom: Practice and Proof," EDUCAUSE 2013 Annual Conference, Anaheim, CA, October 2013.
10. A. Howard, **S. García-Vergara**, **L. Brown**, **H.W. Park**, "Engaging Children in Rehabilitation through Virtual Reality Robot-Assisted Therapy Approaches," IROS 2013 Workshop on Healthcare Robotics and Wearable Systems, November 2013.
11. A. Howard, **H.W. Park**, "Using Tablet Devices to Engage Children with Disabilities in Robotic Educational Activities," 29th Annual International Technology and Persons with Disabilities Conference, San Diego, CA, March 2014.
12. **R. Coogle**, A. Howard, "A Multiagent Robotic System for In-Situ Modeling and Observation of Icebergs", American Geophysical Union's 46th annual Fall Meeting, San Francisco, CA, December 2013.

## **V.E. OTHER SCHOLARLY ACCOMPLISHMENTS**

### *V.E.1. Technology Innovations (filed by NASA as available for public licensing)*

1. Software for Fuzzy Logic Navigation of Mobile Robots, NASA NTR 21199, 2000
2. A Software Tool for Real-Time Terrain Classification, NASA NTR 21234, 2001
3. Cognitive Sensor Technology, NASA NTR 30283, 2001
4. Path Planning Graphical User Interface, NASA NTR 30320, 2001
5. Software for Rover Path Planning using Vision-Based Terrain Characteristics, NASA NTR 30744-CP, 2002
6. Software for Integrating Terrain Maps into Reactive Navigation Strategies, NASA NTR 30794, 2002
7. A Novel Reconfigurable Robot for Navigation on Rough Terrain, NASA NTR 30890, 2002
8. Artificial Intelligence Toolkit to Enhance Understanding and Knowledge, NASA NTR 40496, 2003
9. A Fuzzy Logic Engine for Space Applications, NASA NTR 40461, 2003

### *V.E.2. Patents*

1. Patent Application: G. Brant, A. Howard, "Reprise Encryption System for Digital Data," US 2005/0044388 A1, Feb. 24, 2005.
2. Provisional Patent: B. Johns, A. Howard, "BYROBOT – A New Reconfigurable Hybrid Legged-Wheeled Rover," USPTO serial number 61/034,721, March 7, 2008.
3. Patent: A. Howard, et. al. "Methods, Controllers and Computer Program Products for Accessibility to Computing Devices," Patent number: 10281986, Filed: May 2013, Issued: May 2019.

4. Patent: A. Howard, L. Brown, H.W. Park, "Method and System for Facilitating Interactions between A Robot and User," Patent number: 9846843, Filed: October 2014, Issued: December 2017.
5. Patent: A. Howard, J. Harding, "Toy Controller for Providing Input to a Computing Device," Patent number: 9120027, Filed: April 2014, Issued: September 2015.
6. Patent: A. Howard, J. Harding, "Toy Controller for Providing Input to a Computing Device," Patent number: 9310904, Filed: July 2015, Issued: April 2016.
7. Provisional Patent: A. Howard, H. W. Park, J. Harding, "Interactive Therapy Robot System," U.S. Provisional Patent Appl. No. 62/186,106, June 2015.
8. Patent: K. Fry, Y.P. Chen, Faraz, A. Howard, "Detection of Infant Motor Activity During Spontaneous Kicking Movements for Term and Preterm Infants Using Inertial Sensors," U.S. Patent Appl. No. 62/700,781, July 2018.

## VI. SERVICE

### VI.A. PROFESSIONAL CONTRIBUTIONS

#### *VI.A.1. Membership on Editorial Boards*

1. Associate Editor, *Int. Journal of Intelligent Automation and Soft Computing*, 2000-2014
2. Associate Editor, IEEE Robotics and Automation Conference Editorial Board, 2006-2013
3. Associate Editor, *IEEE Transactions on Systems, Man, and Cybernetics*, 2010-2016
4. Associate Editor, *IEEE Transactions on Robotics*, 2016-2019
5. Editor-in-Chief, IEEE Robotics and Automation Conference Editorial Board, 2018-2021

#### *VI.A.2. Ethics and Responsible Research Service*

1. Scientist Member, Georgia Tech Central Institutional Review Board, 2017 - present
2. AAAI Ethics Committee (Chair), 2018 – present
3. IEEE ICRA SPC Plagiarism Committee (Chair), 2019 – present
4. IEEE IROS SPC Plagiarism Committee, 2020
5. GT Research Misconduct Investigation Committee, 2020
6. Organizing Committee, Symposium on Ethical Management of AI: A French/US Approach, 2020
7. Expert Discussant, U.S. Comptroller General Forum on AI Oversight, Sept. 2020
8. Co-Lead and Co-Founder, Ethics, Technology & Human Interaction Center for Society and Social Change (ETHICS<sup>2</sup>), 2020 - present

#### *VI. A.3. Co-Chairs/Chairs and Program Committees*

1. Co-Chair, AAAI Symposium on Accessible Hands-on AI and Robotics Education Workshop, 2004
2. Tutorial Chair, Program Committee Member, IEEE Int. Conference on Systems, Man and Cybernetics, 2005
3. Program Committee, International Conference on Advanced Robotics (ICAR), 2005, 2007, 2009
4. Program Committee, IEEE/RSJ International Conference on Intelligent Robots, 2005, 2006
5. Program Committee, FLAIRS AI Education, 2006, 2007
6. Poster Program Committee, IEEE Int. Conference on Robotics and Automation, 2006
7. Program Committee, Int. Joint Conf. on Artificial Intelligence (IJCAI), 2007
8. Program Committee, IEEE Conference on System of Systems Engineering, 2007
9. Co-Chair, IEEE ICRA Workshop on Robotics in Challenging and Hazardous Environments, 2007
10. Program Committee, Int. Conf. on Robot Communication and Coordination, 2007, 2009
11. Organizing Committee, BIRS Workshop on Mentoring for Engineering Academia, 2006-2007
12. Finance Chair, 2008 IEEE International Conference on Robotics and Automation, 2006-2008
13. Local Organizing Chair, 2009 International Joint Conference on Neural Networks, 2008-2009
14. Program Committee, International School in Robotics and Intelligent Systems, 2009
15. Space Exploration Track Chair, 2010 Aerospace Systems Conference, 2008-2010
16. Program Committee, Robotics: Science and Systems Conference (RSS), 2009, 2017
17. Chair, HRI ICRA Robot Challenge, 2009
18. Local Organizing Chair, 2011 IEEE Int. Symp. on Robot and Human Interactive Communication, 2009-2011
19. Program Committee, Int. Symposium on Distributed Autonomous Robotic Systems, 2010, 2014
20. Program Committee, IEEE Int. Conference on Systems, Man and Cybernetics, 2006-07, 2013-14, 2016, 2017
21. Human-Machine Systems Program Co-Chair, IEEE Int. Conference on Systems, Man and Cybernetics, 2011
22. Program Committee, IEEE Biosignals and Biorobotics conference, 2014
23. Co-Chair, AAAI-13 and AAAI-14 Doctoral Consortium, 2013 – 2014
24. Program Committee, IEEE Int. Symp. on Safety, Security, and Rescue Robotics, 2012, 2013, 2015

25. Chair, 2014 ICRA Ph.D. Forum, 2014
26. Co-Chair, CRA-W Grad Cohort Workshop, 2014 – present
27. Program Committee, AAAI Doctoral Consortium, 2015, 2016
28. Program Co-Chair, International Conference on Social Robotics, 2016
29. Program Committee, IEEE Symp. on Computational Intelligence in Robotic Rehabilitation and Assistive Technologies, 2016
30. Program Committee, Robotics: Science and Systems Conference Workshops, 2016
31. Program Committee, IEEE Symposium Series on Computational Intelligence, 2016
32. Scientific Committee of the Science and Research Track, Annual International Technology and Persons with Disabilities Conference, 2017
33. Program Chair, IEEE Workshop on Advanced Robotics and its Social Impacts, 2017
34. Program Committee, IEEE Int. Symposium on Robot and Human Interactive Communication, 2016
35. Program Committee, HRI Pioneers Workshop, 2017
36. Poster Committee Member, Richard Tapia Celebration of Diversity in Computing Conference. 2017
37. Editor/Program Committee, IEEE Int. Symposium on Robot and Human Interactive Communication, 2017
38. Workshop Co-organizer, RSS Perception and Interaction Dynamics in Child-robot Interaction Workshop, 2017
39. Publicity Chair (US), ACM/IEEE International Conference on Human Robot Interaction (HRI), 2018
40. Tutorial and Workshop Co-Chair, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019
41. Co-Chair, Computing Research Association (CRA) Grad Cohort Workshop for Underrepresented Minorities + Persons with Disabilities (URMD), 2017 – present
42. Program Committee Member, AI for Multimodal Human Robot Interaction Workshop, 2018
43. Chair, Nomination Committee of the IEEE RAS Early Career Award, 2018
44. Chair, I.AM.GradComputing Workshop for Undergraduate Women in Computing, 2018 – present

#### *VI.A.4. Review Panels*

1. Reviewer, NASA NRA Cross Enterprise Technology Development Program (CETDP), 2000
2. NASA Faculty Awards for Research (FAR) Program, 2002
3. Reviewer, Louisiana Board of Regents R&D Grants Program, 2002, 2003, 2010, 2011
4. NSF Review Panels, 2004-2017
5. Reviewer, NASA Idaho EPSCoR Program, 2007
6. NSERC College of Reviewers, Canada Research Chairs Program, 2007, 2012
7. Reviewer, Health Systems Institute Seed Grant Program, 2007-2009
8. Grace Hopper Celebration of Women in Computing Scholarship Reviewer, 2007, 2008
9. Peer Reviewer, British Columbia Innovation Council, 2009
10. Reviewer, AAAS Research Competitiveness Program, 2009
11. National Research Council Study on NASA's Planetary Science Decadal, 2009-2010
12. Robotics: Science and Systems 2010 Workshop Evaluation Committee, 2010, 2012
13. U.S. Army Corps of Engineers' Engineer Research and Development Center peer reviewer, 2011
14. Peer Reviewer, Cognitive Sciences Call 2011 of the Vienna Science and Technology Fund, 2011
15. Reviewer, AAMAS-13 Doctoral Consortium, 2013
16. Reviewer, HIP-ACTSI Healthcare Innovation Program, 2012-2015
17. Reviewer, NASA Space Technology Research Fellowship (NSTRF), 2014
18. Committee Member, A Richard Newton ABIE Award Selection Committee, 2016, 2017
19. Committee Member, Anita Borg Institute A. Richard Newton Educator Award Selection Committee, 2016
20. Computing Innovation Fellows Reviewer, 2020
21. ACM/AAAI Allen Newell Award committee, 2020-2024

#### *VI.A.5. Reviewing Papers for Journals:*

1. *Journal of Intelligent Automation and Soft Computing*, 12 papers, 2002-2010
2. *Autonomous Robots*, 7 papers, 2003-2006, 2010
3. *EURASIP Journal on Applied Signal Processing*, 2 papers, 2003-2004
4. *IEEE Transactions on Robotics (and Automation)*, 9 papers, 2004-2011
5. *IEEE Transactions on Mobile Computing*, 1 paper, 2004
6. *IEEE Transactions on Evolutionary Computation*, 1 paper, 2004
7. *IEEE/ASME Transactions on Mechatronics*, 3 papers, 2004, 2008, 2015
8. *IEEE Transactions on Neural Networks*, 2 papers, 2005-2006
9. *Journal of Field Robotics*, 5 papers, 2006-2010

10. *IEEE Aerospace and Systems*, 3 papers, 2006, 2011, 2012
11. *Annals of Mathematics and Artificial Intelligence*, 1 paper, 2007
12. *IEEE Transactions on Systems, Man, and Cybernetics*, 6 papers, 2007-2011
13. *IEEE Transactions on Control Systems Technology*, 1 paper, 2008
14. *Educational Technology & Society Journal*, 1 paper, 2009
15. *Biomedical Signal Processing and Control*, 1 paper, 2010
16. *ACM Transactions on Intelligent Systems*, 2 paper, 2011
17. *Communications of the ACM*, 1 paper, 2012
18. *IEEE Transactions on Learning Technologies*, 2 papers, 2012, 2017
19. *International Journal of Robotics Research*, 1 paper, 2012
20. *Mechanism and Machine Theory*, 1 paper, 2013
21. *International Journal of Adaptive Control and Signal Processing*, 1 paper, 2013
22. *Sensors*, 1 paper, 2013
23. *Artificial Intelligence*, 2 papers, 2014, 2019
24. *Journal of Biomedical and Health Informatics*, 1 paper, 2014
25. *Robotica*, 1 paper, 2014
26. *Developmental Neurorehabilitation*, 1 paper, 2014
27. *Journal of Intelligent and Robotic Systems*, 1 paper, 2014
28. *IEEE Systems, Man, and Cybernetics Magazine*, 1 paper, 2015
29. *Journal of Aerospace Information Systems*, 1 paper, 2015
30. *Journal on Technology and Persons with Disabilities*, 5 papers, 2016-2017
31. *Computers in Biology and Medicine*, 1 paper, 2017
32. *Journal of NeuroEngineering and Rehabilitation*, 1 paper, 2017
33. *International Journal of Social Robotics*, 1 paper, 2017
34. *IEEE Robotics and Automation Magazine*, 1 paper, 2018
35. *IEEE Transactions on Affective Computing*, 1 paper, 2018
36. *Nature Machine Intelligence*, 1 paper, 2020

#### *VI.A.6. Reviewing Papers for Conferences:*

1. IEEE International Conference on Robotics and Automation, 18 papers, 2002-2015
2. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 21 papers, 2004-2017
3. International Conference on Advanced Robotics (ICAR), 9 papers, 2005-2009
4. IEEE Int. Conference on Systems, Man, and Cybernetics, 24 papers, 2005-2013
5. International Joint Conference on Artificial Intelligence, 15 papers, 2006
6. ACM/IEEE Conference on Human-Robot Interaction, 13 papers, 2006-2015, 2019
7. International Conf. on Robot Communication and Coordination, 4 papers, 2007
8. IEEE International Conference on System of Systems Engineering, 1 paper, 2007
9. Int. Joint Conference on Neural Networks, 5 papers, 2009
10. IEEE Conference on Automation Science and Engineering, 1 paper, 2011
11. American Society for Engineering Education Annual Conference (ASEE), 4 papers, 2013-2014
12. IEEE-RAS International Conference on Humanoid Robots, 3 papers, 2013-2015
13. IEEE Workshop on Advanced Robotics and its Social Impacts (ARSO), 1 paper, 2013
14. Int. Symposium on Artificial Intelligence, Robotics and Automation in Space (i-SAIRAS), 5 papers, 2014
15. IEEE Symposium Series on Computational Intelligence, 5 papers, 2014, 2017
16. HRI Pioneers Workshop, 7 papers, 2014-2016
16. RSS Workshop on Human-Robot Collaboration in Manufacturing, 2 papers, 2014
17. Rehabilitation Eng. and Technology Society of North America Annual Conference, 5 papers, 2015
18. IEEE-RAS-EMBS International Conference on Rehabilitation Robotics (ICORR), 1 paper, 2017
19. International Conference on Social Robotics (ICSR), 1 paper, 2017

#### *VI.A.7. Membership in Professional Organizations*

1. IEEE Senior Member, IEEE Robotics and Automation Society, 1999-present
2. Lifetime Member, Delta Sigma Theta Sorority, Inc., 2000-present
3. Member, American Association of Artificial Intelligence, 2002-2013, 2016-present
3. Senior Member, Society of Women Engineers, 2001-2005
4. Member, Georgia Electronic Design Center, 2005-present
5. Alumni Member, National Society of Black Engineers (NSBE), 2007-2014
6. Member, American Society for Engineering Education, 2011-present
7. Member, Rehabilitation Engineering and Assistive Technology Society, 2013-present



8. Member, Association for Computing Machinery (ACM), 2016-present
9. Member, American Association for the Advancement of Science (AAAS), 2017-present

## **VI.B. CAMPUS CONTRIBUTIONS**

### *VI.B.1. NASA JPL*

1. Council Member, JPL Director's Advisory Council for Women, 1999-2001
2. Technical Reviewer, JPL Director's Research and Development Fund, 2003, 2004
3. Reviewer, NASA Small Business Innovative Research Proposals, 2002-2004
4. Proposal Reviewer, NASA Graduate Student Research Program, 2004
5. Board Member, JPL Minority Education Initiatives Advisory Board, 2002-2005
6. Technical Recruiter, Jet Propulsion Laboratory, 1999-2005
7. JPL National Society of Black Engineers (NSBE) Convention Planning Team, 2003-2004
8. Speakers Bureau, Jet Propulsion Laboratory, 1998-2005

### *VI.B.2. University/College of Engineering, Georgia Institute of Technology*

9. Speaker, GT Mars Society, 2006
10. Speaker, GT AASU Success Panel, 2006
11. Speaker, GT Women's Resource Center Summer Speaker Series, 2006
12. Instructor, COE Technology, Engineering and Computing Camp, 2007
13. Keynote Speaker, Introduce a Girl to Engineering Day, 2006, 2008
14. ECE Faculty Representative, Robotics Ph.D. Program Committee, 2008 - present
15. Academic Senate/General Faculty Representative, 2006-2008
16. Lunch Keynote Speaker, College of Engineering Tech Camp, 2008
17. Freshman Experience - Hot Topic Dinner Speaker, April 2010
18. ThinkBig Faculty Leader, Techie-Trekie, Aug 2010-May 2013
19. Chair, Robotics PhD Program, Aug 2010-Aug 2013
20. GT X-College Committee, Nov 2010-2012
21. EVPR/Provost GT-FIRE Review Panelist, 2011, 2016
22. Co-Chair, GT Strategic Committee - Revitalizing Undergraduate Education, 2011 – 2012
23. COE Associate-to-Full Professor RPT Committee, 2012 - 2016
24. Associate Vice President for Research Search Committee, 2013
25. Committee Member, College of Computing MOOMS Working Group, 2012-2013
26. Grand Challenges Faculty Fellow, 2015 – 2017
27. Center for Serve-Learn-Sustain Associate/Assistant Director Search Committee, 2016
28. PRIME Research Experiences for Teachers Faculty Advisor, 2015-2017
29. Chief Technology Officer Search Committee, 2019
30. Search Committee, Ivan Allen Dean Search, 2019 – 2020
31. Institute Strategic Plan Steering Committee, 2019 – 2020
32. Chair, School of Cybersecurity and Privacy Task Force, 2020 - present

### *VI.B.3. School of ECE, Georgia Institute of Technology*

1. ECE Representative, Georgia Tech Engineering and Computing Career Conference, 2005, 2006
2. Georgia Tech Women in ECE (WECE) Talk on Graduate Schools, 2005
3. Member, ECE Undergraduate Committee, 2005, 2009-2010
4. ECE Representative, Family Affair, 2006
5. Instructor, ECE HOT Days Camp, 2006-2007
6. ECE Hightower Chair Search Committee, 2006
7. Presenter, ECE FIRST LEGO League Camp, 2007
8. ECE Strategic Plan Steering Committee, 2007
9. ECE Academic Career Panel, 2009
10. IEEE GT Student Chapter Faculty Presentation, December 2009
11. ECE FACES Fellows mentor – 2009-2012
12. CS4911 (Senior Design) team advisor, Spring 2010
13. ECE Faculty Presentation, September 2010
14. VIP (Vertically-Integrated Project) I-Natural team advisor, Jan 2010-May 2016
15. Member, ECE Chair Search Committee, 2011 – 2012
16. ECE Statutory Advisory Committee, 2012 – 2015
17. Member, ECE Graduate Committee, 2015-2018

## **VI.C. OTHER CONTRIBUTIONS**

1. Engineering Advisor, FIRST (2001-2002) - Nonprofit founded to inspire students through participation in annual robotics competitions.
2. Space Expert, Challenger Center for Space Science Education, Space Day 2002 - Program designed to encourage students through interaction with visiting space experts, 2002.
3. Computer Tutor, Restore, Inc. - Provided computer training for a battered women's shelter, 1998-2002.
4. Founder, Pasadena Delta Academy - Mentoring program for young teen girls focused on math, science, and technology education, 2001-2004
5. Co-Founder, JUMP (JPL Undergraduate Mentoring Program for Women) Provides mentoring support to undergraduate engineering students, 2001-2005
6. Consulting: Bitstar International, Seattle, WA - Developed neural network software package for financial forecasting, 2001.
7. Consulting: Veritouch Ltd., New York - Developed information security system using biometrics for database mining. Patent Filed "Reprise Encryption System for Digital Data" in 2003.
8. NASA SBIR Sub-topic Manager for Mars In-situ Robotics Technology, 2003-2005
9. NSF ADVANCE Visiting Scholar, Electrical Engineering Department (Robotics, Automation, Control, and Mechatronics Group), University of Washington. Host: Dr. D. Denton/Dr. E. Riskin, May 2004.
10. Presenter: "Cool Jobs in Engineering," IEEE Engineers Week Global Marathon, March 2006.
11. Academic Mentor, Committee on Status of Women in Computing Research Distributed Mentor Project, 2007.
12. Career Coach, NSF ADVANCE Cross-Disciplinary Initiative for Minority Women Faculty Conf., April 2008.
13. Morehouse College Minority Biomedical Research Support-Research Initiative for Scientific Enhancement Mentor, 2009-2010.
14. Virtual Scientist guest lecturer - Match Charter Schools, English High School, John D. O' Bryant School of Math and Science, Boston, MA., March 2010.
15. Guest Presenter at Various K-12 schools (2005 – present): West Contra Costa Unified School District, Grady High School, Chamblee Middle School, Montgomery Elementary School, Ralph J. Bunche Middle School, Annual Back to School with the HistoryMakers, etc.
16. Member, IDA/DARPA Defense Science Study Group (DSSG), 2014-2015
17. Consulting: Future of AI – AI advisor on YouTube documentary series produced by Robert Downey Jr. examining the implications of AI on our society, 2018-2019
18. Consulting: Google AI Impact Challenge (<https://ai.google/social-good/impact-challenge/>) - Expert Reviewer for \$25M grant funding pool, 2018-2019
19. Judge, Google Science Fair (<https://www.google-sciencefair.com/competition/judges>), 2017-2018
20. Testimony before Congress, Hearing before the House Judiciary Subcommittee on Courts, Intellectual Property and the Internet, <https://judiciary.house.gov/legislation/hearings/lost-einsteins-lack-diversity-patent-inventorship-and-impact-america-s>, March 2019
21. XPrize AI for Good Global Summit, AI Technologies to Achieve Gender Equity Track, Expert, 2020

## **VII. GRANTS AND CONTRACTS**

### **VII.A. AS PRINCIPAL OR CO-PRINCIPAL INVESTIGATOR**

#### *VII.A.1. NASA JPL*

1. Title: Software Tool for Automated Selection of Spacecraft Landing Site  
Organization: NASA/ Code R  
Contract Period: Aug. 2000 – Dec. 2000  
Amount Requested/Funded: \$100K
2. Title: Safe Navigation of Planetary Rovers on Challenging Terrains  
Organization: NASA Cross Enterprise Technology Program  
Contract Period: Sept. 2000 – Sept. 2001  
Amount Requested/Funded: \$500K (\$200K allotted as Co-PI)
3. Title: Autonomous Reasoning for Safe Landing  
Organization: JPL Director's Research and Development Fund  
Contract Period: Sept. 2001 – Sept. 2002

Amount Requested/Funded: \$180K (\$100K allotted as Co-PI)

4. Title: Intelligent Sensors for Planetary Exploration  
Organization: JPL Spontaneous Concepts  
Contract Period: Jan. 2001 – Sept. 2001  
Amount Requested/Funded: \$30K
5. Title: Vehicle Subsystem/Autonomous Precision Landing  
Organization: NASA HEDS  
Contract Period: Sept. 2001 – Sept. 2002  
Amount Requested/Funded: \$150K
6. Title: Multi-Sensor Hazard Avoidance  
Organization: NASA Mars Technology Program  
Contract Period: Sept. 2001 – Sept. 2002  
Amount Requested/Funded: \$300K (\$140K allotted as Co-PI)
7. Title: Evolvable, Adaptable, Reconfigurable (EVADR) Software Architecture for Vision-Based Applications  
Organization: NASA Exploration Team Program  
Contract Period: Sept. 2001 – Sept. 2002  
Amount Requested/Funded: \$200K
8. Title: Human-Equivalent Navigation for Autonomous Planetary Rovers  
Organization: NASA Exploration Team (NEXT) Program  
Contract Period: Sept. 2002 – Sept. 2003  
Amount Requested/Funded: \$150K (\$80K allotted as Co-PI)
9. Title: Artificial Intelligence Toolkit to Enhance Understanding and Knowledge  
Organization: JPL Spontaneous Concept  
Contract Period: Jan. 2003 – Sept. 2003  
Amount Requested/Funded: \$25K
10. Title: Multi-Sensor Hazard Assessment and Safe Site Selection  
Organization: NASA Mars Exploration Program Advanced Technologies  
Contract Period: June 2004 – June 2005  
Amount Requested/Funded: \$298K (\$100K allotted as Co-PI)

*VII.A.2. Georgia Institute of Technology*

1. Title: A Synergistic Approach for Maximizing Human Automation System Performance (HumAnS)  
Organization: Draper University IR&D Program  
Contract Period: June 2004 - June 2006  
Amount Requested/Funded: \$191K
2. Title: Intensive Human-Robot Interaction Workshops for Learning and Knowledge Transfer  
Organization: JPL – NASA ESMD Program Office  
Contract Period: December 2005 – December 2006  
Amount Requested/Funded: \$65K
3. Title: Reconfigurable Sensor Networks for Fault-Tolerant In-Situ Sampling  
Organization: NASA Earth Science Technology Office  
Contract Period: September 2006 – September 2010  
Amount Requested/Funded: \$777K
4. Title: Autonomous Robot Manipulation for Therapeutic Play  
Organization: RIM@GT Seed Grant  
Contract Period: August 2007 – May 2008  
Amount Requested/Funded: \$25K (PI: Charles Kemp - BME, \$12.5K allotted as Co-PI)

5. Title: Popularizing Computing in the Mainstream (PC2MAIN)  
 Organization: National Science Foundation  
 Contract Period: March 2007 – Dec 2011  
 Amount Requested/Funded: \$600K (PI: Georgetown University, \$160K allotted as Co-PI)
6. Title: Robot Learning from Teleoperative-Based Instruction and Multimodal Interaction  
 Organization: National Science Foundation  
 Contract Period: Aug 2007 – Aug 2011  
 Amount Requested/Funded: \$826K
7. Title: Collaborative Research: Advancing Robotics for Societal Impact (ARTSI)  
 Organization: National Science Foundation  
 Contract Period: Oct 2007 – Oct 2010  
 Amount Requested/Funded: \$162K
8. Title: Design Workshop to Solve National Problems of Interest through Diversity of Thought  
 Organization: Proctor and Gamble Higher Education Grant Program  
 Contract Period: Jan 2009 – March 2011  
 Amount Requested/Funded: \$10K
9. Title: Lunar Robotics and Colonization Summer Science Camp  
 Organization: Exxon-Mobil/Bernard Harris Foundation  
 Contract Period: Jan 2009 – Dec 2009  
 Amount Requested/Funded: \$74K
10. Title: Travel Support for 2009/2010 IJCAI Robotics Workshop and Exhibition  
 Organization: National Science Foundation (through AAAI as sponsored program office)  
 Contract Period: Sept 2009 – July 2011  
 Amount Requested/Funded: \$55K
11. Title: Accessible Robotic Programming for Students with Disabilities  
 Organization: National Science Foundation  
 Contract Period: Feb 2010 – Feb 2013  
 Amount Requested/Funded: \$497K
12. Title: VR-in-a-Box: Surgical Simulator - Supplementing Surgical Training for medical students and residents using a low-cost virtual reality simulator with real-time haptic feedback  
 Organization: HIP-ACTSI Healthcare Innovation Seed Grant Program  
 Contract Period: Dec 2011 – Dec 2012  
 Amount Requested/Funded: \$31K
13. Title: Music-Induced Virtual Reality Interventions for Children with Cerebral Palsy  
 Organization: GRAMMY Foundation Grants Program  
 Contract Period: March 2012 – March 2013  
 Amount Requested/Funded: \$17K
14. Title: Embedded Systems Programming Curriculum for Vertically-Integrated Projects  
 Sponsor: Intel  
 Contract Period: May 2012 - May 2014  
 Amount Requested/Funded: \$21K
16. Title: TabAccess: A Wireless Controller for Tablet Accessibility  
 Organization: I-Corps Program - National Science Foundation  
 Contract Period: June 2012 – June 2013  
 Amount Requested/Funded: \$50K
15. Title: NRI-Small: Robot Movement for Patient Improvement – Therapeutic Rehabilitation for Children with Disabilities

Organization: National Science Foundation  
Contract Period: September 2012 – September 2015  
Amount Requested/Funded: \$632K

16. Title: An Assistive Input Device for Tablet Accessibility for Children with Motor Impairments  
Organization: Atlanta Pediatric Device Consortium  
Contract Period: October 2012 – August 2013  
Amount Requested/Funded: \$25K
17. Title: TabAccess Phase I/IIA/IIB  
Organization: Georgia Research Alliance VentureLab Award  
Contract Period: January 2013 – December 2015  
Amount Requested/Funded: \$132K
18. Title: REU Site: Summer Undergraduate Research in Engineering (SURE)  
Organization: National Science Foundation  
Contract Period: March 2013 – March 2016  
Amount Requested/Funded: \$444K
19. Title: Travel Support for AAAI-2013 Doctoral Consortium  
Organization: National Science Foundation (through AAAI as sponsored program office)  
Contract Period: May 2013 – May 2014  
Amount Requested/Funded: \$17K
20. Title: An Accessible Robotic Platform for Children with Disabilities  
Organization: National Science Foundation  
Contract Period: April 2014 – October 2015  
Amount Requested/Funded: \$197K
21. Title: Effectiveness of Rhythmic Auditory Stimulation in Virtual Reality Games for Improving Upper-Arm Function in Children with Cerebral Palsy  
Organization: Center for Transforming Pediatric Healthcare Delivery  
Contract Period: August 2014 – August 2015  
Amount Requested/Funded: \$50K
22. Title: NRT: Accessibility, Rehabilitation and Movement Science (ARMS): An Interdisciplinary Traineeship Program in Human-Centered Robotics  
Organization: National Science Foundation  
Contract Period: September 2015 – September 2021  
Amount Requested/Funded: \$2.9M
23. Title: Comprehensive Training Opportunity for Future Engineers  
Organization: Georgia Tech (GT-FIRE Award)  
Contract Period: June 2015 – June 2017  
Amount Requested/Funded: \$32K
22. Title: The Role of Technology for Empowering Children with Disabilities Worldwide  
Organization: GA Board of Regents (USG World Summit Research Proposal Award)  
Contract Period: October 2015  
Amount Requested/Funded: \$5K
23. Title: Effectiveness of Functional Strength Training in Virtual Reality Games for Improving Arm Function in Children with Cerebral Palsy – A Pilot Sequential Multiple Assignment Randomized Trial (SMART) Design  
Organization: HIP/ ACTSI Research Seed Grant  
Contract Period: Jan. 2016 – Jan. 2017  
Amount Requested/Funded: \$25K (PI: Yu-Ping Chen, \$9K allotted as Co-PI)
24. Title: Developing human-machine systems that actively calibrate a user's trust  
Organization: Air Force Office of Scientific Research

Contract Period: December 2016 – December 2019  
Amount Requested/Funded: \$763K (PI: Alan Wagner, \$380K allotted as Co-PI)

25. Title: REU Site: Summer Undergraduate Research in Engineering (SURE) - Robotics  
Organization: National Science Foundation  
Contract Period: March 2018 – March 2021  
Amount Requested/Funded: \$288K
26. Title: Improving the Academic Matriculation of Undergraduate Women in Graduate Computing (I.AM.GradComputing) Workshop  
Organization: exploreCSR: Google Computer Science Research Grant  
Research Focused Workshops for Women  
Contract Period: September 2018 – September 2020  
Amount Requested/Funded: \$53K
27. Title: EAGER: An Accessible Coding Curriculum for Engaging Underserved Students with Special Needs in Afterschool Programs  
Organization: National Science Foundation  
Contract Period: September 2018 – August 2020  
Amount Requested/Funded: \$300K
28. Title: EAGER: Pilot Study on Bias and Trust in AI Systems  
Organization: National Science Foundation  
Contract Period: October 2018 – February 2020  
Amount Requested/Funded: \$75K
29. Title: An Inclusive Workshop to Develop Best Practices and Guidelines for Fairness, Ethics, Accountability, and Transparency in Computer and Information Science and Engineering  
Organization: National Science Foundation  
Contract Period: March 2019 – February 2021  
Amount Requested/Funded: \$100K

#### **VII.B. AS INVESTIGATOR OR COLLABORATOR**

1. Title: Guidance, Navigation, Control (GN&C) Technology for Small Body Proximity Operations and Landing  
Organization: JPL Research and Technology Development Fund  
Contract Period: Sept. 2003 – Sept. 2004  
Amount Requested/Funded: \$400K (\$50K allotted as Investigator)
2. Title: Steep Terrain Access Robot  
Organization: JPL Research and Technology Development Fund  
Contract Period: Sept. 2003 – Sept. 2004  
Amount Requested/Funded: \$250K (\$10K allotted as Investigator)
3. Title: Development of DARWIN Humanoid Robots for Education, Research and Outreach  
Organization: National Science Foundation  
Contract Period: April 2011 – April 2012  
Amount Requested/Funded: \$400K (PI: Virginia Tech, \$13.7K allotted as Collaborator)
4. Title: SBIR Phase I/IB/II: An Accessible Platform for Engaging Children with Motor Impairments in the Classroom Environment  
Organization: National Science Foundation  
Contract Period: January 2015 – March 2018  
Amount Requested/Funded: \$930K (PI: Zyrobotics)