



An Interview with Ayanna Howard

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DOI: [10.1145/3175502.3175505](https://doi.org/10.1145/3175502.3175505)

Abstract

This column is the fifth in our series profiling senior AI researchers. This month focuses on Ayanna Howard.

Introduction

Our fifth profile for the interview series is Ayanna Howard, Professor and Linda J. and Mark C. Smith Endowed Chair in the School of Electrical and Computer Engineering at the Georgia Institute of Technology.

Bio



Figure 1: Ayanna Howard

Ayanna Howard, Ph.D. is Professor and Linda J. and Mark C. Smith Endowed Chair in the School of Electrical and Computer Engineering at the Georgia Institute of Technology. As an educator, researcher, and innovator,

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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 200 peer-reviewed publications in a number of projects - from assistive robots in the home to AI-powered STEM apps for children with diverse learning needs. She has over 20 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, her M.S.E.E. from the University of Southern California, her M.B.A. from the Drucker Graduate School of Management, and her 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 and recognized as one of the 23 most powerful women engineers in the world by Business Insider. In 2013, she also founded Zyrobotics, which is currently licensing technology derived from her research and has released their first suite of STEM educational products to engage children of all abilities. From 1993-2005, Dr. Howard was at NASA's Jet Propulsion Laboratory. 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.

Getting to know Ayanna Howard

How did you become interested in Computer Science and AI?

I first became interested in robotics as a young, impressionable, middle school girl. My motivation was the television series called *The Bionic Women* — my goal in life, at that time, was to gain the skills necessary to build the bionic women. I figured that I had to acquire combined skill sets in engineering and computer science in order to accomplish that goal. With respect to AI, I became interested in AI after my junior year in college, when I was required to design my first neural network during my third NASA summer internship in 1992. I quickly saw that, if I could combine the power of AI with Robotics, I could enable the ambitious dreams of my youth.

What was your most difficult professional decision and why?

The most difficult professional decision I had to make, in the past, was to leave NASA and pursue robotics research as an academic. The primary place I'd worked at from 1990 until 2005 was at NASA. I'd grown over those 15 years in my technical job positions from summer intern to computer scientist (after college graduation) to information systems engineer, robotics researcher, and then senior robotics researcher. And then, I was faced with the realization that, in order to push my ambitious goals in robotics, I needed more freedom to pursue robotics applications outside of space exploration. The difficulty was, I still enjoyed the space robotics research efforts I was leading at NASA, but I also felt a need to expand beyond my intellectual comfort zone.

What professional achievement are you most proud of?

The professional achievement I am proudest of is founding of a startup company, Zyrobotics, which has commercialized educational products based on technology licensed from my lab at Georgia Tech. I'm most proud of this achievement because it allowed me to combine all of the hard-knock lessons I've learned in designing artificial intelligence algorithms, adaptive user interfaces, and human-robot interaction schemes with a real-world

application that has large societal impact — that of engaging children of diverse abilities in STEM education, including coding.

What do you wish you had known as a Ph.D. student or early researcher?

As a Ph.D. student, I wish I had known that finding a social support group is just as important to your academic growth as finding an academic/research home. I consider myself a fairly stubborn person — I consider words of discouragement a challenge to prove others wrong. But psychological death by a thousand cuts (i.e., words of negativism) is a reality for many early researchers. A social support group helps to balance the negativism that others, sometimes unconsciously, subject others too.

What would you have chosen as your career if you hadn't gone into CS?

If I hadn't gone into the field of Robotics/AI, I would have chosen a career as a forensic scientist. I've always loved puzzles and in forensic science, as a career, I would have focused on solving life puzzles based on the physical evidence. The data doesn't lie (although, as we know, you can bias the data so it seems to).

What is a "typical" day like for you?

Although I have no "typical" day, I can categorize my activities into five main buckets, in no priority order: 1) human-human interactions, 2) experiments and deployments, 3) writing (including emails), 4) life balance activities, and 5) thinking/research activities. Human-human interactions involve everything from meeting with my students to talking with special education teachers to one-on-one observations in the pediatric clinic. Experiments and deployments involve everything from running a participant study to evaluating the statistics associated with a study hypothesis. Writing involves reviewing my students' publication drafts, writing proposals, and, of course, addressing email action items. Life-balance activities include achieving my daily exercise goals as well as ensuring I don't miss any important family events. Finally thinking/research activities covers anything related

to coding up a new algorithm, consulting with my company, or jotting down a new research concept on a scrap of paper.

What is the most interesting project you are currently involved with?

The most interesting project that I currently lead involves an investigation in developing robot therapy interventions for young children with motor disabilities. For this project, we have developed an interactive therapy game called SuperPop VR that requires children to play within a virtual environment based on a therapist-designed protocol. A robot playmate interacts with each child during game play and provides both corrective and motivational feedback. An example of corrective feedback is when the robot physically shows the child how to interact with the game at the correct movement speed (as compared to a normative data profile). An example of motivational feedback is when the robot, through social interaction, encourages the child when they have accomplished their therapy exercise goal. We've currently deployed the system in pilot studies with children with Cerebral Palsy and have shown positive changes with respect to their kinematic outcome metrics. We're pushing the state-of-the-art in this space by incorporating additional factors for enhancing the long-term engagement through adaptation of both the therapy protocol as well as the robot behaviors.

How do you balance being involved in so many different aspects of the AI community?

In order for me to become involved in any new AI initiative and still maintain a healthy work-life balance, I ask myself: Is this initiative something that's important to me and aligned with my value system; Can I provide a unique perspective to this initiative that would help to make a difference; Is it as important or more important than other initiatives I'm involved in; and Is there a current activity that I can replace so I have time to commit to the initiative now or in the near-future. If the answer is yes to all those questions, then I'm usually able to find an optimal balance of involvement in the different AI initiatives of interest.

What is your favorite CS or AI-related movie or book and why?

My favorite AI-related movie is *The Matrix*. What fascinates me about *The Matrix* is the symbiotic relationship that exists between humans and intelligent agents (both virtual and physical). One entity can not seem to exist without the other. And operating in the physical world is much more difficult than operating in the virtual, although most agents don't realize that difference until they accept the decision to navigate in both types of worlds.



Help us determine who should be in the AI Matters spotlight!

If you have suggestions for who we should profile next, please feel free to contact us via email at aimatters@sigai.acm.org.
