

## SPOTLIGHT

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### JPL's Bionic Woman, Dr. Ayanna Howard



Dr. Ayanna Howard with the Safe Navigation Rover, designed to assess the terrain using human-based logic and choose safe paths accordingly.

Local girl Dr. Ayanna Howard can thank the Bionic Woman, her all-time favorite TV series, for inspiring her to get where she is today. The 30-year-old robotics research engineer is now JPL's own bionic woman. She is currently a member of the Telerobotics Research and Applications Group at JPL and the principal investigator of the Safe Rover Navigation Task-a technology development effort that will enable planetary rovers to safely and independently traverse long distances on challenging terrains such as those found on Mars.

"My task is to think of innovative technology for future robotics missions and implement them," said Howard, who specializes in artificial intelligence and is leading an effort to create intelligent technology for space applications. In her work on robotic exploration, Howard and her team look to human behavior for inspiration on working rovers. One of their current projects is developing an advanced Entry, Descent and Landing software application that enables spacecraft to analyze terrain and decide, just as a human pilot would, where to land.

"In essence, we're mapping human intelligence to an aerial robot, such as a robotic spacecraft," Howard said. The application will be used to look at virtual terrain on Mars and help select the landing site for future missions beyond Mars Smart Lander, launching in 2009.

Howard, who lives with her husband and two dogs in Altadena, Calif., was first inspired to be a biomedical engineer and build artificial limbs for humans when she was

12 years old. When she entered high school, she found that she loved math, but did not enjoy biology and chemistry.



Howard with a robotic arm.

"The whole concept of being a medical doctor was not appealing, but I took a real interest in this thing called robotics, which was fairly new, and not a lot of people were doing it," she said. Howard entered her robotics career, thrilled that she could do what she enjoyed most-work with artificial body components instead of human limbs and parts. Making her days on the job both challenging and rewarding are the discoveries she makes while trying to get artificial parts to work together. Every day brings new challenges and rewards as Howard strives to make artificial parts work in unison.

"Being adaptable to change is very important, but it is also very difficult because all paths don't necessarily work," she said. "You have to be open to change, be able to take input from other people and be flexible."

Howard is especially enthusiastic about sharing her career with the community. In addition to speaking about robotics at local schools, she reads to children at the library and helps put on cultural arts festivals where unknown artists interact with the community.

"All the community efforts actually occupy a lot of my time, but it's fun because they're social activities with a good cause," she said. "It's really rewarding when you hear people say, 'Maybe I can do that,' or 'I want to hear more.' I look at their eyes and think, 'Wow, I really do have a cool job.'"

One of Howard's priorities is to get young girls interested in learning math and science and pursuing related careers. She is often concerned when she sees young girls lose hope with those subjects after having one or two bad experiences.



"I think the problem is that parents and teachers allow girls to give up at such an early age, so I try to encourage them," Howard said. "They don't have to be nerds that wear glasses and pocket protectors; they can still join clubs and play sports. Getting into math or science

Ayanna Howard at the Safe  
Landing testbed

doesn't mean they have to lose  
their social aspects."

She also advises girls who want to get into robotics to have a strong sense of determination.

"Don't let anybody persuade you to give up," she said. "Know that you are going to experience adversity, but deal with it and keep going in spite of it."

Howard, who started at JPL as a summer intern in 1990, went to public school in Pasadena before earning a bachelor's degree in electrical engineering at Brown University in Providence, R.I. She then studied robotics and artificial intelligence at the University of Southern California in Los Angeles, where she earned both her master's degree and doctorate in electrical engineering. She has published over 30 journal articles, conference papers and technical reports on the successful use of artificial intelligence techniques in a number of projects. In 2001, she received the Lew Allen Award for Excellence in Research-the highest possible honor at JPL in recognition of significant leadership and technological innovation performed during the early years of an employee's professional career.

Had she not ended up at JPL, Howard said she would still be doing research, but as a university professor. She plans to continue her research at JPL and focus on managing a few large technology projects.

"I love what I do, I love the work and I love the hands-on experience," she said. "As long as JPL continues encouraging people with good ideas, I wouldn't trade it for anything."

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