

# SpelBots: Using Autonomous Robotics to Inspire Women to Participate in Computer Science

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## Abstract

Women, especially African American women, continue to be underrepresented in computer science. There is a need for visible role models for young women to expose them to artificial intelligence education and careers. We describe how we have used autonomous robotics education and research to inspire women through artificial intelligence and robotics competitions. The SpelBots, Spelman College's all-woman team, have raised an awareness and interest in computer science and engineering among women and African Americans for artificial intelligence and autonomous robotics.

## Introduction

The underrepresentation of women in computer science is a well-documented phenomenon (Margolis and Fisher 2002). Although there are women involved in the highest levels of artificial intelligence and robotics research, many young women lack access and exposure to these role models. This is even more apparent in the African American community. It is imperative that women, particularly African American women, be involved with robotics and computer science. As the fields change according to consumer-based needs and preferences, women are able to play a significant role in the decisions made that will affect them directly and indirectly.

## Competitions

In 2005, the Spelman College SpelBots (figure 1), became the first all-woman, African American team to qualify and compete in the RoboCup Four-Legged League Soccer competition in Osaka, Japan. In 2006, the SpelBots qualified again for the Four-Legged Soccer competition but failed to qualify in 2007. However, the SpelBots competed in the RoboCup 2007 Four-Legged Technical Challenge in July 2007 and tied for second place in the passing event with the University of Texas-Austin while placing seventh overall. Whitney O'Banner, a Spelman student who had just completed her freshman year,

designed and implemented the program code for the passing event. Not only did she defy stereotypes that women and African Americans rarely program autonomous robots, but she also defied the notion that first-year computer science students cannot compete at the international level. The rest of this paper seeks to explain how the SpelBots recruit and motivate women students to study robotics and participate in international robotics competitions.



Figure 1 The RoboCup 2007 SpelBots Team (l-r): Philana Benton, Katrina Stewart, Ashley N. Johnson, Andrea Roberson, Andrew B. Williams, Whitney O'Banner.

## Recruitment

Students are recruited to study robotics at Spelman through demonstrations, robotics clubs, and the media. Whitney O'Banner first learned about the SpelBots after seeing them featured in an Ebony Magazine article (2005). She visited Spelman while a Plano, Texas high school student through a program called *A Day in the Life at Spelman*. During this time, she met Professor Andrew Williams and saw a live demo of the Sony AIBO four-legged robot dancing to music. She also saw a video clip of previous SpelBots competing in RoboCup. She knew then that she wanted to attend Spelman and join the SpelBots team.

At Spelman, an all-woman school, we seek to create an environment in which women are encouraged to learn an area of science, autonomous robotics, that is not seen as a "woman's field". It also helps that the robots that are used are cute and not seen as just "guy toys". In the past, we

have been asked by a male student at neighboring Morehouse College to join the team, but we offered to help Morehouse start their own team. Our concern was if men were asked to join the team, the women would not be as willing to take the lead in contributing to the team.

The SpelBots Club (versus the SpelBots *Team*) is used to recruit new students of any educational discipline to study robotics and its potential benefits to society. The 2007 SpelBots Club has approximately eighteen Spelman students in diverse disciplines including English, Biology, Computer Science, Physics, Math and Chemistry. In the SpelBots Club, students work on robotics-related projects and receive instruction in robot programming. This year they will also be involved in building various robot kits. The SpelBots Club members can “graduate” to compete as part of the SpelBots Team.

### **Resources**

The right resources, including robotics curriculum and appealing robots, can help inspire women and African American students to pursue robotics education. Prior to Professor Williams’ arrival, a mobile robotics course was not taught at Spelman. Professor David Touretzky offered to teach Tekkotsu robotics workshops for Spelman students and faculty during the spring of 2005. Receiving robotics training was critical to the success of the Spelman robotics program; this training has been spread to other historically black colleges and universities (HBCUs) in collaboration with Professor David Touretzky at Carnegie Mellon. This project has since been expanded to include eight HBCUs and seven Carnegie Research I institutions through the NSF-Funded ARTSI (Advancing Robotics Technology for Societal Impact) project (2007).

The Sony AIBO’s appealing visual design appears to be another factor in attracting women students to robotics at Spelman. These students tend to comment frequently on the “cuteness” of the robots after seeing them for the first time. However, many students who are initially attracted to the robots often believe it would be too difficult to learn how to program them. Some comments include “I can’t do that” or “I took a computer class in high school and I wasn’t good at it.” The SpelBots encourage these students to learn with the right instruction and practice.

### **Community Outreach**

The SpelBots reach out to the community through the C.A.R.E. Camp and Workshop and presentations. Our recruitment of women students to study robotics starts at the middle school level through our NSF-sponsored Computer and Robotics Education project. C.A.R.E. includes a middle school camp that exposes students to robotics using the Sony AIBO with R-Code and Tekkotsu (2007). Students are taught how to program the robots to

perform simple dances and have a dance contest. Also, they use the Tekkotsu Controller GUI to play remote control one-on-one soccer in a round robin soccer tournament.

The SpelBots recruit and promote robotics through robotics demonstrations and presentations. In 2006 and 2007, some of the presentations given included the Grace Hopper Celebration of Women in Computing, the Black Women’s Agenda (an organization of black women civic and religious organization leaders), the Computer Science Teacher’s Association and the National Center for Women in Information Technology.

### **Conclusion**

The SpelBots actively recruit, compete, and provide educational resources and activities to promote computer science using robotics. The SpelBots believe the forefront of technological advances should not be gender-discriminate but instead should include the ideas and concepts conceived by both women and men alike. If women are to take an active role in the future of robotics and computer science their interests in these fields must be developed at an early stage in their academic careers, which is the aim of the SpelBots.

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