Robot Virtual Worlds - Providing children with virtual robots to program with!

United States

Robin Shoop

Organization type:
nonprofit/ngo/citizen sector

Budget:
$500,000 - $1 million

Website:
http://www.education.rec.rni.cmu.edu/index.htm

- At risk youth
- Employment
- Education
- Education reform
- Information & communication technology
- Youth development
- Technology

Project Summary

Elevator Pitch

Concise Summary: Help us pitch this solution! Provide an explanation within 3-4 short sentences.

Computer Science and algorithmic thinking are "new basics" that all children need to understand. Robotics is being used as a motivator of CS-STEM education. We have developed a solution that enables children without robots to control virtual robots using the same code they use to control their physical robot. This new innovation will be extremely well received in education because it will give all students an opportunity to program robots (in a game like environment). This innovation will also be widely accepted in emerging economies who do not have the funding to bring robots into schools. We began by developing an emulator for ROBOTC that enabled the software to target a PC then developed the DLLs that enable ROBOTC to talk to Unity, a game development software. www.cs2n.org/rvw

About Project

Problem: What problem is this project trying to address?

Formal and informal education across all demographics. Our materials are being used in thousands of schools across the United States and have been translated into twelve languages.

Solution: What is the proposed solution? Please be specific!

We have developed the only solution that allows students to use the exact same code to control virtual robots in a game like environment using the exact same programming language as they use to control their LEGO, VEX, or Arduino Robot. We are making the solution available for free to students through our new "Computer Science Social Network" (CS2N). At CS2N students will also find all of the training materials that they need to learn to program in a newly developed Learning Management System. Our group will offer classes to students in both formal and informal education on multiple activities. This solution provides equity. If a student or school has access to a computer and the internet, then they have access to our materials.

Impact: How does it Work

Example: Walk us through a specific example(s) of how this solution makes a difference; include its primary activities.

To provide opportunities for children to learn programming. We make all of the resources available for free: the curriculum, a moodle based Learning Management System, and the Robot Virtual World.

About You

Organization:
Carnegie Mellon Robotics Academy

First Name
The Robotics Academy was started in 2000 by a teacher that worked in the Pittsburgh Public School System for 28 years. His background was Industrial Arts education and he was involved in the school district's transition to Technology Education. He recognizes that we are in an era of exponential change and if we are going to prepare students to compete in the emerging economy that they are going to need to teach them skill sets that many teachers are not prepared to teach. The Robotics Academy develops research based solutions for education that teach 21st century skills.

We have developed a back end database that tracks users. Our project is using the motivational effects of gaming to retain interest in computer science.

We are in year one of the development of the Computer Science Social Network. We've had an informal launch of the site in May 2011, we had nearly 2,000 downloads of our technical demonstration of the Robot Virtual World programming solution. We are working with organizations like the Boy Scouts, 4H, and Boys and Girls Clubs as well as with national robotics competition sponsors to market the project.

We partner with FIRST Robotics, VEX, the National Robotics Challenge, Boys and Girl Scouts, 4H, and other informal education groups. We also have partnerships with LEGO, Robomatter, IFI, and National Instruments.

When I started the Robotics Academy in 2000 I recognized that depending on foundations would not allow us to maintain our outreach and mission.
Our organization provides many free resources to students and teachers, but of course there is no such thing as free, you have to do business to stay in business. I have cultivated partnerships with organizations and businesses that serve the robotics education market. My organization provides services and products to those organizations. As our organization has gotten larger so has the number of students and teacher that we reach; our materials are being used by millions of students per year based on sales. For example, we just signed a multi-year contract with Project Lead the Way and they will use software that we support as well as our training materials for the next five years. I started a for profit company named Robomatter which funds approximately 1/4 million dollars per year to Carnegie Mellon which allows us to pay for staff that works at the Robotics Academy. Our outreach has been entrepreneurial but at the same time generous to organizations without resources.

How do you plan to strengthen your project in the next three years?

Educate to Innovate - while we can't predict what the new innovation will be in five years we can more confidently predict that innovation will involve computer science, embedded systems, engineering design and mathematics; all of these concepts can be taught through robotics. Our work is research based; we have won 3 NSF research awards and 2 DoD contracts that have allowed us to develop strategies that use robotics as an organizer to teach Computer Science and STEM concepts. Robot Virtual Worlds using gaming to motivate learning, not that we've discovered this technology we will blend it with other technologies that we've developed with in the past (i.e. cognitive tutors) and develop better tools to engage children. In the ideal situation we would find funding that would allow us to make all materials and services available for free, but we have not been able to find funders that allow us to do that. We will continue to conduct collaborative research with others and develop research based solutions for education that teach computer science and STEM. Our project is distributed via the cloud. We believe that there will be a significant market for our cloud based educational technology. Our goal is to continue to be generous and post resources online for teachers and students but at the same time cultivate partnerships with for profit companies that sell into the education market.