



News Release

Defense Advanced Research Projects Agency

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DARPA Supports a “Renaissance of Wonder” for Nation’s Students

Today the White House hosted its Science Fair. Today DARPA helped ignite a ‘renaissance of wonder’ for students. And in releasing the BAA for its MENTOR program today, DARPA’s investment reached \$15M in STEM-related programs over the next year.

Science education and technology breakthroughs need not be the exclusive domain of a few wunderkinds and technogeeks. Several DARPA programs help students discover the wonder of scientific creativity and introduce students to the satisfaction they can find as creators of things. These programs are certainly about education, but more importantly, they are about inspiration.

DARPA programs that foster student creativity in science, technology, engineering and mathematics (STEM) disciplines include:

Manufacturing Experimentation and Outreach (MENTOR)

To innovate we must make. To protect we must produce. This is the theme of DARPA’s manufacturing initiative. And in the service of wonder, the Agency has undertaken a STEM manufacturing counterpart aimed at engaging high school students in a series of experiments using collaborative distributed manufacturing and design. It intends to motivate students to innovate while exposing them to foundry-style digital manufacturing. Open-source tools, with 3D printers, will ultimately be provided to up to 1,000 schools. Prize-based design and manufacturing challenges enable schools to team and compete in the development of cyber-electro-mechanical systems like go-carts, robots, and small unmanned aircraft for a total of \$10M in awards.

ENGAGE: Learning to Solve Problems, Solving Problems to Learn

Capitalizing on DARPA’s success with the protein-folding game “FoldIt”, the ENGAGE program uses computer-based interactivity to introduce concepts and their appropriate teaching tools, tailored by, and to, the learning proclivities of students. Unique tool use, or learning strategies in problem-solving, are noted and reinforced as part of interactive computer simulations, games, and learning modules. The outcome is a continuously reinforced, customized, interactive learning environment that defines students’ strategies and generates data on their distribution within a student population. Learning can be made fun and rewarding for every student through a customized strategy. Additionally, ENGAGE will advance STEM classroom curricula and learning theory nationwide, by an evidence-driven optimization of concept presentation to engage the most students most effectively.

International Space Station SPHERES, Integrated Research Experiments (InSPIRE)

In the summer of 2010, DARPA launched InSPIRE, a \$6M program designed to increase student exposure to the complexities of space system development through crowd-sourcing activities that elicit participation from anybody in the testing of space technologies. As a platform to target high-school

student experimentation in space, InSPIRE uses a collection of bowling-ball-sized spherical satellites to test maneuvers for spacecraft performing autonomous rendezvous and docking. InSPIRE awards are intended to total \$1.2M.

CS-STEM Seeks to Invigorate Computer Science Education

Faced with a dramatic (perhaps as high as 58%) decline in students graduating with Computer Science and related degrees, DARPA's CS-STEM program seeks to enable middle and high school students to realize their potential as expert developers and innovators, not simply users, of everyday technologies. In the CS-STEM program, students acquire STEM-discipline mastery and skills, as well as real, tangible rewards. An online robotics academy (FIRE) will sharpen their ability to solve complex problems and will equip them with algorithmic thinking, engineering process mastery, math, and programming know-how. CS-STEM will create and maintain an online community of students to support interactivity and relationships to foster lasting and meaningful involvement in STEM creativity and careers.

HBCU Robotics Initiative and SMART scholarship

Military Departments have an important and unmet need for a common robotics training platform—a need shared by the postsecondary academic community. The DARPA HBCU Robotics Initiative and SMART scholarship leverages significant efforts and talent within the ARTSI (Advancing Robotics Technology for Societal Impact) Alliance. Students can compete for receipt of a DoD Science, Mathematics and Research for Transformation (SMART) scholarship. The effort creates a consortium of robotics users from within the Military Departments to define the requirements of a robotics training platform and to provide a place for the HBCU/ARTSI-SMART scholars to intern and find post-graduate employment. The inexpensive, user-friendly training platform will boost robotics education, common platform development, and interoperability within both Military, and postsecondary, robotics training and use.

ARM, The Autonomous Robotic Manipulation program

DARPA's Autonomous Robotic Manipulation (ARM) program can actually look at building blocks, find one with a special pattern, and move it to a new location. More challenging tasks include picking up a gym bag, unzipping it, reaching inside, feeling around without visual feedback, and finding an object that's inside the gym bag. To advance the technology, DARPA lets members of the public, including high school students, write software for ARM, then watch a model on the internet perform the task. Through ARM and the internet, an advanced robotic capability can be programmed and managed by students who would otherwise have no opportunity to interact with such a sophisticated technology.

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