



# Cyber-Physical Systems Virtual Organization: Active Resources

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The central objective of the proposed research is to transform the CPS-VO from a collaboration platform and passive repository of information into an active resource that provides access to tools and methods emerging from the CPS research community.

The project will make a significant contribution to education via support to student competitions and challenges that will help prepare a new generation of students who will be inspired and trained to realize the promise of CPS. We expect that the integrated suite of models, integration platforms, and intellectual frameworks to be developed and contributed by the research community will lead to a new era of low-cost, distributed and open design infrastructure.

## Infrastructure for Creating CPS Design Studios



The development and dissemination of **open model libraries, open-source tools and integration platforms** give the proposed research significant impact. The open integration platforms will empower CPS researchers to make their work accessible and immediately usable via **design studios** built for different target domains, will enable small projects to effectively contribute to large research efforts and make a direct impact, and will help in shortening the transition path for research results.

## 2017-18 CPS Student Competition

The competition is designed for undergraduate teams participating in a capstone project course. Teams should have a mentor who is a graduate student, or a faculty member that can provide direction and suggest technical approaches. All solutions will involve both software and hardware. The final challenge will be held in Tucson, AZ in Spring 2018 (travel support is expected, pending sponsorship). <https://cps-vo.org/group/CPSSChallenge>



## CAT Vehicle Challenge

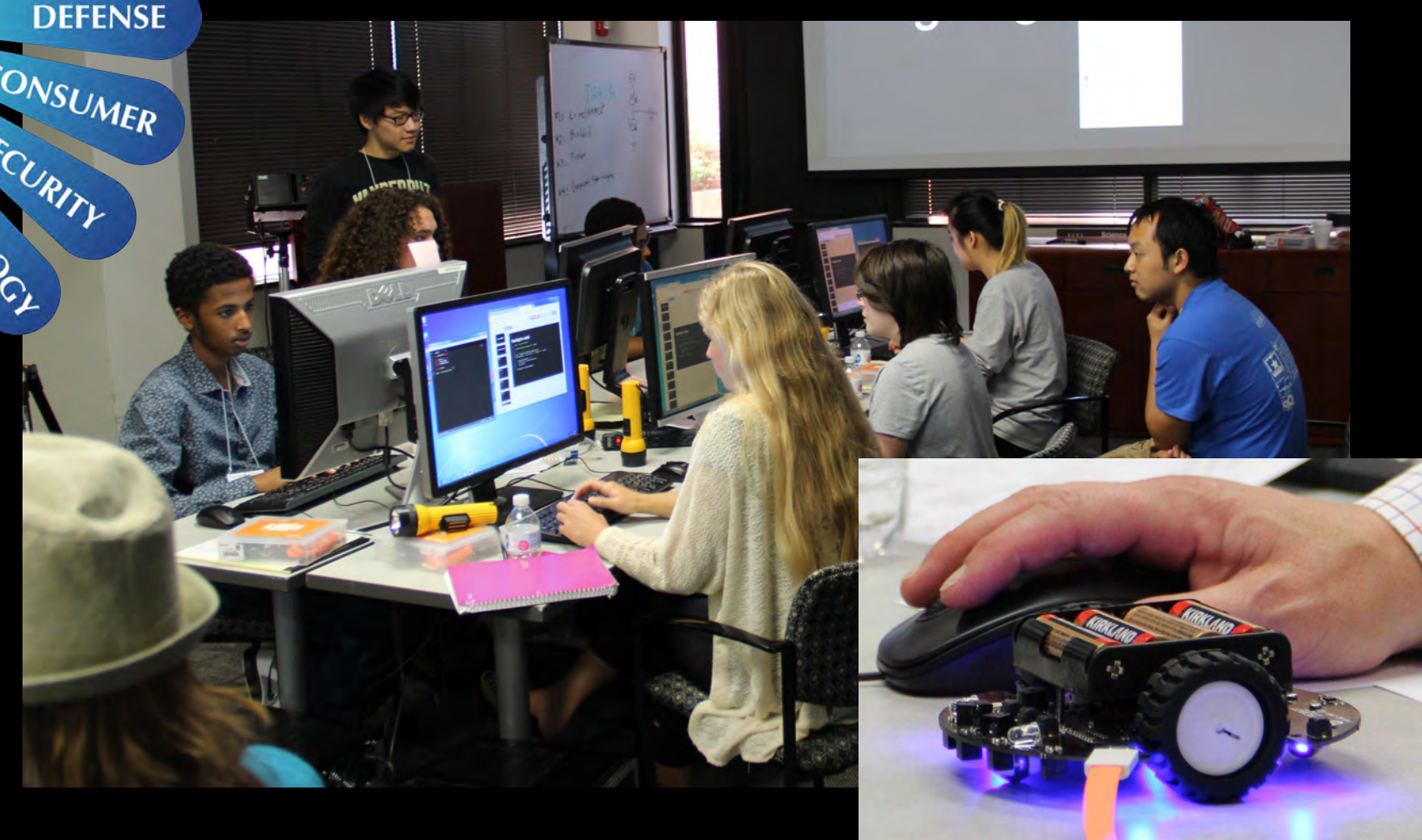
The CAT Vehicle Challenge was a Spring 2017 student challenge focused on model-based design for a self-driving car. The challenge aimed to broaden participation in Cyber-Physical Systems, and was run in the spirit of the DARPA Robotics Challenge as a competition in four phases. The Challenge provided an exciting opportunity for students to build a component that controls and runs on a real self-driving car—the University of Arizona's CAT Vehicle.

In this challenge, participants were given data from the CAT Vehicle, driving along a path. The task was to use that data to identify potential obstacles along and off the path, and provide possible identification of those obstacles using as few sensors as possible. Each team selected to participate in the Final Challenge was able to control the velocity of the CAT Vehicle as it drove along the trajectory. The result was a configuration file for a simulation environment (Gazebo) that mirrored the environment from which the data was extracted.

The composite image displays the CPS-VO website with navigation options like 'BROWSE', 'SEARCH', and 'MY GROUPS'. It features a 'save the date' poster for the 2017 CPS PI Meeting on November 13-14, 2017, at the Hilton Alexandria Mark Center Hotel. A 'CPS DOMAINS' graphic lists sectors like Energy, Education, Medical, and Transportation. A large circular diagram at the bottom illustrates the CPS-VO ecosystem, centered around 'CPS-VO' and 'NIST CPS Testbed', with various domains and activities like 'Verification', 'Medical', 'Edu', 'Clockwork', 'Collaboration', 'Symposia', 'Public Outreach', 'Academia', 'Government', 'Industry', 'Users', 'Special Interest Groups', 'Challenge Problems', 'Technology Transition', and 'R&D Directions'.



## CPS SummerCamp '17



This summer camp took place at Vanderbilt University July 31st - August 4th. Invited participants were 15 MLK Jr Magnet School rising HS Seniors and Juniors.

The program used simulation-based and experimental platforms of autonomous vehicles to demonstrate how fundamental concepts from computer science and engineering are integrated to develop operational and dependable systems.

The long-term goals of this initiative include establishing (or building) a pipeline that targets highly-qualified students who are interested in CPS-related engineering disciplines.

"They want women to be in these fields and they don't know a better way than to get our hands really dirty with it, and the good news is we like getting our hands dirty even though it's really hard and confusing sometimes". - Lily

"The high-paced learning environment combined with the interesting and thought provoking questions our lecturers asked us was resulted in a sense of engagement that was overwhelming. In fact I think it was the first time in what is probably way too long that I managed to forget my phone exists for an entire day". - Mikhail



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