



Cyber-Physical Systems Virtual Organization: Active Resources



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<https://cps-vo.org>

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, Integrated Tools, and Tool Libraries

The dissemination of **integrated tool suites developed in CPS research projects** significantly increases their potential impact. **The CPS-VO** provides an integration platform to empower CPS researchers to make their work accessible and immediately usable as **configured design studios** built for different target domains. It also enables small projects to effectively contribute to large research efforts, make a direct impact, and shorten the transition path for research results.

Successfully running examples include: tools for modeling and configuring deep neural networks (DeepForge), tools that automatically generate Ethereum contracts (FSolidM), tools for design, development and deployment of large-scale distributed ROS applications on embedded devices (ROSMOD), and more.



TOOL LIBRARIES

A catalog of publicly available tools that is highly searchable and explorable under a community-formed taxonomy. It offers significantly increased and targeted visibility for project results.



INTEGRATED TOOLS

Tools requiring external initialization, end-user tunable parameters, runtime commands, post-processing, data collection, and other advanced features can be directly accessed through the CPS-VO.



DESIGN STUDIOS

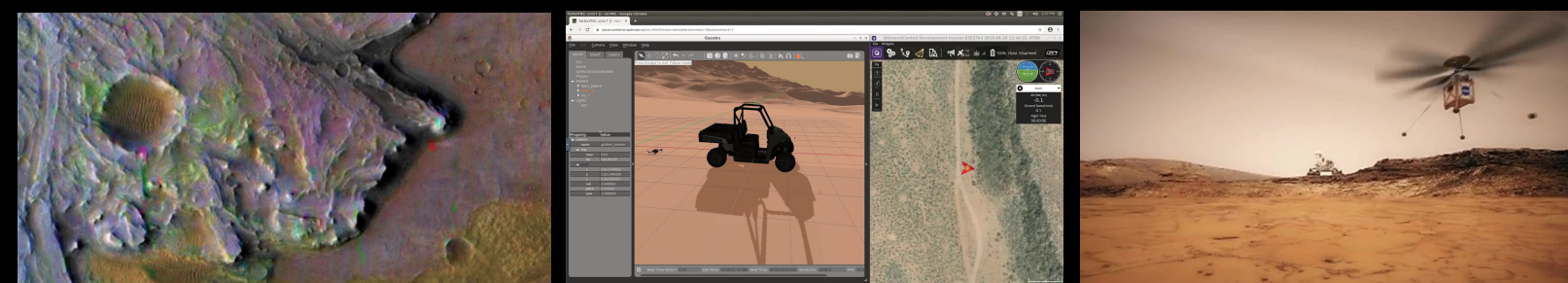
Reconfigured integrated tool suites that support CPS design tasks can be accessed through the CPS-VO portal.

NSF CPS Challenge



The CPS Challenge is designed for undergraduate teams participating in a project-based course or working in maker clubs. Each team has a mentor to provide direction and suggest technical approaches. All solutions involve both software and hardware. The 2020 challenge was inspired by the Mars 2020 mission scenario, emulating an autonomous probe deployment science mission by a rover and drone duo, at the Jezero crater landing site.

The winners of the competition were Srikar Siddharth and Yogesh from the National Institute of Technology, Karnataka, India. Their team 'Planet Porters' solved the qualifying round involving detection and recovery of a sensor probe with a multirotor drone with very little prior knowledge of robot control and went on craft robust solutions to the Phase I and Phase II rounds featuring increasing levels of difficulty.



Learn more about the 2020 NSF CPS Challenge: <https://cps-vo.org/group/CPSChallenge>

ARCH-COMP

<https://cps-vo.org/group/ARCH/FriendlyCompetition>

The 4th International Competition for the Verification of Continuous and Hybrid Systems (ARCH-COMP) is a friendly competition among scientific software in the context of algorithmic verification of continuous and hybrid systems.

The first goal of the competition is to provide a forum for observation, such as which methods are particularly suitable to which types of problems and which types of problems already have good solutions.

The second goal of the competition is to establish a consensus for comparing different software implementations in the context of verification, as such comparisons help define objective metrics to advance state-of-the-art.

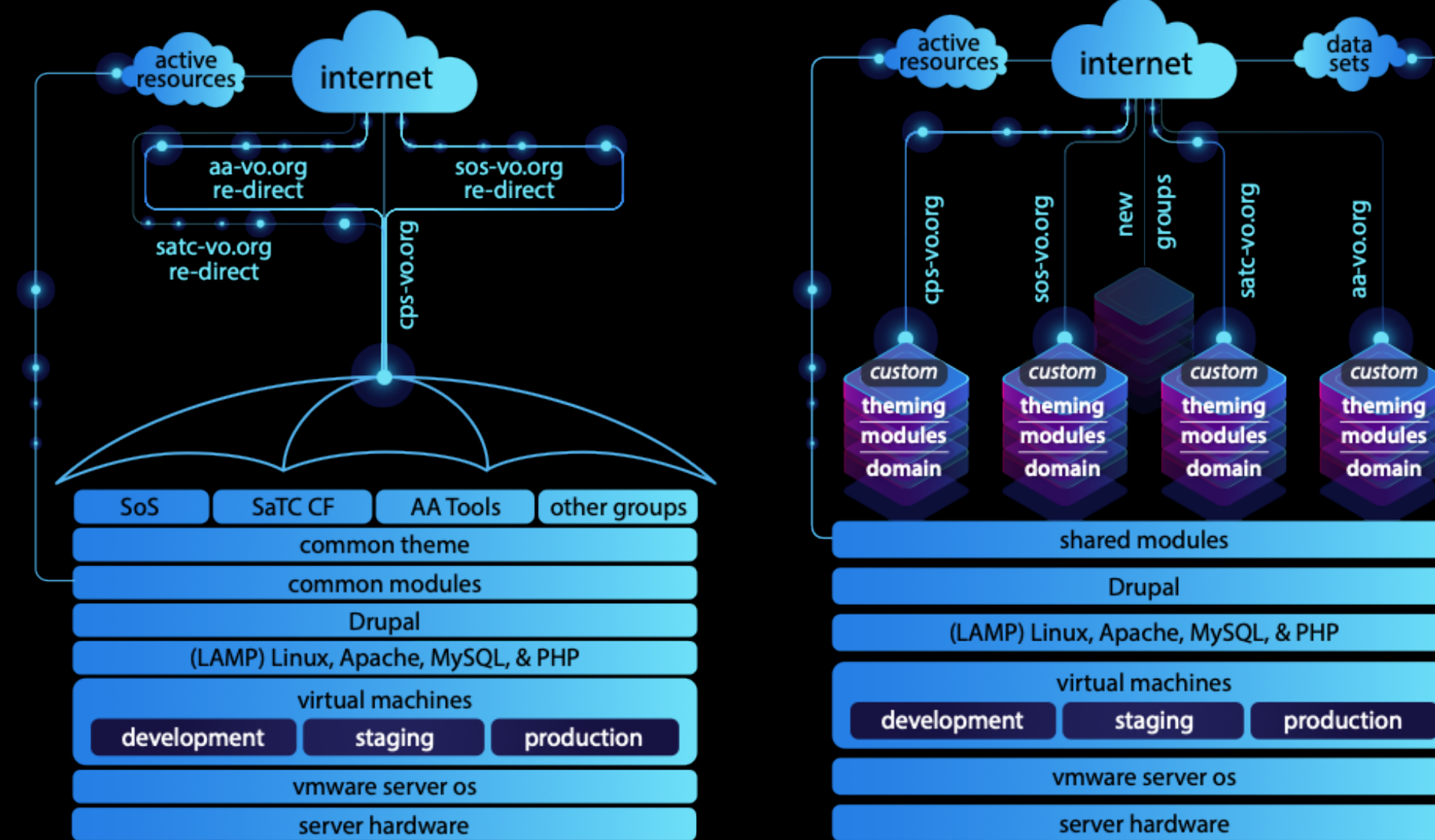
The results of ARCH-COMP were presented at CPS-IoT Week 2020 at the IFAC World Congress during the 7th ARCH workshop.

The competition is still ongoing in 2021 and the workshop will be held with the IFAC ADHS conference.

All software, benchmarks, and results are available online at: <https://gitlab.com/goranf/ARCH-COMP/>



Coming Soon! CPSVO Architectural Changes



With the next instantiation of the CPS-VO, we will move to a multi-site architecture. This structure will enable new communities to take advantage of shared resources while also allowing for individualized customizations with community-specific theming, modules, and domains. Core CPS communities will remain on the CPS-VO and sister sites will be created for the Science of Security and Privacy, Secure and Trustworthy Cyberspace, and Assured Autonomy Communities as well as others. In addition to an improved interface with a modern look and feel, there will be easy navigation and searching across the connected communities.

