

For Immediate Release:

ADI Wins AFWERX Fighter-Bomber Pitch Day Award

March 10, 2020. Ann Arbor, Michigan.

Applied Dynamics (ADI) is pleased to announce the award of an innovation research contract with AFWERX to deliver virtual aircraft Verification and Validation (V&V), or “Virtual V&V” capability and software, based on ADI’s industrial computing and data handling software platform, ADEPT. AFWERX and this Fighter-Bomber contract represent a partnership between the Air Force, Army Futures Command, and National Security Innovation Network (NSIN). AFWERX is a catalyst for agile Air Force engagement across industry, academia, and non-traditional contributors to create transformative opportunities and foster an Air Force culture of technology innovation.

Modern aircraft programs use cyberphysical (hardware-in-the-loop) test rigs or facilities to perform pilot-in-the-loop or automated virtual flight test with some portion of the real aircraft systems connected. The Virtual V&V capability ADI delivers to the Air Force and Army users will allow for a substantial reduction in cost by performing more comprehensive testing in the purely-virtual space and reducing the load on cyberphysical hardware rigs.

Cyberphysical and virtual V&V test activities are performed using a set of assets that include IT systems and software and physical assets such as test rigs, System Integration Labs (SILs), hardware-in-the-loop test rigs, and other capabilities. These integration and evaluation activities allow the design and implementation of each airborne system to be exhaustively evaluated in a computer-driven manner, much like how large complex software systems, e.g. Google and Amazon software platforms, are taken through nightly and sometimes continuous implementation testing.

The value of cyberphysical product development and virtual V&V is immense with reduced costs for aircraft flight testing and shortened product development cycles as a result of more concurrency in the product engineering tasks. Perhaps most importantly, the methodology allows the product to be taken through extreme and unsafe virtual flight test scenarios that would never be performed in a real flight test aircraft, for safety reasons, e.g. what happens when this sensor begins sending bad data? And because virtual flight test doesn’t come with the expenses of fuel or a ground support team (in fact for most of the virtual testing no team is required at all) a far more comprehensive test campaign can be performed.

Software has become a vastly increased portion of the complexity within big systems like aircraft. Software test and virtual test approaches are necessary in order to manage the quickly increasing complexity of these software-based aircraft systems.

ADI’s phase I Small Business Innovation Research (SBIR) project with AFWERX will involve engagement with the Joint Partners and the development of a concept and feasibility study for improving the state-of-the-art for virtual aircraft verification and validation capabilities, including:

- Faster, more comprehensive aircraft systems testing through expanded virtual V&V
- Reduced dependency on expensive, aging real-time HIL/HWIL rigs
- Cloud-deployable for ultra-fast test plan pipelining using Containerized frameworks, e.g. Dockers
- Standards-based industrial and test automation through prevailing Open Process Automation standards (O-PAS)
- Drag & Drop Machine Learning (ML) algorithm deployment using prevailing ML model portability standard

A common example of an aircraft cyberphysical test facility used in commercial and military aircraft development programs is an “Iron Bird” test lab (<https://youtu.be/AeHSfMYA6G8>). The Iron Bird lab is used to test the aircraft’s integrated fly-by-wire flight control system, by integrating the aircraft hydraulic system, flight control actuators and electronics, avionics networks, pilot controls, and the Flight Control Computer, and taking the integrated set of systems through highly-representative simulated flight through test in both normal and failure mode operations. The testing performed on an Iron Bird lab generates test data and test evidence used to demonstrate that the flight control systems design performs as expected and to validate engineering assumptions made as part of the normal engineering process. A virtual Iron Bird framework includes no real hardware being tested but only simulation models of all the pieces within the scope of the Iron Bird test approach, including software-in-the-loop models of each of the software-enabled aircraft systems are utilized. Because a virtual V&V test framework includes no real hardware, testing can be performed at an accelerated pace, with many test cases being executed in parallel, in the cloud, to accelerate the test campaign. The hardware-free nature of virtual V&V frameworks also makes it possible to greatly increase the scope of testing, achieving much higher test coverage and thorough evaluation of the design, running many more parameter sweeps, analyzing the design in a more comprehensive manner, and developing safer, high-performing aircraft.

About the AFWERX Fighter-Bomber Pitch Day

AFWERX, in partnership with Air Force Research Lab (AFRL), and the National Security Innovation Network (NSIN), developed the SBIR Open Topics to increase the efficiency, effectiveness, and transition rate of the SBIR program.

For these topics, companies with existing commercial products or services, like ADI’s ADEPT software platform, that may also be useful to the Air Force are invited to apply. Several barriers to working with the Air Force have been removed or mitigated for this program, to include a shorter application process, an accelerated contract award, and a shorter period of performance.

“We’ve had some experience with these new, agile, DoD contracting approaches with our project win on the F-35 Pitch Day.” said Scott C James, ADI’s President and CEO. “These fast-turn-on projects with the DoD feel familiar to us. This is how we tend to contract with industry. When industry moves they move quickly and expect us to ramp up resource to solve problems quickly. And industry wants us to assemble a concept and a phased project plan that minimizes commitment until the main risks are behind the project.”

About the ADEPT Framework

The ADEPT Framework is an industrial data and control software platform built around the concept of a “data framework” that links industrial real-time Linux servers as a distributed resource and provides

desktop client control of the time-deterministic computing and data handling capability. The ADEPT Framework is used in the largest, most demanding industrial data and control applications across the global aerospace and defense industry, but also scales down to work with low-cost computing and open source real-time Linux. The open architecture framework allows users to leverage best-in-class COTS and open-source technologies in a common, project-based environment.

The ADEPT Framework software dramatically reduces the cost and time to deploy and operate industrial real-time Linux servers, with comprehensive capability and trusted technology.

About the National Security Innovation Network (NSIN):

[NSIN](#) is a Department of Defense (DOD) program office with the mission to build networks of innovators that generate new solutions to national security problems. NSIN does this by building communities of non-traditional defense problem solvers (the academic and venture communities), exposing these communities to national security problems, and supporting the further development and transition of these solutions into the DOD. To facilitate the building of this network of problem solvers and to actively solve DOD problems, NSIN delivers three portfolios of programs: Acceleration, Collaboration, and National Service.

About Applied Dynamics

[Applied Dynamics](#) helps companies make better use of data and control assets through all stages of product development, verification testing, demonstration, training, and maintenance. Applied Dynamics flagship product, the ADEPT Framework, is the most advanced real-time, industrial Internet of Things (IoT) model-based systems engineering software platform available, providing an agile, open architecture, feature-rich environment for the complete product lifecycle from development through integration, verification, validation, certification, deployment and sustainment. ADEPT embraces an open architecture and allows its users to leverage best-in-class COTS components. The ADEPT user base includes 14 of the global top 35 A&D companies and extends into marine, power systems, oil & gas, and the automotive industry.

To learn more about how ADI can help your team, visit www.adi.com or send an email to adinfo@adi.com.

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