



News Release

Defense Advanced Research Projects Agency

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3701 North Fairfax Drive
Arlington, VA 22203-1714

IMMEDIATE RELEASE

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PROGNOSIS PROGRAM BEGINS

The Defense Advanced Research Projects Agency (DARPA) has kicked off the technology development phase of the Prognosis program. Four contractors will be performing work in this phase.

Northrop Grumman Corp., Integrated Systems Sector, Bethpage, N.Y., will focus on aircraft structures. The objective of their project, Structural Integrity Prognosis System (SIPS), is to create a tool for predicting near-term system capability including imminent failure, without the need for any inspection or maintenance action with a specific focus on materials and structures for aircraft. SIPS will include physics-based failure models, state awareness sensors and reasoning/predicting methodologies, and will be applied to metallic, composite and hybrid structures. Northrop Grumman was awarded \$14.1 million on October 27.

The project planned by Pratt & Whitney, East Hartford, Conn., and General Electric Co., GE Aircraft Engines, Evendale, Ohio, will focus on gas turbine engines. The goal of their Engine System Prognosis (ESP) effort is to provide field commanders the ability to quantitatively predict and adaptively manage, deploy and use aircraft engine assets to the limit of their current capability. The project will develop a prognosis system for predicting near-term engine capability as well as providing the pilot with early sensing and warning of pending failure, in time for corrective action to be taken. The project plans to develop physics-based models, a state awareness sensing prognosis and asset capability management system and conduct system testing. Pratt & Whitney received \$7.1 million on November 14; General Electric Co. received their \$7.1 million award on November 28.

The final participant, Southwest Research Institute, San Antonio, Texas, will develop and demonstrate a novel, wireless, sensor system for crack detection and monitoring in fracture-critical turbine engine components. They received a \$1.7 million award on November 21.

Currently used predictors of the useful remaining life for weapon systems can be inaccurate and are very conservative. Because existing damage accumulation models are inaccurate for realistic use conditions, and because there has been no practical way to determine the actual state of individual components while they are in service, current approaches to determine useful remaining life employ statistical methods to manage the fleet. Statistically, this means that the Department of Defense (DoD) must inspect or replace 999 good parts to ensure

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that the single worn-out component does not fail during use. The Prognosis program will use advanced, physics-based and data-driven models supplemented by advanced sensors to assess the health of individual weapon systems as they are subjected to damage, stresses, and corrosion during normal operational use. The DARPA Prognosis program will permit DoD to track the state and accurately and reliably predict the capability of individual components and platforms. This capability will enable management and deployment of critical assets based on their real remaining useful life and capability rather than on assumptions. DARPA projects that this enhanced capability will result in increased readiness with prudent risk, higher reliability and reduced costs.

“I am very excited about the promise of the Prognosis program. I believe that we will show that it is possible and practical to double the useful life of expensive gas turbine engine components and increase by five-fold the accuracy of estimating aircraft fatigue life,” explained Prognosis program manager Leo Christodoulou. “Prognosis technologies and methods should save the taxpayer money, increase safety for our warfighters, and dramatically increase the military commander’s ability to accurately predict the warfighting capabilities of his or her equipment.”

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Media with questions, please contact Jan Walker, (703) 696-2404, or jwalker@darpa.mil . Companies and military organizations should contact Leo Christodoulou, (703) 696-2374.