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DARPA Chooses Carnegie Mellon To Develop Autonomous Capability for “Flying Car”

Military Ground Vehicle Would Transform Into Flyer for Scouting, Resupply and Medical Evacuation

PITTSBURGH—The Defense Advanced Research Projects Agency (DARPA) has awarded a 17-month, \$988,000 contract to Carnegie Mellon’s Robotics Institute to develop an autonomous flight system for the Transformer (TX) Program, which is exploring the feasibility of a military ground vehicle that could transform into a vertical-take-off-and-landing (VTOL) air vehicle.



The TX vehicle envisioned by DARPA would be capable of transporting four people and 1,000 pounds of payload up to 250 nautical miles, either by land or by air. Its enhanced mobility would increase survivability by making movements less predictable and would make the vehicle suitable for a wide variety of missions, such as scouting, resupply and medical evacuation.

Renderings of the Transformer concept by AAI Corp. (above) and Lockheed Martin (below), the two designers for the first phase of the DARPA project.

“The TX is all about flexibility of movement and key to that concept is the idea that the vehicle could be operated by a soldier without pilot training,” said Sanjiv Singh, CMU research professor of robotics. “In practical terms, that means the vehicle will need to be able to fly itself, or to fly with only minimal input from the operator. And this means that the vehicle has to be continuously aware of its environment and be able to automatically react in response to what it perceives.”



Carnegie Mellon has a long history of leadership in autonomous navigation. That includes the self-driving SUV called Boss, the winning entry in DARPA’s Urban Challenge robot road race in 2007, and

DepthX, an autonomous NASA submarine that explored the world’s deepest sinkhole, also in 2007. Singh applied expertise in robotic perception and planning to demonstrate a fully autonomous helicopter flying in between wires, trees and buildings in DARPA’s Organic Air Vehicle II (OAV2) Program and, working with Piasecki Aircraft earlier this year, demonstrated that a full-size helicopter could avoid low altitude obstacles, select a landing site and land without human input.

Carnegie Mellon is one of six contractors DARPA has chosen for the TX program. The focus of CMU’s program will be on situational awareness, collision avoidance and intuitive control. Honeywell Laboratories, which worked with Carnegie Mellon in the OAV2 program, is a subcontractor to Carnegie Mellon and will work on the human factors issues associated with the program.

AAI Corp. and Lockheed Martin Co. were selected by DARPA to develop overall design concepts for the transforming vehicle during the first phase of the TX program. Pratt & Whitney Rocketdyne, which is developing engine technology, and Carnegie Mellon were selected as “critical enabling technology” vendors.

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About Carnegie Mellon University: Carnegie Mellon (www.cmu.edu) is a private, internationally ranked research university with programs in areas ranging from science, technology and business, to public policy, the humanities and the arts. More than 11,000 students in the university’s seven schools and colleges benefit from a small student-to-faculty ratio and an education characterized by its focus on creating and implementing solutions for real problems, interdisciplinary collaboration and innovation. A global university, Carnegie Mellon’s main campus in the United States is in Pittsburgh, Pa. It has campuses in California’s Silicon Valley and Qatar, and programs in Asia, Australia, Europe and Mexico. The university is in the midst of a \$1 billion fundraising campaign, titled “Inspire Innovation: The Campaign for Carnegie Mellon University,” which aims to build its endowment, support faculty, students and innovative research, and enhance the physical campus with equipment and facility improvements.