

Drones Prove an Agile, Affordable Mechanism to Inspect Aging Civil Infrastructure

Greensboro, NC – May 2019 – How do you inspect a bridge for signs of hazardous weakening or deterioration? It's not easy! Chances are you'd need to close traffic lanes, lower inspectors on ropes, raise them on scaffolds or use specialized trucks or cranes with long, extending arms. The process of inspecting bridges is costly, dangerous and creates traffic disruptions.



Labor costs, public inconvenience and the safety hazards of lane closures are only a few of the factors which had North Carolina's Department of Transportation (NCDOT) looking for a better way.

Unmanned aerial vehicles (UAVs) are the perfect solution. Also known as drones, UAVs can scan bridge spans and nose into hard-to-reach and hard-to-see crevices that humans find difficult to navigate. As they hover close to aging trusses, piers, and other structures, drones take high-resolution images or video, sending these back to inspectors on the ground for collection. Special software assembles these images into 3-D models, which engineers can examine on computers.

In October of 2019, Dr. Ali Karimodini of N.C. A&T will begin a project with the NCDOT called "Developing a Safe and Cost-effective Flight Control Methodology for a UAV-enabled Bridge Inspection." Dr. Abdollah Homaifar, from N.C. A&T, and Dr. Navid Goudarzi from UNC Charlotte will assist him on this project.

N.C. A&T is a national leader in its autonomy capabilities and infrastructure for control of drones. Two UAV laboratories exist on campus, run by Dr. Karimodini and his colleagues. The Autonomous Cooperative Control of Emergent Systems of System (ACCESS) Laboratory in Cherry Hall is designed to investigate the teaming of a large number of robots (called a swarm). There is also a UAV laboratory in TECHLAV Center, directed by Dr. Homaifar and co-directed by Dr. Karimodini, in the Fort Interdisciplinary Research Center, primarily sponsored by the U.S. Department of Defense. Both laboratories contain designated flights zones as well as ample floor space for rovers and other robotics exercises.

“We are one of the few universities in the nation with these types of facilities,” says Dr. Karimodini. “Our facilities have enabled us to attract government agencies like the NCDOT to investigate the development of drone technologies and their applications.” The laboratories have also attracted many autonomy students. “Our students have easy access to hands-on labs showing our cutting-edge technology, and they see career opportunities in this field when customers like the NCDOT express interest in using our technology.”

About North Carolina A&T State University

North Carolina Agricultural and Technical State University is the nation’s largest historically black university, ranked number one among public HBCUs by U.S. News & World Report. It is a land-grant, doctoral high-research classified university by the Carnegie Foundation and constituent member of the University of North Carolina system. A&T is known for its leadership in producing graduates in engineering, agriculture and other STEM fields. The university was founded in 1891 and is located in Greensboro, North Carolina.

About the ACCESS Laboratory

Founded in 2013, the Autonomous Cooperative Control of Emergent Systems of Systems (ACCESS) Laboratory aims to address fundamental problems in modeling, analysis, control, and improvement of complex systems. The ACCESS Laboratory particularly focuses on the applications of developed technologies to different domains including Autonomy, Defense and Civilian Oriented-applications of Autonomous Vehicles, Smart Agriculture, Smart Transportation Systems, Security and Reliability of Complex Systems, Aerial Robotics and Flight Control Systems.



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