



Unmanned Systems Research

Expanding OSU's counter-UAS capabilities

Research innovation, leadership lay the foundation for the Unmanned Systems Research Institute

Introduction:

For more than two decades, Oklahoma State University has been developing a national reputation for designing, building, and testing unmanned air vehicles (UAVs). Now the College of Engineering, Architecture and Technology (CEAT) is expanding that program to include unmanned systems research and development including land-based vehicles, watercraft (including submersibles), and spacecraft. This growing capability is exemplified in the 2016 launch of the OSU Unmanned Systems Research Institute (USRI), which brings together interdisciplinary expertise from across OSU and beyond.

Definition:

Unmanned systems are any type of remotely controlled aircraft, vehicle, or watercraft that are used by a wide variety of industries, the military, emergency response and security agencies, and agriculture operations. Well-known examples include military use of unmanned aircraft, or drones, in conflicts, Amazon's testing of unmanned aerial systems to deliver packages, and the use of submersibles for deep-sea applications too dangerous for humans such as oil and gas exploration. Unmanned systems research and development include



GE's Raven for pad and pipeline inspection; developed by OSU in collaboration with the GE Oil and Gas Technology Center.



the vehicle itself and systems required to control it and perform its function. This includes the autopilot, communication systems, and payload, as well as advanced software algorithms to meet the growing need for increased autonomous operation.

Currently at OSU:

OSU has stood up the Unmanned Systems Research Institute to focus on fundamental and translational unmanned systems research to design, test, and evaluate new applications of unmanned technologies. USRI is the hub of basic and applied research requiring collaboration involving cutting-edge facilities and talent from OSU and across Oklahoma. Disciplines currently and potentially involved include aeronautics, aeroacoustics, materials engineering, computer science, electrical engineering, geography/geospatial technologies, and many other areas. OSU is

home to a growing portfolio of UAS research projects. Just a few include the development of UAS to collect atmospheric data to better understand weather and improve forecasting and severe storm warnings; develop quiet UAS to combat noise pollution; systems to aid integration of UAS into the national airspace; technologies to protect critical and military areas from unfriendly or rogue drones; systems for first response in natural and man-made disasters; UAS to monitor and inspect powerlines, pipelines, and farming operations; develop tools used in driverless cars; and expand the ability of unmanned systems to function independently of operators and to autonomously react to changes in the operational environment. OSU leads an industry team in the support of quiet UAS platforms for the Department of Defense and other government agencies.

OSU unmanned systems research includes technologies and standards to ensure public privacy and airspace safety

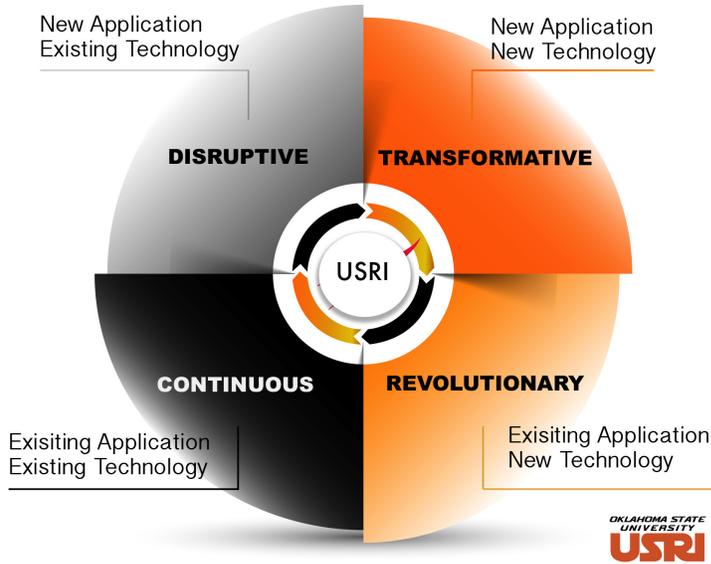
Additionally, CEAT operates a surrogate Group 4 UAS manned aircraft (King Air C-90) that can be rapidly configured to support sensor and payload development and testing as well as other remote sensing demonstrations that require a cost efficient and responsive airborne test platform.

Potential:

Commercial and military use of unmanned systems that fly, swim, roll or crawl has exploded in just the last decade. The growing realization of capabilities and need for new unmanned technologies has given OSU an ideal advantage that has come from building a program from the ground up. With a national reputation for unmanned

systems research, development, and educational opportunities, OSU is a leader in devising and engineering new applications. OSU is a highly sought-after partner for companies, government agen-

over 5,500 facilities throughout the world. Aligned with this role, USRI is focused on providing US military and civilian agencies reliable threat assessments and technology evaluation of emerging risks posed by UAS. The rapid development of UAS technology has stressed government agencies that lack the ability to rapidly respond. With OSU's expertise, USRI has become a highly sought after resource to educate federal and other government agencies about this new hazard. Counter-UAS technology will be needed to ensure the safety of civilian airspace from rogue or errant drones and protect



cies, and the military seeking help turning concepts into reality. The growth of OSU's Unmanned Systems Research Institute adds specialized resources and capabilities to Oklahoma's already robust aerospace industry, and to the critical industries of agriculture and oil/gas extraction. A vital mass of research talent, facilities and funding at OSU will continue to fuel the university's and state's leadership in this fast-growing industry.

A major future thrust of the OSU USRI is the development of a Counter-UAS Center of Excellence. In addition to the expansion of current research efforts, major Counter-UAS thrusts include flight inspection capabilities for the FAA to aid in their role of ensuring the integrity of airways and instrument approaches for

US forces from weaponized UAS technology, while at the same time ensuring US technological dominance.

Conclusion:

More than two decades of unmanned aerial vehicle research has made the university a national leader in unmanned systems. A growing demand for commercial applications of unmanned systems means OSU's impact has nearly unlimited potential. Cutting-edge research, facilities, expertise, and talented engineers and scientists position OSU at the center of unmanned innovation and leadership in the state and nation.

For more information, contact the OSU Vice President for Research at vpr@okstate.edu or 405-744-6501.



Jamey Jacob, Ph.D.
Director of the Unmanned Systems Research Institute