OAK RIDGE NATIONAL LABORATORY

Autonomous Systems Research

Enhancing national security through air, land, and sea

Oak Ridge National Laboratory's Autonomous Systems Research Group provides uncrewed vehicle systems research, development, engineering, and operations in support of national security missions. As a part of the US Department of Energy, the group leads uncrewed systems research initiatives for a variety of government programs with applications such as nuclear security, emergency response, and environmental research.

RESEARCH INITIATIVES

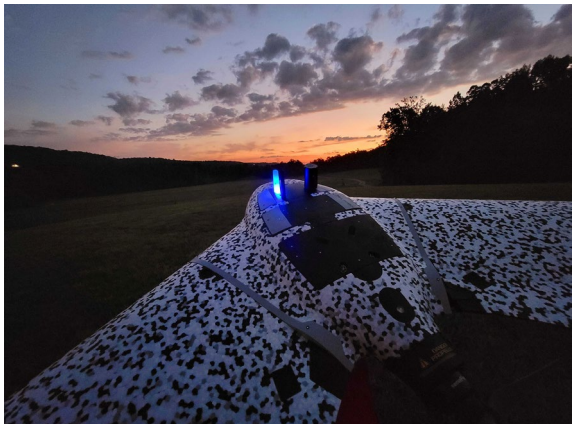
Advancing Autonomy: Researching technologies and developing solutions that advance the capabilities of UxS and address unique government needs related to the widespread adoption and deployment of autonomous uncrewed vehicles.

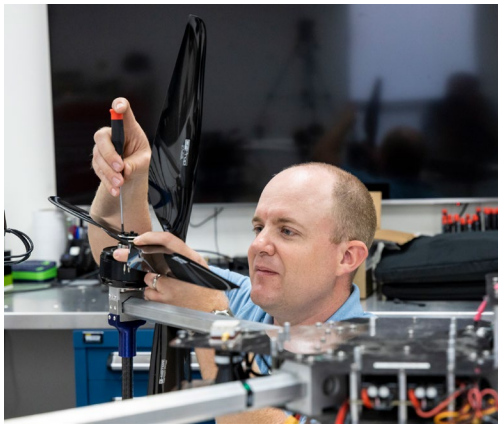
Edge Computing: Developing custom hardware and software to leverage advanced edge-computing SoMs and conduct research in class-leading machine learning, artificial intelligence, and edge data processing for a variety of applications.

Novel Communications: Researching novel approaches such as multimodal network architectures and Artificial Intelligence to develop the next-generation communication solutions and address challenges with operating uncrewed autonomous vehicles in operationally relevant and austere environments.

Nuclear Security: Leveraging ORNL's expertise in nuclear science to enhance the security of nuclear materials by researching innovative tools, technologies, and tactics to improve security, enhance response efforts, and support global nuclear non-proliferation.

Operations and Test & Evaluation: Researching innovative methods for operating next-generation autonomous vehicles, providing technical research support for data collection activities, and providing subject matter expertise to partner agencies regarding hardware, workflows, and operational deployments.





KEY CAPABILITIES

Custom Ground/Air Vehicle Development – Our team of engineers design and build custom uncrewed and remotely operated vehicles for a variety of government and national security applications.

Next-Generation Networked Communication Technologies – Engineers and software developers at ORNL have unique experience with developing next-generation multi-modal communication systems enabling truly global command and control of uncrewed systems in a size, weight, and power constrained environment.

Test and Evaluation – ORNL has the most diverse fleet and one of the largest and most experienced teams of operators within the US Department of Energy which provide test and evaluation support for many different aircraft and payloads.

Remote Sensing, Mapping, and Geospatial Science – Leveraging ORNL's expertise in geospatial science, our team of scientists conduct remote sensing and geospatial research utilizing a variety of custom and commercial sensors to answer questions in support of the national security mission.

Training – Our staff consist of multiple FAA and manufacturer certified instructors with specialized experience in operating in operationally relevant and austere environments.

TECHNOLOGY SPOTLIGHT

- **MAVNet** – The Multi-modal Autonomous Vehicle Network is a next-generation communications solution which addresses the challenges associated with operating multiple vehicles in remote and austere environments.

- **Mapster** – Designed to address the challenges associated with managing large amount of disparate data sources, the Mapster system provides a solution for collecting, organizing, transferring, and storing geospatial data to improve data quality and efficiency.

CONTACT

Andrew Duncan | Sr. Research Scientist and Group Lead | duncanam@ornl.gov

Oak Ridge National Laboratory is managed by UT-Battelle LLC for the US Department of Energy

OAK RIDGE National Laboratory | U.S. DEPARTMENT OF ENERGY | Office of Science

NATIONAL SECURITY SCIENCES