

Researchers Study UAV Uses

By Lisa A. Wright

The military routinely uses unmanned aircraft in combat and espionage abroad, but the FAA is cautious about allowing UAVs to mingle here in the United States with commercial jets, helicopters, small airplanes, blimps, hot-air balloons, parachutes and others. However, researchers at universities all over the world are working on ways to integrate manned and unmanned aircraft together.

Alaska's wide open airspace, varied terrain, extreme climate and sophisticated flying community make it the ideal place to develop and test federal rules that would prevent collisions and allow the FAA to comfortably sanction unmanned flight. State and federal agencies asked Congress in July 2006 to invest about \$90 million to establish Alaska as a test base for maneuvering unmanned aerial vehicles in domestic skies.

The University of Alaska Fairbanks' Poker Flat Research Range is already prepping for trial flights that could help shape future FAA regulations. The school's new \$1 million unmanned aircraft system should give FAA officials more clues about specific precautions and instruments the agency should require, said Poker Flat manager Greg Walker in a news release. "Our equipment to detect other aircraft is not FAA-approved because there's not a standard. We're helping them find one."

In Utah, a Brigham Young University team of scientists and engineers, funded by the U.S. Air Force Office of Scientific Research, has recently demonstrated increased consensus capabilities among unmanned air vehicles. The research involves developing methods by which multiple UAVs can coordinate with one another.

In one experiment, the team conducted simultaneous arrival flight tests involving three UAVs. The team was able to coordinate the UAVs' arrival over a target location to within fractions of a second. Another flight test demonstrated a successful UAV coordination, even in the presence of inconsistent information. The researchers conducted a successful perimeter tracking exercise where the changing perimeter emulated the growth of a forest fire. The exercise involved a team of UAVs coordinating their efforts to divide the changing perimeter equally among the UAVs.

One of the team's most exciting research developments refers to a "corridor-following method." Utilizing miniature optic-flow sensors, these methods allow small UAVs to navigate through complex terrain like canyons and city environments. "Maneuvering small UAVs in urban terrain will require local proximity sensors to detect the buildings and other obstacles," said Professor Beard, research team co-leader. "The optical flow sensor that we have developed under AFOSR support plays the same role for small UAVs that ultrasonic sensors play for mobile robots." In addition to offering potential benefits to a variety of military applications, the research will contribute to civil and commercial applications such as forest fire monitoring, law enforcement surveillance and border patrol.

Researchers at the University of Alabama have been working on an unmanned aerial vehicle called the Flying Bassett as well as an unmanned ground vehicle nicknamed the Rover. Bassett was initially developed through a grant from the Department of Justice in support of homeland security. Before getting started in 2004, researchers interviewed police organizations in North Alabama to better help them develop the hardware.

This autonomously guided helicopter can operate in flight by either responding to pilot directions or through programmed GPS coordinates. The Bassett can carry up to 20 pounds including a digital camera, an infrared camera and a three-channel video switcher. It can hover for 60 minutes and has a range of up to 25 miles. The lightweight, unmanned ground vehicle called Rover has four-wheel-drive and is one foot long and weighs about three pounds. The two unmanned vehicles are seen as tools to give vital information to emergency personnel who may be called out for a disaster, whether it is a toxic chemical spill, a nuclear disaster or some other type of emergency.

Researchers at universities that currently explore the emerging field of unmanned flight systems include the Georgia Tech's UAV Research Lab; University of Kentucky; University of Sydney (Australia); University of Ottawa (Canada); Iowa State University; University of California-Berkley and the University of Colorado, to name a few.

Online UAVs Resources

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www.ioeaaa.faa.gov

www.uav.wff.nasa.gov

www.uvonline.com

www.defenselink.mil

www.uavs.org

www.unmannedaircraft.com

www.flightglobal.com

To learn about the U.S. military's 25-year forecast for its use of UAVs, download the 213-page document at: [www.fas.org/irp/ program/collect/uav_roadmap2005.pdf](http://www.fas.org/irp/program/collect/uav_roadmap2005.pdf).