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INNOVATION HIGHLIGHT

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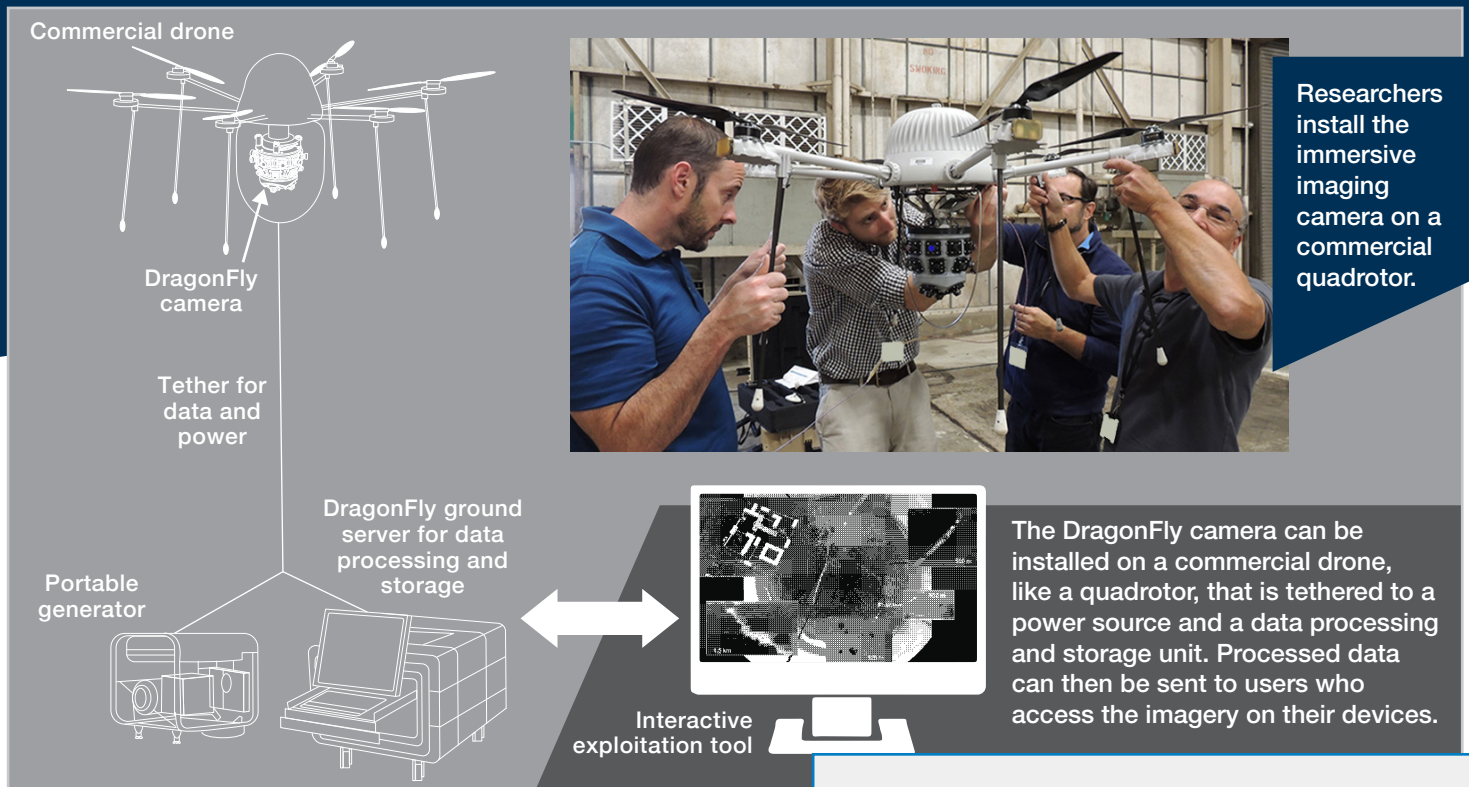
DragonFly: A Drone-Mounted Wide-Area Imaging System



DragonFly, a lightweight, low-power motion imaging system, can be mounted on a mobile platform to capture imagery over a 360-degree horizontal field of view. This system can be rapidly deployed on a tethered drone to provide high-resolution imagery of the area above or below the drone. DragonFly is valuable for monitoring events, areas, or venues, such as outdoor concerts or natural disaster sites, that lack towers, poles, or fences on which stationary cameras can be mounted.

KEY FEATURES

- The multi-tiered camera array is mounted on a tethered uncrewed aerial vehicle (UAV) that can hover at heights of up to 400 feet
- The tether provides power to the UAV and camera array, and serves as a data link from the UAV and camera array to a ground processing system that receives, processes, and stores the imagery
- The ground server uses data from a GPS receiver and an inertial navigation system to remove from the imagery any motion artifacts caused by movement of the UAV

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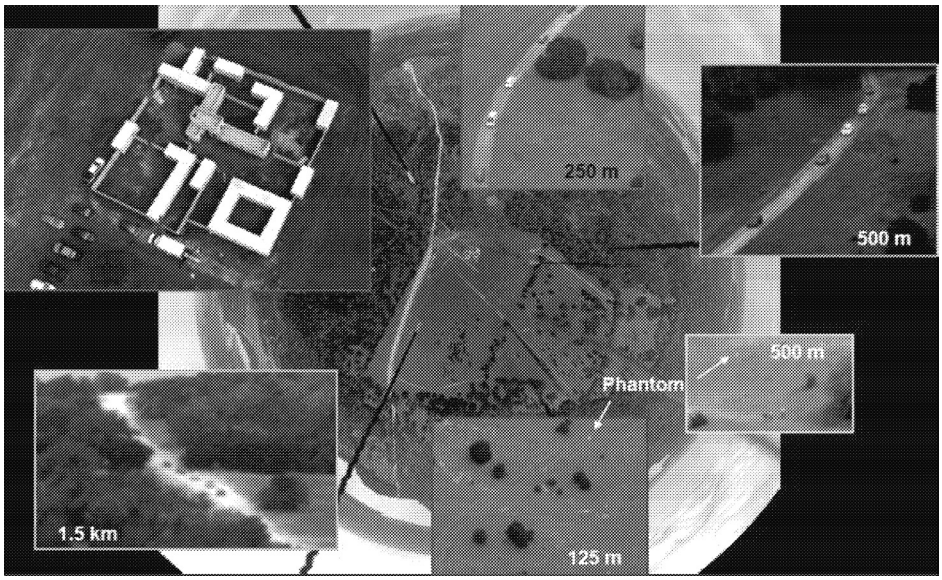
Background: The Initial Immersive Imaging System

Increasingly, cities and large venues rely on video surveillance to support security operations. At strategic locations, cameras installed on building exteriors, interior walls, fences, and poles capture views of activity within their field of view. Because single-field-of-view cameras create a disjointed mosaic of a scene, MIT Lincoln Laboratory in partnership with the Department of Homeland Security developed a unique video imaging system that provides security personnel, law enforcement, and first responders with a high-resolution, continuous 360-degree panorama of an area, allowing them to gain a comprehensive understanding of ongoing activity.



Shown are images captured and processed with DragonFly while its UAV was hovering about 400 feet above a small compound in forested countryside. The camera array used three tiers of cameras each with a different fixed focal length. The ground server stitches together overlapping images to produce a wide-area image of the entire area below the UAV and closeups of any region within that area.

Advancement: The DragonFly

Although that imaging system has unprecedented surveillance capabilities, it is too large, weighs too much, and consumes too much power to be practical for mobile applications or quick deployments. To remedy this drawback, Lincoln Laboratory researchers developed a smaller, lighter, more efficient wide-area motion imaging system, Dragonfly. Mounted on a UAV, it surveils 360 degrees of an area above or below the aircraft. It has fewer components, uses less expensive optics, and is simpler to deploy and operate. It can be moved quickly and integrated easily with other systems (e.g., in hours or even minutes). The drone's tether supplies electrical power from a ground station to the UAV and DragonFly, relaying commands to the UAV and connecting DragonFly to a remote server. The server enables DragonFly to process and to compress and store georectified (correctly localized) motion imagery in an archive.

An interactive exploitation tool with a display/viewer connects to the server to allow users to view processed imagery in real time or in playback mode. Users can identify and track moving objects in the motion images. A zoom feature lets users determine the level of detail they need to evaluate the scene. The ability to review archived data facilitates forensic examination of activity captured in a scene. The tool also enables the display to color correct and georectify images on demand.

INTERESTED IN ACCESSING THIS TECHNOLOGY?

Contact the MIT Technology Licensing Office
https://tlo.mit.edu/
tlo-inquiries@mit.edu 617-253-6966

U.S. PATENTS #11,662,727; 9,007,432; 9,036,001; 9,749,526

INTERESTED IN WORKING WITH MIT LINCOLN LABORATORY?

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