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Industry-Nominated Technology Breakthroughs of NSF Industry/University Cooperative Research Centers



Center for Advanced Knowledge Enablement (CAKE)

A CISE-funded Center

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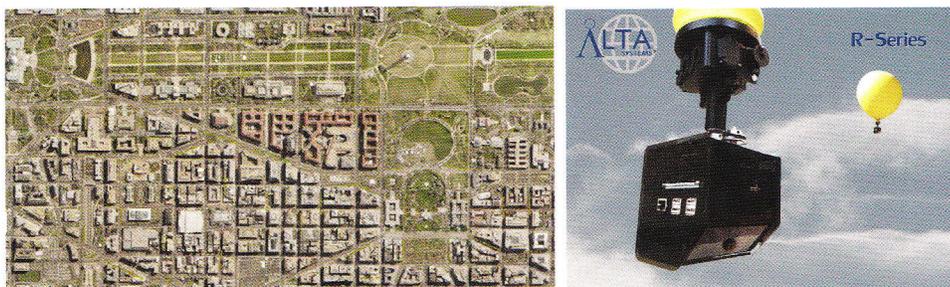
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Center website: <http://cake.fiu.edu>

Autonomous Lighter Than Air (ALTA): Sub-centimeter Aerial Photography

Lower than a plane, higher than any street view, Autonomous Lighter Than Air (ALTA) platforms provide a brand new vantage point. ALTA is a smart balloon that transmits images and environmental information from distant locations. ALTA models may be tethered to continuously monitor specific patches of land or sail on air currents along predicted wind-driven paths.



Autonomous Lighter Than Air (ALTA) Platform and its view of Washington DC.

ALTA's remote-controlled, smart balloons transmit to the Internet geo-referenced super-resolution, oblique imagery, as well as air quality data. The US patented, Federal Aviation Administration (FAA) compliant technology operates from otherwise unreachable places, higher than ground cameras and lower than most planes. Its low cost makes frequent updates cost effective. The ALTA balloons' (R series) ability to operate at low altitudes makes possible aerial photography with unprecedented detail. ALTA's image clarity is not hampered by propulsion vibration or cloud cover. Because of these advantages, ALTA photography often yields higher fidelity images than are produced by other geo-referenced imagery.

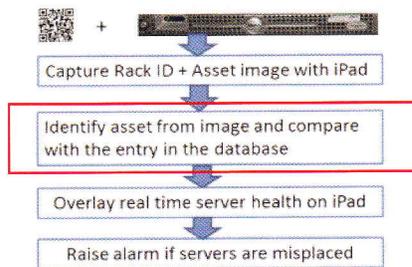
Atmospheric graphical information can be attached to the images to depict air quality and other atmospheric data. The ALTA imaging technology <http://altadrifter.com> is being combined with TerraFly at <http://TerraFly.com>, see Figure, "TerraFly Maps Enable Monitoring of Airborne Cameras," on page 31. As such, it will be provided as a service via <http://TerALTA.com>. The ALTA team services public safety, news agencies, agriculture, construction, real estate, travel and tourism. A demonstration prototype is at <http://cake.fiu.edu/ALTA>.

Economic Impact: ALTA opens a new multi-billion market for aerial photography as it produces images that are orders of magnitude higher resolution than the current state of the art. Image collection is currently accomplished from ground-based cameras, aircraft or satellites. Because ALTA is higher than ground-based cameras, it sees more. ALTA is lower than an aircraft and therefore sees better. Additionally, compared to other aerial platforms, ALTA has low cost components. For the capital outlay of one manned aircraft, 300 ALTAs could be purchased; balloons are also dramatically cheaper than drones. It costs \$100 to build one ALTA. It costs many thousands dollars to build other aerial platforms. Operations costs also are a fraction of what other aerial collections cost. ALTA missions eliminate cost of pilots, aircraft, and airports.

In addition, ALTA can be deployed in minutes and have information and images returned instantaneously. The ALTA technology is thus poised to produce much higher-quality imagery at much lower cost than current technologies, thus opening up new markets and bringing new capabilities to existing markets such as public safety, real estate, construction, environmental monitoring, disaster mitigation, and disaster recovery. By economically providing virtual "see for yourself" access, ALTA imagery will capabilities to civic and real estate land data and imagery, which are already multi billion dollar markets. In addition, it is expected that retail markets of socially networked users will approach hundreds of billions of dollars. It can also be used in public safety, homeland security, government and military arenas wherein ALTA can replace UAVs and drones with lower cost and longer, more stable flights, the potential markets are estimated to be in excess of \$500 million.

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Automated Asset Management in Data Centers



Visual identification of computing assets for efficient data center operations

CAKE researchers at Florida Atlantic University developed an innovative solution for visual asset identification using visual features of an image. Visual features of asset images are computed using complex mathematical methods. These visual features are used to identify and match asset images. A database with visual features of asset images was built for every distinct asset that is typically present in large data centers.

A data center is a facility that hosts computer systems, servers, power supplies, storage systems, and other related computing equipment, referred to as assets. The size and number of these data centers are continuously increasing to accommodate the need and demand for web based

applications and services. Assets are mounted in racks and a typical rack can accommodate up to 42 assets depending on the asset size. Large data centers have thousands of racks and keeping track of these large numbers of assets manually makes it very tedious and highly prone to errors.

Human errors continue to be the greatest cause of unplanned downtime in data centers. Downtime of assets in data centers lead to slow or unavailable information services on the Internet. Solutions that minimize human input in asset management will lead to higher productivity and reduced downtimes.