



DJI Phantom over Eeyore's birthday party.

# How You Can Get Involved with Unmanned Aerial Systems

I recently moved from Dallas to Austin, Texas to take a position with [Surveying And Mapping, Inc \(SAM, Inc.\)](#). We chose to live downtown on the fourth and top floor at our apartment complex with a deck that looks across the lake towards Zilker Park. The park is home to the Austin City Limits (ACL) music festival and many concerts and

events, including a free summer concert series called Blues on the Green, which runs every other Wednesday night throughout the summer. Unfortunately summer in Austin is hot; too hot for us on most nights, but after the sun goes down we sit on our deck and are close enough to see some of the action. Recently, we have spotted Unmanned

Aerial Systems (UAS) flying around, surveying the area and recording the events, looking like fireflies in the night.

UAS sightings around Austin have become very common. The first time we came across one was at "Eeyore's Birthday party" this past May, (*Yes it really exists and I can only say you have to see it to believe it...Google it*).

BY ERIC ANDELIN, CP, GISP

While watching all the hippies, hipsters, pot smokers, urban families, venture capitalists, entrepreneurs, and start-up moguls that keep Austin weird, we saw up in the sky a DJI Phantom quadcopter with a GoPro camera mounted on it entertaining and filming the crowd. Following the copter we were able to track down its owner who told us that he also does work for the film industry but had started out capturing images of high-end homes overlooking Lake Travis for real estate agents. That evening I did a little more research and found out that DJI North America is based in Austin and has a more than one type of UAS platform available for sale in the US, including the DJI S800 which is fully capable of carrying a high quality DSLR camera.

Neat stuff these small UASs. They are very easy to fly, can be ordered over the Internet or picked up at better hobby shops ready to fly. Any young entrepreneur who is into photography can purchase and rapidly learn to fly a DJI Phantom for about \$700, then add a stabilized mount and GoPro for another \$400 and start capturing HD video. Once mastered, they can upgrade to an S800 or other more professional system like Allied Drones Hornet Cam. In a place like Austin or any other booming city you can find UASs flying for fun in parks and at events capturing amazing videos and imagery. It is perfectly legal as long as one flies under the FAA's guidelines for R/C aircraft.

I see about one every other week these days, but then again I'm on the lookout for them. Interestingly, every one of them has been a quad, hex or octocopter. It makes sense, with vertical takeoff and landing (VTOL) craft the launch footprint is very small.



MAPPS Policy luncheon on UAS at AUVSI.

They are controlled by typical R/C controllers or via tablets and can have onboard GPS and IMUs that allow for planned flight routes. Some have auto-return functions built in to bring them back safely when they reach their battery limit or lose communication with the operator. The barrier to entry is almost non-existent given that you can learn to fly them quickly with not much initial investment.

While these platforms are inexpensive, they should not be considered toys. Their popularity in the hobby world on one end and in the defense industry on the other is driving the development of smaller and cheaper GPS, IMU/telemetry technology for autopilot navigation, First Person Viewing (FPV) technology for safety, gimble mount technology, and the miniaturization of LiDAR. Further downstream there is also an infusion of new entrepreneurs rethinking processing software for mapping and digital terrain modeling through pixelgrammetry in some

instances via real-time downlink or through cloud-based methodologies.

This is all great news for those of us in the mapping profession. While this infusion into development currently revolves around small UASs—both VTOL (vertical take-off and landing) and fixed wing—be very aware that this same development is being ported to more robust systems that can carry professional grade payloads. Large amounts of money are being invested in these technologies. Recently Airware, the makers of one of the more popular micro to mid-sized UAS autopilots, received \$10.7 million in Series A funding.

So why aren't we seeing a wave of new aerial acquisition companies based on these small UASs? There are two answers: 1.) We are. Just Google UAV aerial photography and you will find them in your area. 2.) It is still illegal to fly a small UAS under current FAA guidelines for R/C aircraft for commercial purposes. [FAA Advisory](#)



Texas A&M's fabrication shop.

**Circular 91-57:** FAA guidance says that model aircraft flights should be kept below 400 feet above ground level (AGL), and should be flown a sufficient distance from populated areas and full scale aircraft. However, the FAA later published this clarification in 14 CFR Part-91 *“The FAA recognizes that people and companies other than modelers might be flying UAS with the mistaken understanding that they are legally operating under the authority of 6 AC 91-57. AC 91-57 only applies to modelers, and thus specifically excludes its use by persons or companies for business purposes.”*

MAPPS, ([www.mapps.org](http://www.mapps.org)), the association of private sector geospatial firms and its members are aware of many companies currently offering aerial photography and/or aerial mapping services illegally by the FAA's definition. As a board member of

MAPPS, someone employed in the geospatial community, and a fan of this technology, I can emphatically say that we would very much like this situation to change. However, we as geospatial professionals have to operate under the existing FAA guidelines, while also lobbying for changes to the law, which we are deeply involved in. Some of our member firms have begun operating UASs outside of the contiguous United States. Other member firms are poised and ready to provide professional grade systems once regulations permit their use. At the AUVSI conference held this month in Washington D.C., MAPPS hosted a policy luncheon with a panel of key congressional staff directly involved in UAS related legislation and policy. The discussion ranged from distancing ourselves from media's use of the term “Drone”, to highlighting applications where UASs are being used

for agriculture, pipeline inspection, vegetation encroachment and so on.

So where does this leave us? The FAA is supposed to prepare a plan to open U.S. skies in 2015 to the use of unmanned aircraft by public agencies and private sector firms. We are all collectively holding our breath. Recently the FAA approved two types of UASs for operation in Alaska for pipeline inspection and iceberg monitoring. It is possible to gain access to limited airspace now through a COA (Certificate Of Authorization) for R&D purposes.

Who has a COA and how do I get one? That's a challenge in itself. One route is through a partnership with an agency or university that currently has one. Some DOTs and agencies that would be considered first responders such as police departments have COAs as well. Many of us are currently looking at R&D opportunities with universities where we can “piggyback” on their COA. This is an excellent path in my opinion as this type of partnership benefits the university system, its aerospace and robotics programs, and our profession as a whole.

Typically universities are already operating UASs within a defined area under their COA. Not only are they flying, but they may offer payload testing where you can bring your own sensor and let them collect data for you. They can offer assistance with safe, effective operating procedures and drafting documentation for these procedures. Universities may be able to assist in drafting a request for a project specific COA, and/or airworthiness certifications as well. Working within an approved environment allows for the incubation of UAS technology and its application in future implementations



Dr. John Valask, Ph.D, Department of Aerospace Engineering and myself looking over one of the Universities test platforms.

within our profession. In addition many of the university students will soon be joining the profession, which will be of benefit to the private sector. It's a win/win. Working with a university does not put us into commercial operation since we still do not have access to the skies above our projects, but it does allow us to prepare and be ready when the FAA does grant access.

It seems we have two worlds colliding. We have on one side the geospatial professionals who currently gather this information with full scale aircraft and helicopters, processing data to mapping and/or survey standards with the licensure and qualifications behind them

to support this type of work. They would love to service their clients with these new UAS acquisition platforms, but cannot due to current FAA regulations.

Then we have those entrepreneurial hobbyists looking for more opportunity and uses for their nimble quad, hex, or octocopters. Sure they are currently pushing the boundaries of this technology while operating illegally, but in doing so they are creating the demand that is driving improvement in the technology and supporting the eventual conversion from hobby to professional use. For the first time in a long time I am very excited about the changes coming to our profession as a result of this technology and for

the pioneers, entrepreneurs, students, universities, hobbyists and professionals who are driving it. ■

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