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The Game of Civilian Drones

What are the Rules?

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ON A RECENT Sunday morning, I was hiking up the back streets of Soledad Mountain in La Jolla. Arriving on top and prepared to enjoy the stunning aerial view of our Pacific coastline, I suddenly heard a disturbing, loud, buzzing sound. As I poked my head around one of the black, granite-covered walls of the Veterans Monument, a small robot-sized helicopter jumped out, hovering just above me.

“What the heck?” My eyes were soon drawn to its source, a man

standing near the edge of the main parking area operating a small remote control, with the drone now buzzing over toward him. I was staring at, in today’s parlance, a drone. Curious, I walked over and said, “Hi, I was wondering, do folks need some kind of permit to operate near a Veterans Memorial site?” The drone operator did not respond. Within minutes, however, he was gone.

End of story? I think not.

In fact, this is just the beginning. Just a wild guess, but I'm betting the drone operator did not respond to me because in that moment neither of us actually knew what the rules are for flying these high-tech robots over our metropolitan area in general, or over a public park and war memorial site in specific. And that is exactly the problem.

Most people associate the word "drone" with the large military pilot-less bombers that are being used by the U.S. government to track down and fight terrorists in the Middle East and elsewhere. Far less known is the fact that, in the next year or two, the skies over major cities like San Diego could be crowded with smaller, flying, robot-sized "civilian drones." Hundreds of them, perhaps, and sooner than we might imagine. And thousands more across other cities in the U.S. Some estimates claim that anywhere from 7,500 to 30,000 civilian or "commercial" drones could be flying the friendly skies over our cities in the next decade.

What is a Drone?

Drones or "unmanned aerial vehicles" (UAVs) are generally defined as vehicles that weigh less than 55 pounds and typically fly under 400 feet, and never anywhere near airports, although flight patterns remain one of many points of uncertainty in the 'game of drones.'

Entrepreneurs and commercial giants see a multi-billion dollar enterprise in the making. Amazon.com would deliver packages to its

customers with "octocopters," flying robots now being designed by their techies. Dominos Pizza imagines drone-delivered pies arriving at warp speed to your front door. Real estate companies already use small drones to photograph high-end properties. They may be flying over your home right now, and without your permission. Police departments are contemplating deployments of crime-busting drones.

Where will it all end?

Will the heavens soon be filled with flying robo-copters and drones bringing newspapers, submarine sandwiches, or the latest Netflix DVDs to your doorstep? Will our city skies soon remind us of the iconic scene in L. Frank Baum's *The Wizard of Oz*, where thousands of winged monkeys darkened the heavens over Dorothy and her friends?

As I write this, the cheerleaders for the billion-dollar drone industry are lining up: chambers of commerce, high tech companies, drone manufacturers and operators, real estate interests, elected officials and their colleagues in the local media. In San Diego, newspapers and TV stations are salivating over the prospect of a "drone industry ready to take off," to quote a recent headline article.

San Diego is home to two of the largest manufacturers of military drones—General Atomic and Northrup Grumman. Drone production generates a reported two thousand jobs in the region. Locals here were not happy that the Federal Aviation Administration

(FAA) bypassed California when it chose six national test sites for drones (Nevada, Texas, Alaska, North Dakota, Virginia and New York were selected). The California drone-lobby complained the state did not have sufficient support from the governor and other politicians. But drone lobbyists never mentioned the reasons politicians remained on the sidelines.

Urban drones will dramatically impact the quality of life in cities across the United States, and beyond. The ecological, public safety and privacy implications are poorly understood at this point. This is a huge social and environmental policy concern that demands lively public debate. Yet, to date, dialogue has remained muted.

It's time to let the drone debate out of the gate, because, like them or not, civilian UAVs are on their way. The subject is all over the media, but too many issues remain unclear. Meanwhile, we face a pivotal moment of history. The U.S. Congress has instructed the FAA to craft a set of regulations for the UAV industry by September 2015. The stakes are high.

Balance between technological advances and social function

Let's be clear – there are vital and socially useful functions that small drones can play – from monitoring ecological destruction (including wildfires) in forests and national or state parks, to aerial crop surveillance on large agricultural zones, mapping weather systems, tracking

storms, hurricanes, and other natural disasters, searching for persons lost in the wilderness, and tracking crime suspects. Most of these positive uses will occur in open spaces where a few drones won't significantly intrude upon millions of inhabitants.

Every technological advancement must be weighed against the burden it places on society. When we consider the future of drone technology in the places where most Americans live – our cities – we need to think about public safety, the environment, citizen privacy, trespass, noise, nuisance, impacts on wildlife, and other possible intrusions.

are the limits on privacy if a flying robo-cam is perched five or six hundred feet over your rear garden shooting video and still photographs of you relaxing in your hot tub? At what point does this constitute a trespass or a legal nuisance?

For players in the multi-billion dollar drone industry, given the current climate of lawlessness, it's game on. Drone lobbies, Facebook pages, and twitter accounts are multiplying. Legions of followers are lining up. A partnership is being forged between the real estate industry and drone photography agencies. Properties will be increasingly viewed and sold via aerial drone imagery.

FAA Rules and Permits

Some users will tell you that if they keep their drones below 400 feet elevation, they don't need FAA permits. Not true. FAA rules state that, without a permit, any venture in the skies involving a financial transaction is illegal. But to avoid applying for a permit, some companies that use drones to shoot videos and photos for high-end properties claim they are not being paid for photographs. They argue that drones are "merely a hobby" (though they are compensated later on a consulting basis). This is one of many skirmishes as players clash in the brave new world of civilian drone flights.

All airspace lies within the Federal government's aviation regulatory domain. Civilian drones challenge legal and environmental notions of airspace, property rights and the larger public interest. Airspace rights were

The big question, however, is what happens when drones are allowed to fly over high-density urban areas. How many should be permitted? Where will they be allowed to fly, at what heights, and under what set of Federal aviation rules? Will these new, remote-controlled robo-copters be free to hover above our homes, streets, schools, or public parks?

How will the quality of life of America's more than two hundred million citizens living in metropolitan regions be altered when hundreds or possibly thousands of small drones, operated by private owners with limited regulation, fly regularly over streets, back yards, or the neighbor's driveway? What



first debated back in the 1940s. The landmark U.S. Supreme Court case (*U.S. v. Causby*, 1946) established a link between private landowner rights on the ground and the immediate airspace above their property. Over the years, the courts have ruled on the differences between “navigable airspace” (the space commercial aviation uses for flights) and what, back in the U.S. Supreme Court ruling of 1946, Justice William Douglas called the “immediate reaches of the enveloping atmosphere,” or the zone just above the private owner’s property, which the courts argued deserves some measure of protection to allow the property owner to enjoy the use of his/her land.

Critical Buffer Zone

The buffer zone of 500 to 1,000 feet between navigable space and private land will become the critical zone of contention between drone users and folks on the ground. Further up, however, “navigable airspace” evolved as a legally protected public domain for both the routes used by the air travel industry, as well as those occupied by private civilian planes. Folks on the ground can legitimately challenge the drone lobby by asking: at what point does an invasion of property occur from the air, either in the form of a “taking” (when that invasion is done by a public entity like a police department) or a “tort”/trespass on private property, when the invasion is done by a private entity (for example, a commercial drone)?

Larger vehicles, like jet airplanes or helicopters, pose obvious threats

to occupants of land and property, which is why government agencies over the years (mainly the FAA) defined a set of rules for regulating their flights over human settlements. These rules include an intricate system of airport flight zones, approach and departure routes, as well as elevation controls for flying and landing. With drones, however, the science of regulation is going to be more complicated, since drones are smaller and will fly closer to the land. Their diminished size means they won’t likely be as noisy as planes or helicopters, and won’t create the levels of vibration and dust or even the immediate safety threats from crashes of larger flying machines. This might fool us into believing their impact is mostly benign.

Whose Drone Is That?

How will you know whether the drone over your property is a police entity, or a private “peeping tom” simply looking down over you? It’s increasingly possible for anyone to go on-line and buy a drone. And that would be dangerous. Consider that, since drones will fly lower, and since there may be a lot of them (thousands over every city?), it’s also more likely they will literally “get in our faces,” and much closer to, if not directly over, our private properties, the places where we live.

We also don’t know the extent to which police departments and/or the Federal Department of Homeland Security will begin to use drones for surveillance purposes, and what kind of data will be collected and stored.

What will be the cumulative environmental impacts, from noise to the toxic release of chemicals or dust, of thousands of drones flying over our neighborhoods? Apologists for the drone industry, when questioned about its impacts, always pull out the “it’s cutting edge technology!” card. Missy Cummings, a former navy pilot and current professor of engineering at Duke University told the CBS *60 Minutes* program in their “Drones over America” segment that “I’m willing to accept the possible negative consequences of the technology because its revolutionizing science and technology.”

Really? Nuclear power is also revolutionary technology, but its dangers are leading governments to reconsider and even abandon its production (see the 2011 nuclear disaster in Japan). Cell phones are another advanced technology, yet the number of accidents or deaths from texting or chatting while driving remains a scary and unresolved public safety concern for this “revolutionary” technology.

It’s one thing to have drones policing the wilderness, or checking the safety of an energy pipeline across miles of empty desert or arctic zones. It’s another to have drones flying over high-density cities. With the Congressional deadline for FAA rules looming ever closer, America needs a more informed public debate on the ecological, public safety, legal and privacy implications of civilian drones in our metropolitan areas.

Let the game of drones begin. **P²**