14 CFR Part 107 (UAS) – Drone Operators Are Not Pilots

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Abstract

"Owning a drone does not a pilot make" (Morritt, 2017). Why does only answering a few questions give someone the ability to fly through the skies like piloted aircraft? The ability to obtain a Part 107 Remote Pilot License could be made more difficult and like manned aircraft have harsher penalties for violations from individuals who are not pilots. A series of events have happened and several recommendations are shown in the attempt to change the way non-pilots have the ability to receive a "pilots" license. Interviews from professionals agree that the Part 107 license needs to be changed.

KEYWORDS:

Drone, sUAS, UAS, UAV, Unmanned, Aerial, Vehicle, System, Systems, Pilot, Helicopter, Airplane, CFR, Part 107, Part 333, Operator, Operate, Crash, Fly, License, Damage, FAA, Federal, Aviation, Administration, Robot, Zombie, Aircraft, Flight, Machine, Weather, Airspace, National, Aerodynamics, Knowledge, Accident, Catastrophe, Mass Casualty, Human, Factor, Swiss Cheese, Solution, Solutions, Public, General, Safety, Safe, World, United States, United, USA, America, Military, Rules, Regulations, Social, Media, Incident, Device, Data, Temporary, Restriction, TFR, Football, Stadium, Report, Permission, Altitude, Sheriff, Purpose, Landing, Police, Radio, Control, R/C, Model, Airport, Air, Traffic, Controller, ATC, New York, For Hire, Commercial, Invincibility, Fallacy, Psychology, Psychological, Photo, Photograph, Photography, Takeoff, Educate, Education, Manpower, Hobby, Hobbyist, Rated, Purchase, Government, Delivery, Delivering, Ignorance, Anti-social, Disorders, Achieve, Maslow, Certified, Instructor, CFI, Transportation, Security, TSA, Aeronautics, Commerce, Act, Regulate, Requirements, Guidelines, Club, Clubs, Information, Recreational

Introduction

There is a growing trend of non-pilot individuals that are able to buy Small Unmanned Aerial System (sUAS) because the cost is fairly inexpensive, and they can be bought anywhere by anyone. These are basically toys that can cause a vast amount of damage. Because they are so readily available, an individual can open the box and fly it immediately anywhere. Because the Federal Aviation Administration (FAA) put out a new set of rules that are Federally enforced by 14 Code of Federal Regulations (CFR) Part 107, it says that pilots cannot just go fly these small aircraft anywhere or however wanted.

The word *drone* makes one think of robots or zombies. An object innocuously doing the same thing over and over again with no resolute as to why it is doing it that way. Just like a warehouse worker moving from aisle to aisle filling his or her cart with products to be shipped out and his or her only concern is to do it faster so more money can be earned. Saying an object is a drone or droning on means it is really boring. The word *drone* just does not sound professional. So the industry has started using acronyms or short phrases to state what these devices actually are, like unmanned aircraft or remote piloting for "pilots." The word *drone* has become synonymous with death and destruction in foreign lands and in the USA with war, causing those that fly for agriculture or film to get a bad reputation. These are not drones blowing the enemy up, but they are pilots and vehicles doing a job to earn a living.

What does it mean to be a pilot. To the author, it means to be in control of a machine that moves through the air much like a car moves on the ground. To be a safe pilot, pilots must know as much information as he or she possibly can about the weather, airspaces, the aircraft, and the aerodynamic forces that are affecting him or her the entire time in the air. As a sUAS pilot, pilots

still must know all of this because of operating in that same airspace as manned aircraft, as well as other unmanned aircraft, and do not want to cause an accident or possibly kill someone.

This study investigates the need to change and update Part 107, by mandating non-pilot sUAS operators have the same knowledge base as manned pilots. When stating manned aircraft, it means that a person is in the aircraft flying the machine. Unmanned means no human is in the aircraft operating it. A pilot is one that flies an airplane or helicopter and is licensed to do so. A non-pilot is someone that is not a pilot but can be licensed to fly sUAS. It is important because these operators are in the same airspace or National Airspace System (NAS) as other aircraft that have a 180 degree field of view compared to a tiny screen to look at. It has already been shown in the news that many people fly these aircraft where they should not and get into trouble, which damages other licensed remote pilots who are doing it the right way (See the Literature Review for examples). One day a catastrophe may happen, and this study is to discuss some possible solutions to change the Part 107 process that may help to keep the general public safe and everyone else involved around the world. Individuals who buy these sUAS aircraft need to be educated on operating them properly.

Literature Review

In a timeline of some recent incidents involving drones from 2104 forward, it has been shown that the incidents occurred before the rules came out, but also increased in frequency after the rules came out. Could this be due to the rules being too lenient, or is it because the aircraft are much more acceptable and sought after by non-pilots? It could also be that the costs have come down significantly for these toys. Social Media is pushing these devices to become more popular, and everyone wants to have his or her photos be more spectacular than the next person's photos.

The following is a recount of the incidents/accidents that have happened, broken down by recent years. There is not much information about non-military devices before 2015; however, in November 2014, according to the FAA's Accident and Incident Data System (AIDS), an individual was flying his sUAS in a Temporary Flight Restrictions (TFR) area, and while landing, struck someone in the parking lot next to a football stadium (Federal Aviation Administration Report # 20141115021999I, 2014). This could be a place this pilot should not have been flying. The operator was not a licensed pilot or Part 107 (at this time before August 2016, it was Part 333) operator. (Fly for Fun, 2017)

Mid 2015 shows more activity with these small aircraft, and in May 2015, another AIDS report shows that a plane flying at an altitude of 5,500 feet reported a significantly sized drone was near them. (Federal Aviation Administration Report # 20150519012399I, 2015) Due to the color, it may not have been a military Unmanned Aerial System (UAS) or a civilian one that may or may not have had permission to be at that altitude. For it to be included in the reporting system means that it did not have permission to be at that altitude, and there is no reason for a

drone to be at that altitude outside of being for military purposes. The next incident was a Sheriff's helicopter reporting that a sUAS was at 800 feet and came within 50 feet of the helicopter, thus causing the helicopter to file a near-miss report with the FAA. (Federal Aviation Administration Report # 20150706021199I, 2015) The helicopter reported the landing position of the sUAS, and police counseled the individual to not fly that high or near aircraft. This is a perfect example given by Dr. Sarah Nilsson, Assistant Professor of Unmanned Aircraft Systems and UAS Law, ERAU, of how the FAA is currently having law enforcement do the investigations and issue citations with the FAA's issuance of a PDF outlining this matter. (Law Enforcement Engagement, 2016) This was before the Part 107 rules came out, but the R/C regulations of "The Special Rule for Model Aircraft (P.L. 112-95, Section 336)" (Fly for Fun, 2017), were still in effect. This individual more than likely did not know the regulations because this pilot may have been just a hobbyist and could buy the sUAS off the shelf and go fly it into other aircraft without knowing the rules.

An interesting report in July 2016 described an individual flying his sUAS just 20 feet below passenger jet airliners at JFK airport in New York (Messing, P., Moore, T., & Perez, C., 2016). How this individual was allowed to get that close to the aircraft after 9/11 and how did the Air Traffic Controllers (ATC) not see this aircraft flying near the runways at one of the busiest international airports in the world will be questioned for a long time. The person was arrested for the incident. The next month is when the official FAA involvement came into effect. On August 1st 2016, the FAA released 14 CFR Part 107, and the rules and regulations went into effect for all UAS across America. There was a pause in activity as those that worked commercially tried to get registered and figure out the rules. Approximately 25,000 people either registered their aircraft or registered to get licensed within that first month (Warwick, 2016).

To operate "for hire" means to get compensated or paid to fly any aircraft to either take video and images or data with mapping software. If an individual takes anything in lieu of flying, then that individual is doing it "for hire" and must abide by Part 333 or the new Part 107. Licensed pilots have similar rules to abide by. Money, game tickets, or the fuel for the flight constitutes payment for commercial operations, and thus that pilot would be "for hire." Part 107 states that an individual does not have to be a pilot, but will need to be licensed as a UAS operator and take some tests. Since Part 107 has come out, Part 333 is now 107, and if an individual had any exemption from 333 prior to Part 107, must still follow those rules until 107 changes or the FAA says differently. (Fact Sheet, 2014)

2017 has been a year where accidents and incidents from non-pilots have been flying their aircraft out of control all across the country. A possible reason for this is the "Invincibility Fallacy" of people thinking that an accident or injury could not happen to them, according to Dr. Jonathan Gallimore, Assistant Professor of Psychology and Psychologist, ERAU. But in February 2017, there was an incident where a drone flew through a window of a 27th floor apartment and almost hit the occupant. (Celona, L., Prendergast, D., & Fenton, R., 2017) Because of this incident, Manhattan, New York has banned the recreational use of drones within the city, so this individual, if caught, will face charges. In March of 2017, it was reported that a drone was flown into the Con Edison power-plant in Brooklyn, NY and broke into several pieces upon impact. (Cohen, 2017) No one had been charged, but it shows a pattern of people flying these devices into and near places they should not be flying them. June 2017, an incident made national news when a man used a sUAS to get pictures for his personal photography website, by flying over the Goodwin fire near Prescott Valley, AZ. (Klapper, 2017) The fire department had to ground all of their aircraft due to the safety of flying near this object. According to the

Goodwin Fire Drone Suspect Arrested article (2017) “there were 14 aircraft in the area including 5 helicopters, 3 very large air tankers (DC-10), and 5 heavy air tankers flying.” With an average cost of $7,000 per aircraft per hour, this individual cost the taxpayers well over $100,000 with the grounding of the aircraft and crews. (Efrein, 2017) There was a TFR in the area, and the man was arrested for the incident.

The next examples involve the military and shows that they too are not void of having bad things happen to them. In August 2017, a military drone crashed after takeoff in Turkey a few days after another drone had crashed. (Another MQ-1 Predator Drone Crashes, 2017) No news has been released as to the cause, but it shows that the military has their problems too with Unmanned Aerial Vehicles (UAV). Then in September 2017, an Army Blackhawk helicopter crashed into a sUAS near Midland Beach, NY at 500 feet Above Ground Level (AGL). (Furfaro, D., Celona, L., & Musumeci, N., 2107) The helicopter suffered some damage and was able to land safely. The sUAS was above the 400 foot limit given by the FAA, and the individual probably did not look out for other aircraft around them. Part 107 states the operator must keep the aircraft within sight and if in first person view use a visual observer with unaided sight. (Fact Sheet, 2014) This demonstrates it may just be the beginning of more damages to come that could end up killing someone.

And then it happened; a passenger airplane collided with a sUAS in Canada while it was on final approach to an airport. “It crashed into the drone about three miles out from the airport at about 1,500 feet,” (Andrews, 2017). Granted this happened in another country, but the principles are still the same. More than 400 feet AGL and within three miles of an airport is common sense of where not to fly. How soon until this happens again, or an even worse accident occurs to a much bigger aircraft.

In an interview with Dr. Nilsson (2107), who agrees, “the process to get a Part 107 license is too easy but due to the FAA’s decreased manpower, there is nothing that can be done except to somehow educate the public with the safety of these devices.” She goes on to explain that these devices are not toys and need to be treated with respect like the hobbyist and clubs do with their machines. Some of these operators are not hobbyists, and any age group can purchase UAV’s, by only needing to be 13 years of age to be responsible for an email account or YouTube account, according to Dr. Nilsson.

In an interview with Mark Anthony Forbes (2017), a hobbyist and not a rated pilot, he states, “It would be great if the federal government was able to create more jobs for regulating the UAS industry, but I don’t think that will happen with all the budget cuts we have seen recently.” In another interview with Nick Johnson (2017), a rated helicopter, airplane and UAS pilot, he states, “It would be great to see the general public have the knowledge of the UAS industry to better aid in the work that can be done by delivering goods.” One day in the future, there just might be aircraft everywhere in the skies doing the every-day hustle and bustle. Companies could save a lot of man hours not having to drive zigzags on the roads, but be able to fly as the crow does to do a delivery.

An interview with Dr. Gallimore (2017), where many different topics and issues were discussed, he stated, “These individuals are more than likely doing these inappropriate acts due to their ignorance of the laws or their lack of understanding of the consequences to what could possibly happen like striking another aircraft.” If these individuals truly do not care about what can happen then, they need psychological help for the many personal or anti-social disorders they may have, according to Dr. Gallimore.

Methods

This research study focuses on the 14 CFR Part 107 (UAS) requirements and how it is too easy to achieve the license for non-manned pilots. The research shows how this could be potentially fatal to other manned pilots or aircraft and to the non-aviation community. This paper examines how the trend of unlicensed operators causing harm to the UAS industry and to the general public. “The Method section describes in detail how the study was conducted.” (*Publication manual of the American Psychological Association*, 2016) This topic analyzes several accidents and incidents gathered from news sources as well as NTSB reports. Several interviews were conducted with pilots, non-pilots, and professors from Embry Riddle Aeronautical University (ERAU) in which their knowledge was gathered and compared on what has been done and what can be done to make the NAS much safer for everyone. The steps are discussed for acquiring the Part 107 license currently and how those steps should be changed to make better pilots. Currently, an individual does not need any knowledge at all to fly alongside a Boeing 747 with a sUAS license, unlike the vast knowledge required by manned pilots and their licenses obtained. Lastly, there are cases of improper and dangerous uses of sUAS that have prevented critical air operations from being conducted. This is expensive to taxpayers and dangerous for lives and property because those operations could not be completed as planned.

Results

When CFR Part 107 was first released in August of 2016, it was a complicated process that no one knew what to do or how to achieve it. With further study, licensed pilots were able to figure out that they only needed to watch a two hour video on the FAA's website and have a Certified Flight Instructor (CFI) sign their Integrated Airman Certification and Rating Application (IACRA), and those pilots now had a UAS Remote Pilots license from the FAA and could now operate and get paid to fly drones. If an individual was not a pilot, would have to find the exam study questions, for which there are several hundred total, and study those. Those individuals would then have to get with a CFI and have that CFI approve their taking the exam for the FAA. If passed, it was the same process with IACRA to get the license, assuming it was the same process for manned pilots with the Transportation Security Administration (TSA) security checks.

Although that individual studied some questions, the majority of non-manned pilots still do not have the grasp of basic aviation knowledge like manned pilots do. As a manned pilot, pilots have to know basic aeronautics, airspace requirements, weather, and several other topics that help keep everyone safe from crashing or killing themselves while flying. Joe Snuffy can go into Wal-Mart and by a DJI Phantom drone and go fly it anywhere he wants too without knowing what he is doing or how he might be endangering everyone around him or in the air. He has no knowledge of flight, period, but can still get paid to video record real estate for a realtor; until the FAA finds out he is not a licensed pilot for which the ramifications are up to a $10,000 fine and revocation or loss of any future licenses and/or possible jail time. (Moore, 2017) But does the FAA have enough man-power to cover every one of the millions of individuals that now

own drones, some as big as a suitcase to ones that fit in the palm of the hand, are unlicensed and flying alongside of manned aircraft.

The trend continues to show individuals doing inappropriate acts with these devices and having accidents in places where they should not be. They have already hit buildings, people (which have not been reported but can be seen in YouTube videos), and now other aircraft. This trend shows that the worst case scenario is going to happen, and it will happen soon. Action needs to be taken to ensure the safety of every one. The FAA needs to do something soon! Professionals and other pilots are warning of the many dangers to come, and their voices need to be heard before someone has to die for the rules and regulations to be changed.

Discussion

During an interview with Mark Anthony Forbes (2017), he suggested "the FAA should make it mandatory for the manufacturers of these sUAS, like DJI or Autel, to have them locked when first purchased, and the buyer has to take a 4-8 hour class where the individual would learn the basic rules and regulations, weather, airspace, and other pertinent information needed to be a pilot; the aircraft could then be unlocked and operated as a hobbyist." Would this be perfect for everyone that keeps doing acts they should not with them because they are so easy to get? Dr. Nilsson (2017) states, "This cannot be done because of the Commerce Act and how the government cannot interfere with the manufacturers." If an individual wanted to operate commercially after that, then that individual would need to take the FAA's Part 107 license to operate and get paid to fly the sUAS.

"Although the manufacturers should do something similar anyhow; especially when the possibility to be sued, due to someone causing a major catastrophe or international incident is the contributing factor," according to Mark Anthony (2017). The FAA could also make the laws much harsher for those that violate them because those individuals would then have had the rules and could not say they did not know them. It allows for "big brother, the US government" to not have oversight and control over every purchasers information, but allows the manufacturers to take control and regulate those that can fly these drones at will.

Why do people do what they do? Is it because they can? Is it because they want to? Or is it because they have a sickness? The world may never truly know what motivates someone to do exactly what he or she does. Maslow (1943) created a guideline for needs and what motivates people. These mistakes in judgment could fall under Maslow's esteem needs for that individual

to get some respect from others or their friends. The violators want that awesome picture shot to show the world. For someone to fly a UAS into an area not allowed to be, comes down to that individual just not knowing; which leads to the community needing to change the knowledge for a license or just the general public buying these toys because people are under-educated.

The Swiss Cheese Model states that one failure lines up with another failure, which lines up with another failure, and the ending failure is the final result to a crash or incident. “The holes in the defenses arise for two reasons: active failures and latent conditions. Nearly all adverse events involve a combination of these two sets of factors.” (Reason, 2000) Basically several different failures come into play for an accident or incident to occur, and much of it can be caused by human error, whether from a pilot, mechanic, or the boss not doing some part of their job. This model does not specifically apply to aviation but applies to every industry or everyday use like driving a car. A perfect example is that a sUAS is flying around an airport (why was it there and did it have permission), and a Boeing 747 sucks it into its engine. Now the UAS may not be the result of a crash or incident, but it can be the start of the Swiss Cheese Model that leads to the Jet fan coming apart (this could be because the mechanic failed to discover a hairline fracture that has started on a blade), which then tears into the fuel tank in the wing causing an explosion (this could be because a bladder was not installed) bringing the aircraft down. And other similar types of “what if” scenarios that could happen.

With the hopes that this never happens, but unfortunately, it very well could happen or cause a mass casualty incident somewhere in the world. “More than 550,000 recreational drone owners have now registered with the FAA, and are working with local law enforcement agencies "to ensure they know the rules and the penalties."” (Garvey, W., Salerno, J. A., & McMillin, M., 2016) That is quite a bit of “aircraft” to look for and control especially in highly congested areas.

Recommendations

"We need to change the social norm of it being acceptable for people to fly these aircraft wherever they want and however they want, to teaching them about the rules and regulations and the basics of flight knowledge," says Dr. Gallimore. (2017) The general public needs to be made more aware of what it is like to be a pilot before they can purchase these aircraft and fly them around the neighborhood; he goes on to say. Safety of everyone should come first before profits! Why as American's are we always the last to do something? Is it because our government is corrupt or is it because they are all too lazy to want to do their jobs in a timely manner. Why should we always suffer because the "fat cat" wants to line his pocket to change his vote in your direction? According to the textbook, *Unmanned Aircraft Systems*, the FAA has known about drones since the 1980s and done nothing to come up with rules because at the time only the government was using it to the corruption of spying on the world. (Austin, 2010, p. 309) It is almost 40 years later, and still nothing has been accomplished.

It would be great to have a set of rules and regulation in place for companies that will use these sUAS for profit. The problem being is any Joe Shcmoe can go and buy one and start using it for personal gain. The government will not be able to control this because the industry will be too massive for them to control. This industry will get way too out of control, very quickly. Hobby flight will be the most affected by the rules. Not everyone is a pilot. Not everyone will know all the rules. Not everyone will even follow all the rules. Just look at the way airplanes and helicopters fly around now. The government is going to try to regulate a hobby, and this will cause uproar within our society.

Well now that there are actually some rules in place, the community can move forward with its endeavors. The "new rules" are basically those for Radio Controlled (R/C) airplanes from AC 91-57 (AC 91-57 (Cancelled), 2017) with added pilot requirements. So if "you're for hire," then those operators have to get a remote pilot airman certificate and follow the guidelines of Part 107. Remote pilots do not need a medical certificate, and the UAV does not need to be registered. All that is needed is to pass an aeronautical knowledge test. If not for hire, then that operator would be considered an R/C airplane and only need to follow the "guidelines" of AC 91-57. Good job FAA. America will see how well Part 107 does.

Those individuals that keep getting into trouble are not pilots and are not operating to get paid for their expertise but those that are recreational flyers or just got a new toy for their birthday. If the community had in place a 4-12 hour course requirement before someone could buy a sUAS, then the community could educate people on some of the basics. It would be like when going to buy a gun; individuals have to wait a certain amount of time to cool down or have to get licensed to use that firearm first, according to Dr. Gallimore. (2017)

The communities need to create clubs for the public at large to be able to go to for information and knowledge and to be able to learn how to operate a sUAS properly. The safety with this type of environment will go a long way to help mitigate any accidents that could be caused by someone who did not know the rules or laws. This will also help to alleviate pressure off the FAA and Flight Standards District Offices (FSDO) by having knowledgeable persons available to answer basic questions and to be able to guide those harder questions to the right people in the government. The big box stores should educate people on the uses of UAV's like when purchasing a gun; the store owner informs the buyer of some of the new rules and regulations so that mistakes are not made. This also covers him or her for any negligence. The

same should be done with the availability of fireworks and sales. Maybe the government should enforce the sellers to start informing the buyers of the rules and regulations to help keep innocent bystanders safe from harm.

Individuals need to be licensed in order to purchase these aircraft. The FAA needs to better regulate the use of these aircraft. There are too many sUAS around for incidents to not get out of control, and soon. The aviation community needs to stand up and fight for the safety of everyone and to have better control of these aircraft before someone gets hurt. Pilots have too much to lose when in the same airspace as little Joey flying his new toy. Why do pilots have to be licensed to do the same thing that these machines are now doing. Why do sUAS operators not have to follow the same exact rules as manned pilots? Something needs to change and the sooner the better.

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