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Taking Off: A Documentary on the Modern Uses of Drones

Drones, a term used to describe any unmanned aircraft, are an evolving technology platform that is being adapted for multiple uses such as military warfare, cinematography, agriculture, etc. Because of these multiple uses, drones are starting to attract more attention, some of it negative, about the ethics and safety concerns related to drone use. In recent years, big corporations have been developing programs to involve drones in their business. In 2018 Amazon was issued a patent to experiment with drones delivering packages in less than 30 minutes and with the technology to respond to a recipient's hand gestures. In another case, Google is currently apart of a program to aid the military with analyzing footage from warfare drones known as Project Maven. Because of the program's controversy, the deal expires after 2019. Many people are raising questions about the safety of drones and the extent to which they should be regulated as a reaction to these news stories.

In response to these mounting concerns, the F.A.A. (Federal Aviation Administration) has increasingly created legislation on the different implications of flying any aircraft that is unmanned, including drones and model aircrafts. In 2014, The University of Virginia paid a man named Raphael Pirker to fly his aircraft and take footage over the college campus. Pirker flew his aircraft above 400 feet, which the

F.A.A. deemed that unsafe. They fined him \$10,000, even though he had a spotter with him and video camera feed from the drone which would prevent it from encountering any other aircraft (Rupprecht 95).

While the F.A.A. and a vocal contingent of critics see an urgent need to regulate drones, enthusiasts are finding new recreational and innovative ways to utilize drone technology.

A New York Times article from 2013 highlights the growing practice of using drones for environmental science, citing the work of ecologist Jim Kellner. Interested in using his drone for “remote sensing’ in the rain forests of Panama, Kellner planned to fly it among more than two hundred species of birds and fifty types of bat” (“Up in the Air”). Kellner’s particular interest in drones represents a faster and cheaper way of surveying endangered species for legitimate research purposes. Drones can also be used for crop surveillance by taking images which allows them to see indications of crop health that cannot otherwise be seen in person (Rupprecht 11).

In terms of recreational use, competitive racing is becoming increasingly popular. Organizations like the DRL (Drone Racing League) and the ASL (Aerial Sports League) put together competitions in which pilots race drones through a plotted course and try to complete as many laps as they can. The pilots wear goggles that receive video feed from small cameras on the drones and therefore they are able to stay in one place and navigate the drone as if they were the drones themselves. This phenomenon is known as FPV (First Person View) drone racing and, according to Marque Cornblatt, CEO of the ASL, the sport is riveting for pilots and enthusiasts alike: “Instantly when you

put the goggles down, you feel like you're flying. That experience is so addicting and transformative for people that once they start doing it, it's all they want to do."

The racers can attest to that addictive feeling. Colby Curtola, a "part-time" drone racer commonly known by his "pilot handle" (gamertag) SFPV, says he spends 40 hours a week practicing flying his drone as a part of the racing team, Velocidrone. "The most addictive thing is just the rush you get and the freedom in racing head to head against someone the same speed as you—there's so much pressure and adrenaline." Recently he took part in an "insane" event in New Orleans where 8 teams of 8 pilots were tasked to race for 12 hours straight. At this point, he says drone racing is too young of a sport to enable him to race full time, but he spends every possible minute attending events and he is able to receive sponsorships from companies to maintain and grow his fleet. Even when he isn't drone racing at events, he is racing in simulators against other people online. For Curtola, drones and drone racing are a huge part of his identity. "Drone racing is everything about me. Everyday I think about it, and everyday I'm trying to get better at it."

How did drones eventually start becoming so involved in people's lives? What led to this growing phenomenon with hobbyists and business? As early as World War II the United States was developing drone technology, though at the time it was considered too expensive and unreliable. It was utilized in the Cold War by both the U.S. and the Soviet Union for spying on each other, which may explain people's association of drones with "Peeping Tom" implications. This tactic was only used to a certain extent and to this day it is not clear specifically how much each country used drones. Modern

drone warfare began in 1982 when Israel used drones to attack the Syrian fleet. “The Israeli Air Force used military drones to recon the enemy’s position, to jam communications, and to act as decoys that would prevent the loss of pilot life” (“History of Drones”). These new, successful tactics incited the U.S. to spend millions of dollars into developing modern warfare drones.

Flashing forward to 2006, government agencies started to use drones like the ones we see in everyday life to provide disaster relief, border surveillance, and wildfire fighting. Corporations also used drones to inspect pipelines and spray pesticides on farms (“History of Drones”). The F.A.A. started to issue their first permits to flying unmanned vehicles. For the next 7-8 years, this allowance of drones in these particular fields of interest lead to widespread consumer drone production and marketing. Much like an RC helicopter, drones were becoming increasingly popular to buy and crash at home. In 2013, Amazon announced its interest in using a drone delivery service, and as a result, the public awareness of drones grew.

It was around this time that recreational drone users like Curtola and Cornblatt of the ASL began to get involved with drones. At first they only bought and crashed cheap consumer drones that everyone was buying at the time, but they became interested in fixing the drones themselves with the help of YouTube videos online and making them more durable and efficient. This allowed them to become very experienced in learning about soldering and wiring as well as software programs to develop FPV technology. 2014 was the year that drone racing took off. The first amateur competitions were being

held in Australia and New Zealand and the hobbyists like Curtola and Cornblatt who were building their own drones were organizing their own meetups as well.

As drone racing increased in popularity, online platforms allowed people from different backgrounds and geographic areas to meet up and develop their drone-racing interests together. Cornblatt claims this is one of the best aspects of drone racing, stating that no matter where you go, “the community is always very welcoming and very open and they want to see more pilots and new people. Especially as those new people tend to be kids and younger and younger pilots.”

In the sense of a sport like NASCAR racing, drone racing requires a lot of technical skill. Besides practicing flying the drone for hours on end like Curtola, drone racing requires knowledge about engineering, soldering, and other STEM fields in order to maintain a drone’s functionality. These subjects are not just being taught through drone racing and YouTube, they’re now being taught in American schools.

In Mountain View, California, home to Google and other Silicon Valley entrepreneurs, a class is held at Mountain View High School on these technical skills. On a recent day in March during the class, called Engineering 1 and 2, students worked frantically on an assignment given to them two months before. The assignment was simple in purpose but difficult to execute: design, build, and fly a drone. Aidan Lansky, an Engineering I student, explains the process simply:

There’s no instruction booklet – we ourselves have to get on computers and research what drones look like and how other people have done it. Then we see what they did and we change it a little make it our own – make it how we want it

to be. Then we go out to CAD and we make it on a computer. We either 3D print it or laser cut it. Then comes the electronic part and that's the hardest part – soldering all the circuits – it's really hard work. Then once you have it fully built you're only halfway done because you're going to fail a lot before you get to the final product.

The final product is a drone that the students choose to either go as fast as possible, lift heavy weights, or make it automatically move to a specific location. As Lansky described, it not exactly the easiest task in the world, but he thinks the skills he's learned has outweighed the challenges he encounters. "I have definitely learned the value of trial and error; in the real world pretty much nothing is gonna work the first try, so you have to keep attacking it and seeing what you did wrong and seeing what you can do next time."

Senior Kaveh Ghalambor, a current student in the Engineering II class, says he is still building upon the things he learned in Engineering I. "Compared to when I started in Engineering I, I've been able to take criticism a lot better, for the most part. It's probably something I'll take away from this class." He hopes to utilize the skills he's learned while drone building in the university course in engineering he is taking next year.

Lansky and Ghalambor had no experience with engineering or drone building before taking the class and now they both have a desire to pursue engineering careers in the future. This was the ultimate goal for Ms. Lydia Conoway, teacher of Engineering

classes at Mountain View High School and former teacher at Gunn High School. “We just want students to know that there are these career tech ed options for them and consider exploring that if that’s a passion they have.”

In the areas of drone building, Ms. Conoway says there is a big demand for students who know how to do the skills they learn in the course of the project, specifically soldering and circuit design. She explains that currently the only people holding electrical engineering jobs in the country are in their 50s and 60s, and there are fewer young people in line for those jobs, so in the next 20 years there will be a huge demand for students who have learned those skills at school or even on their own time like the drone racing community.

It seems inevitable that big tech corporations like Amazon and Google will continue to explore the implementation of drones into people’s lives in different ways, and people will continue to develop their skills and passion for drone racing and building, all of which will result in a continuous upgrading of the technology and capabilities of drones in general. Ms. Conoway wants to continue to encourage young generations to get involved in drone building, but in areas that are created specifically for them to learn how to fly in a safe way. In terms of drone racing, Curtola thinks that the sport may be more popular if it was improved to be more suitable for spectators: “Educating people more about how amazing it really is that we’re racing around these tracks at that speed, and just making them bigger so it’s easier to see.” If drone racing became more visible to the public, Curtola could potentially pursue the sport full-time.

Cornblatt of the ASL believes that drone racing will become more and more popular with the advancing technology and increased communities around the country. He only wishes that America wasn't so slow about accepting drones and seeing the benefits they bring, and thinks it is because people are hung up about negative and controversial stories directed at drones and drone users. "In reality, I've never heard of any of those stories that are true," he says. "So it's more just people's concerns about those ideas than any actual practical problem occurring. It wasn't that long ago that you couldn't bring a drone to school, but now every school wants to have a drone program because it's got educational value."

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