

## AGRICULTURAL DRONES

## Agricultural Drones

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**Introduction:** This paper is all about the use of drones to help commercial farmers better care for their crops and have a higher yield. Drones cannot only be used for crops they can be used to monitor livestock as well. The drones use a wide array of technology including infrared cameras, sensors and GPS to help farmers monitor and better care for their farms. Drones can drastically cut the costs of monitoring crops and they can drastically cut down on water waste. Drones can also reduce the amount of chemicals being released into the environment, preventing negative effects on the environment. The drones are beneficial, provided they are used correctly. There are some concerns with these drones, such as security and privacy, which will be discussed in this paper.

**Current Use:** Agricultural drones are available on a very limited market and primarily used in university research. Rachel King says “Oregon State is one of several universities that have begun research projects to investigate the use of the unmanned aerial vehicles in agriculture” (King). Drones cannot be used commercially, only for private personal entertainment. The drones use cameras and sensors to detect which plants need fertilizer, water or have been infested with pests and they can determine which plants are ready to be harvested. They can also be used to determine how much sunlight the plants are absorbing. They also monitor livestock and determine if they need more water, medical attention or if there is a hole in a pasture fence. Drones are also gaining popularity in other countries such as Australia and New Zealand. The University of Minnesota is currently trying to develop a standardized software that will help farmer analyze the data collected from the drones with equipment they already own. Chris Anderson describes drones used on a vineyard and made by his company called 3D Robotics “autopilot does all the flying, from takeoff to landing. Its software plans the flight path, aiming

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for maximum coverage of the vineyards, and controls the camera to optimize the pictures for later analysis”(Anderson).

**Security of Technology:** Many hear the word drone and immediately think of them being used for war, which is why these agricultural drones are controversial. Should drones become readily available to the public, there would be a high risk of people misusing them. The FAA is currently working on guidelines for the use of drones for agricultural purposes. However currently the FAA has strict regulations about drones. They cannot be used for commercial purposes but they may be used for personal entertainment given they are flown under 400 feet and away from airports. Privacy also poses a problem for the development of drones. Many opposed to the use of drones fear for people’s privacy. They believe that there is nothing stopping someone from using the drones to spy on a neighbor or to film or photograph a group of children.

**Ethical and Social Implications:** By using drones farmers can produce crops with less waste. The drones would detect which specific plants need water, therefore reducing the waste of water. Also these drones could limit the amount of pesticides being used causing less chemicals to be released into the environment. These drones would have a large impact on the current social trends of going green and saving the environment. These drones are ethical, provided they are used for their intended purpose, and are not used to cause harm to the plants and animals they are watching.

**Research:** Research was conducted for one year by a company called 3D Robotics. They flew drones on farms and got input from farmers about what they wanted to get out of a drone. They learned that there will probably need to be specialized programs for different types of crops and livestock because every plant and livestock has its own individual needs. They also learned about what would be convenient to the farmers. Drones that can take off and land anywhere are ideal

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since very few farms have the space for a landing strip. An app for an Android or iPhone would be ideal so farmers do not have to drag computers out to their fields. Having drones go on “auto missions” rather than farmers having to control them would also be ideal. Many farmers want the ability to capture video as well as stills and they want something that is time efficient. Many of these points will have to be further researched and developed before the ideal drone can be created.

**Future Use:** With the world’s population growing, the need for more food will grow as well and the pressure on farmers to produce larger quantities will increase. The drones will allow farmers to produce greater yields, therefore providing more food and they will be able to cut costs while doing so. With the drones costing less than \$1,000, many farmers will have access to the technology to allow their farms to run more efficiently. Farmers using drones will not have to spend time walking fields which wastes time and money. A field that takes hours to survey by foot can be surveyed by drones drastically quicker. They also would not have to pay for planes to fly over and survey the fields, which is not always accurate due to cloud coverage for example.

Agricultural drones have the potential to find problems with crops or livestock that could harm their yield in a more efficient manner, thus causing an increase in yield and productivity. In Australia, the drones are more popular than in the United States. An 18 month program using these drones will hopefully improve farms. The Australian Controlled Traffic Farming Association, or ACTFA, hopes to make the drones available to farmers in Australia in three to five years. The drones will not only help farmers with their crops, it will help them with their livestock as well. The drones can be used to oversee the livestock, check for holes in pasture fences and checking water supplies.

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**Conclusion:** Agricultural drones can be hugely beneficial to farmers all over the country. As the population grows, so does the need for food. Chris Anderson states that “Compared with satellite imagery, it's much cheaper and offers higher resolution. Because it's taken under the clouds, it's unobstructed and available anytime” (Anderson). Drones can increase the crop yields by finding problems with plants faster and determining which plant specifically needs attention. By narrowing down which plants are infested with weeds or insects, need water, or not growing as they should, it cuts down on the resources used by the farmer, reducing the waste of water, chemicals and time. By reducing the amount of chemicals sprayed on the plants, the amount of unnecessary chemicals released into the environment is reduced. The drones will be popular during the current social trend of going green and saving the environment. They are not run on gasoline like regular airplanes thus reducing carbon emissions into the environment.

Although with this innovative technology comes some concerns. The primary concern of agricultural drones is security. People using the drones cannot be monitored at all times therefore causing an increased chance that they may be misused and used for illegal activities such as spying on neighbors and recording or taking photographs of groups of children. Also, drones have a stereotype among the general population for being used for military action. While that is true, not all drones are used for malicious purposes. Currently drones are available on a very limited market and the FAA has very strict regulations for their use. They cannot currently be used for commercial purposes but they can be used privately for entertainment, as long as they fly under 400 feet and are flown nowhere near an airport.

In conclusion, these drones would greatly benefit the business of commercial farming and benefit the general population. Farming will become more efficient and farming operations will

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be less expensive to run. Crops and livestock will be healthier. Although there are questions about the security of agricultural drones, the benefits greatly outweigh the risks.

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Anderson, C. (2014, May). Agricultural drones. *Technology Review*, 117, 58-60. Retrieved from <http://search.proquest.com/docview/1534143322?accountid=14541>

This source well explains the use of drones and ways they are beneficial to farmers. It explains how the drones will cut down on water waste and reduce the amount of chemicals being released into the environment.

This source however does not explain the social or legal problems these drones could face. Such as problems with security, privacy and ethical problems.

Anderson, C. (n.d.). Ten Lessons for Farm Drones. Retrieved September 29, 2014, from <http://robohub.org/ten-lessons-for-farm-drones/>

This is a great source because it discusses the research involved with the agricultural drones.

Like other sources, it does not discuss security issues.

Bennett, C. (2013). Drones begin descent on US agriculture. Western Farm Press, Retrieved from <http://search.proquest.com/docview/1286694303?accountid=14541>

This source goes into great detail about the concerns associated with the use of drones for agricultural purposes. Some believe that the drones would be misused and abused. For example, they could be used to spy on people or record them. Some are also concerned that the price of drones will become so low that almost anybody could get one.

While this source does an excellent job describing the problems with drones, it does not focus very much on the main topic of drones being used for agriculture.

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DRONES used to survey agricultural land in the Fassifern valley... derived headline]. (2013, May 27). The Queensland Times Retrieved from

<http://search.proquest.com/docview/1355387957?accountid=14541>

This source is good because it talks about drones being used in Australia and it shows the difference of opinions that people from the US and people from Australia have of these drones.

Like some of my other sources, this source does not talk about security and ethical problems with the drones.

King, R. (2013, May 01). Drones hit new turf: U.S. farmland; agricultural groups experiment with unmanned vehicles to monitor crops and spray pesticides. Wall Street Journal (Online)

Retrieved from <http://search.proquest.com/docview/1347395977?accountid=14541>

This source is all about the use of drones for agricultural purposes. Farmers have begun using drones to monitor their crops. Oregon State University students are teaming up with commercial farmers to test drones on potato crops. The drones are fitted with sensors to determine if plants need more water, are being infested with insects, or need additional fertilizer.

This source does a great job of explaining what the drones are used for and why they are beneficial to commercial farmers. However it does not explain in detail the potential safety and legal problems these drones could face.

Rohr, R. (2014, January 21). Meet the New Drone that could be a Farmers' Best Friend. Retrieved September 29, 2014, from <http://modernfarmer.com/2014/01/precision-hawk/>



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This source is great because it discusses the uses of drones and the benefits of using them for agricultural purposes.

It however does not discuss security issues like some of my other sources.

Tipa, R. (2014, Feb 25). Drones appeal to farmers. *The Southland Times* Retrieved from <http://search.proquest.com/docview/1501426313?accountid=14541>

This is a great article because it discusses drone use in other countries not just the US. It also discusses the use of drones for livestock rather than crops.

This article also does not discuss security and ethical problems with the drones.

U research pushes for agriculture drones. (2014, Apr 30). *University Wire* Retrieved from <http://search.proquest.com/docview/1519810266?accountid=14541>

This source is about the up and coming technology of agricultural drones and the impact they will have on farmers and crop yields. It is great because it discusses points that the other sources do not.

The only thing this article is missing is arguments about security and ethical problems with the drones.