MAE 275 UAS – Homework#1
On The Current State of UAS

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In recent years, there has been a major advent in the development of Unmanned Aerial System (UAS) technology, especially in the civilian and commercial sector. Advancements in wireless communication, on-board computing, imaging systems, and power storage have all come together recently to make functional, affordable UAS a reality. Facing this influx of a new, world-changing technology, there are a few questions that need to be answered.

What is most exciting about the future of UAS?

UAS are exciting because they hold the potential to not only fill roles that are traditionally held by large, expensive aircraft but also create their own new niches in society. Automation of flight has the immediately obvious benefit of improved safety to the human that would otherwise have been required to pilot the aerial vehicle in question. This is especially important for tasks that require particularly dangerous flight operations. One example is manual inspection of tall structures such as bridges, radio towers, dams, etc. Typically, these jobs require a human to be tethered to a structure or helicopter and hang hundreds of feet in the air. This obvious hazard can be eliminated by using UAS equipped with appropriate imaging technology. The removal of a job hazard, aside from being enough motivation for implicating this technology on its own, could also have the effect of improving the safety of the structure being inspected. If the inspection task was suddenly made safer, and thus less expensive, it could be performed more often or more thoroughly than previously, ensuring better confidence after an inspection.

UAS also has the potential to improve the safety of police officers and soldiers in the line of duty. It is the nature of these occupations to deal with the unknown, which can prove deadly when the wrong decision is made. A surveillance UAS provides the ability to learn more about the unknown environment without endangering a human life. Thus, police officers and soldiers would be able to make more informed decisions when in a dangerous or hostile environment.

Another advantage of the automation and size reduction available in a UAS is the cost reduction of a task typically performed by a full-size aircraft. These tasks range from crop dusting to air science to to aerial surveillance for search-and-rescue or journalism. As before, automating these processes also holds the additional benefit of improving their safety by removing the human pilot.

As mentioned above, UAS also hold the potential to perform new and unique jobs. By removing the pilot, the human limitations on flight (sleep, eating, etc.) no longer restrain the vehicle, allowing for single missions that extend much longer than was previously possible. This opens the door for all kinds of new ideas for aircraft, like real time imaging of the earth, power generation, or wireless communication.

UAS also have many implications in warfare and may create new tactics. UAS swarms are a unique kind of force that could accomplish tasks varying from sensor jamming or spoofing to wide-spread surveillance, and may even hold abilities that have yet to be discovered.

This is nowhere near a complete list of the potential advantages of UAS use in the future, but rather than continue to laud the benefits of this technology, it is also necessary to address the potentially negative implications as well.

What is most disturbing about the future of UAS?

Above, it was stated that UAS will create their own niches in our society. The positive aspect of this is that new benefits may be unlocked that were not available to humankind before, but the

negative aspect is that the exact same is true for undesirable effects.

One of the most apparent potential issues with UAS is the effect on increase aerial surveillance on the populace. UAS altitude allows imaging of areas that have been previously considered as "private" and future UAS may be so small that they could enter private areas unseen and act as a "fly-on-the-wall", so to speak. It is technologies like these that make an Orwellian future seem a tangible possibility.

Another UAS issue already in effect is the impact on aviation safety. While some applications of UAS improve human safety (as stated in the previous section), the interaction of small UAS and large, crewed aircraft is a new phenomenon that does not have an existing system to safely govern their interaction. There have already been incidents of UAS near-misses and collisions with manned air vehicles, so the threat of a deadly accident is very real.

Aside from the inherent "wrongness" of the invasion of privacy, this nature of UAS also creates a negative view

Individual privacy is a right protected in the Constitution of the United States, but the nature of what that privacy pertains to is a contested subject that is finely adjusted by various laws and court cases.

UAS altitude allows imaging of areas that have been previously considered as "private", so these laws and cases may need to be updated to address these developments.

What are some of the main hurdles in future of UAS?

they’re cool

How can UAS be made to be beneficial to humankind?

they’re cool