

# **Commercial and recreational drone use in the UK inquiry**

A response to the House of Commons Science and Technology Select Committee  
inquiry on the Commercial and recreational drone use in the UK inquiry

April 2019



The Royal Academy of Engineering welcomes this opportunity to submit evidence to The House of Commons Science and Technology Select Committee inquiry on the commercial and recreational drone use in the UK inquiry. As the UK's national academy for engineering, we bring together the most successful and talented engineers from across the engineering sectors for a shared purpose: to advance and promote excellence in engineering.

Through its Fellowship, the Academy has access to highly qualified individuals with industrial and academic interests in drones. This response is based on the views of Fellows.

## **Introduction**

Drones bring a new dimension to aerospace; they are not governed by the design or operational rules of traditional aircraft as they are not required to carry a human, negating many constraints on size, operating environment or manoeuvring. Without such constraints drones could bring many new potential benefits to society.

As with nearly any new technology, alongside the benefits come risks from misuse, either accidental or intentional. As drones are unmanned the risks to the vehicle are purely commercial. Instead the risks are to other airspace users and people and property on the ground. The challenge for both human operated and autonomous drones is to manage the potential risks without significantly destroying the benefits.

## **Safety**

The safety risk to people, property and other air users is dependent on the weight, speed and to an extent the detailed design of the drone. For the 'hobby' user the best approach is likely to be to limit the amount of damage that can be done by controlling the permitted weight, operational envelope (height, speed, and distance from the operator) and construction. Existing bird strike requirements for commercial aircraft could inform these limits.

Larger drones for commercial operations should require licensing, formal operator training and, if appropriate, type certification as for manned aircraft. All these would be required to carry a position reporting system (ADS-B) to alert Air Traffic Control and other air users of their presence.

Airfields and other critical infrastructure must be equipped with multi-spectral sensors and a variety of interception systems such as kinetic weapons, radio, microwave or laser radiation. Drone detection systems must ensure there is awareness of a drone's presence independent of any specific drone characteristic. However, triggering the protection system should be carried out on a risk assessment basis as a 250g drone will pose a much lower risk on an airfield perimeter than a 25kg drone operating in a fully autonomous mode but both could cause damage if disabled at height. The risk of small drones to aeroplanes may need to be better understood to inform this threshold. Additionally, the interception system needs to be tuned to the region of operation so as not to create a greater risk than the threat.

## **Privacy**

Given the range of uses for drones there are privacy concerns. However, these risks are unlikely to be greater than those existing from smart phone cameras, and as such these issues are already adequately covered by existing UK privacy legislation.

For accidental surveillance by someone using a drone for another purpose there will be a role for education to ensure the user is aware of the existing laws. Where the invasion of privacy is deliberate it may cause undue distress to an individual who will have limited opportunities to seek redress. Reporting mechanisms for such incidents will need to be clear. There may be additional risks from amateurs accessing the drone's software and changing its behaviour for example inserting low-quality AI features that give the drone the capability to track a particular type of person or animal.

## **Risk mitigation**

Drones have a very broad range of potential uses and characteristics, and as such a risk based approach to management will be needed. Safety should be addressed through a comprehensive risk assessment, with mitigations set consistent with the level of risk.

Mitigation of these risks will come from a combination of education, training, legislation and technology. However, many of the current ethical issues relate to their use by people rather than being intrinsic to the drones themselves. Enforcement of measures to protect against unethical or malicious intent is likely to prove challenging at an individual level.

Built-in drone safety features, such as tracking and monitoring capabilities could provide benefits but will add cost, power need and possibly weight to a drone, therefore, will only be installed if mandated by national and international regulations. However, international markets mean that someone could either accidentally or deliberately obtain drones with fewer features than those required. As such there would be benefits from international alignment. Furthermore, the resource implications of monitoring the UK's drones is likely to be significant so the benefits must be fully understood before regulation is implemented.

Registration processes may be effective in some instances. Enforcement of these regulations may also prove challenging as people who wish to break the law will either not register, or if they do will not display the registration number on their aircraft. There is a risk that regulatory changes will inconvenience the law-abiding users of small drones or model aircraft. Small drones are an important contributor to STEM and for decades model aircraft have played a role in introducing young people to engineering. Given the annual shortfall of engineers incentivising the safe use of drones amongst young people should be encouraged.

To mitigate risk through education existing organisations can be used. The British Model Flying Association deals with all aspects of model aircraft flying in the UK and all flyers of model aircraft, including drones, are encouraged to join. There are currently over 40,000 members who can access training and achievement schemes run at a national level. The British Model Flying Association is recognised by the Civil Aviation Authority and should continue to provide these services and support. There would likely be challenges involved to scale this self-regulating model for the anticipated numbers of drones but their experience will be highly valuable to take into account.

There are many technical solutions to the problem of downing or diverting a drone. However, all active methods will involve the use of kinetic weapons, radio, microwave or laser radiation which all have strict regulations preventing their use. Even taking control from the operator or pilot is against international air regulations. There must be legal clarity in how every counter-drone technology can be used legitimately. There is a risk of collateral damage from such anti-drone technology, this could simply be the drone dropping on a person or property. Alternatively jamming a drone's control signal may adversely affect other devices. Such technology should be limited to safety critical areas so as not to cause additional damage.

## **Opportunities**

There will likely be economic opportunities arising from the growth of drone technology. While the UK may not be able to compete in the mass-produced market, it may be good at devising and providing services around the world such as specialised deliveries in remote or complex areas. Additionally, the UK's expertise in aerospace could enable us to exploit the middle to large drone market by developing new designs. Regulations implemented in the name of safety and privacy that cannot be appropriately enforced may inhibit the UK from realising any economic opportunities from drones.

Further benefits can be realised from the commercial use of drones for productivity improvements and to replace humans in dirty or dangerous environments. However, complex and expensive regulatory requirements will create significant barriers for industries, especially those unfamiliar with aerospace regulations, to realise this potential.