

Results of Competition: Drone Solutions for COVID-19: Innovate UK Article 25 Strand

Competition Code: 2005_UKRI_IDEAS_COVID19_DRONES_ART25

Total available funding is £34,000,000 (from FFC Strand 1/2)

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
WECORP LTD	Drones to Protect: Shared-Value Analysis of Aerial Surveillance during the COVID-19 Pandemic, and Ethical Framework Development for Future Crises	£293,221	£205,255
King's College London		£50,099	£40,079

Note: you can see all Innovate UK-funded projects here: <https://www.gov.uk/government/publications/innovate-uk-funded-projects>

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Project description - provided by applicants

Aerial surveillance has been central to the discussion of intervention during the pandemic with an undeniable ability to become a central force in the fight against COVID-19 due to a wide spectrum of applications.

However, every procedure enacted during this crisis creates a precedent for how the world will respond to future crises, therefore, it is imperative that government agencies work together with the general public to find solutions that will have lasting positive impacts, setting the bar high whilst still attending to the crisis that we are facing.

Professor Jonathan White of the London School of Economics and Political Science concludes on the complexity of such processes:

"Fear creates a desire for political action easily abused -- an impulse to applaud interventions of all kinds and to bemoan their absence. It creates a licence for new powers that are hard to control, and precedents bad as well as good."

Allowing fear to yield unprecedented power is counterproductive as it undermines democratic freedom and risks permanently damaging our perception of technological innovation, putting its benefits at risk of never being used.

The question then is not only potential, but also the ethical applications of use. Whilst it is simple to implement aerial surveillance to track and monitor, it also normalises a 'big brother' regime.

It is therefore crucial that we learn from history to ensure appropriate reactions to 'black swan events', where civil liberties are often discarded.

WECORP proposes a joint-research project with King's College London to develop insights on the effects of aerial surveillance during and after a pandemic crisis.

The research focuses on aerial security providers and the impact various providers may have on public trust. The data acquired will provide a detailed understanding of public perception vis-a-vis surveillance methods used by government agencies, known tech giants, and an alternative citizen-centric model of drone application by ethical challengers.

WECORP was founded on the belief that technology can relieve safety challenges in our communities by empowering community participation in the procedure.

This philosophy compels our core operating principle -- our services need to positively affect the status quo, make things better, not just provide new ways of doing old things -- making us a Challenger in the security industry.

With our research targeting a representative sample of all UK districts, we will aggregate the data necessary to understand the best path to ethically implement aerial security across the UK.

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APIAN LIMITED	Project Léman	£791,000	£553,700

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Project description - provided by applicants

COVID-19 has highlighted the challenges and requirements for increased resilience in NHS supply chain logistics. There has never been a better time to create a faster, more dependable and environmentally friendly method of transporting medical supplies. A medical drone delivery service can break chains of COVID-19 transmission by taking humans out-of-the-loop, protecting key NHS staff and the wider public. It also frees-up key staff allowing them to focus on service delivery.

Apian, an award-winning healthcare startup, founded by doctors in training, NHS Clinical Entrepreneurs and Innovation Fellows; Mid and South Essex NHS Foundation Trust (MSE), one of the largest Trusts in the country serving a population of 1.2 million people; and IPP Pathology First (pathology laboratory) are collaborating to deliver COVID-19 blood and swab tests between its hospitals and labs in response to the pandemic.

Apian is uniquely positioned. Not only can they help solve the technical challenges of BVLOS, but they can also lay the foundation for legal frameworks, standards and best practice and guidelines from within the NHS, all while generating a strong public pull for drones in healthcare - key to unlocking drone delivery across the UK. Their understanding of the healthcare system, access to it and ability to transfer medical needs into technical requirements is what makes this project unique. Apian is creating and building the NHS drone API, that integrates the NHS, drone industry and regulators. The platform will schedule and track deliveries, contract NHS certified drone operators, match delivery requests to available lab capacity, manage risk and ensure regulatory and NHS compliance.

The stakeholders will take a phased approach over 6 months to accomplish the consultation, design, integration and rapid deployment of drone flights to enable quicker diagnosis through reduced travel times, in an environmentally sustainable manner. At the end of the project, Apian plans to scale and share its learnings, including the impact on health outcomes, through a published white paper for wider industry and public benefit.

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TRAXINTERNATIONAL LTD	BVLOS Drone operations in non-segregated airspace	£166,332	£116,432
ANRA TECHNOLOGIES UK LTD		£130,631	£91,442
PINKROOT LIMITED		£66,879	£46,815
UAVIONIX LIMITED		£225,314	£157,720

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Project description - provided by applicants

CAP722, CAP1861 and CAP1915 indicate, that Beyond Visual Line of Sight (BVLoS) operations in UK are possible in unsegregated airspace subject to the 'Detect and Avoid' capability of the Unmanned Air System (UAS) being as good as the 'See and Avoid' capability of conventional aircraft under Visual Flight Rules (VFR). If no such technology is available, then segregated airspace (a Temporary Danger Area (TDA)) should be established. TDAs are required, because they reduce risks to conventional traffic imposed by Remotely Piloted Aircraft System (RPAS) to as low as practically possible. TDAs by their nature, segregate the airspace and prohibit other airspace users from accessing the airspace unless specific permission is granted.

Currently there are multiple TDAs promulgated in the UK Aeronautical Information Publication (AIP). The reasons for them vary but examples of use are to facilitate RPAS to carry out operational flights for the purposes of Maritime Surveillance in the area of the English Channel. An other is to facilitate RPAS to carry out delivery flights to remote areas for the purposes of a government led COVID-19 response plan to assist the National Health Service. The TDAs are required because the aircraft will be operating BVLoS and are currently unable to demonstrate adequate Detect and Avoid capability. However, TDAs are not a long-term solution.

It is understood that there are currently multiple live applications with the CAA for the establishment of TDAs to enable BVLoS RPAS operations. There is a risk that accepting these requests will create a patchwork of temporary airspace segregations that will quickly become unsustainable because of the impact on safety and efficiency, specifically:

* SAFETY -- more temporary segregated airspace increases the risk of infringements by other aircraft into the protected zone, which may result in mid-air collisions.

* EFFICIENCY -- more temporary segregated airspace limits access to aircraft into the protected zone, constraining the operations of other aviation activities.

This project aims to develop and deploy a solution for BVLoS UAS operations in ****non-segregated**** airspace.

The solution will provide RPAS operators (and other equipped aircraft) with real-time, shared situational awareness of the airspace, enabling the RPAS operator to strategically and/or tactically detect and avoid other aircraft during BVLoS operations.

The work package will demonstrate that BVLoS operations in non-segregated airspace are safe, can meet with regulatory approval and integrate seamlessly with manned aviation whilst still providing safe and efficient access to the airspace by all airspace users.

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SEESAI LIMITED	Drone Inspection & Monitoring for Construction, Industry & Infrastructure BVLOS	£359,655	£251,758
ATKINS LIMITED		£10,067	£0
BP P.L.C.		£22,091	£0
COSTAIN LIMITED		£9,931	£0
NATS LIMITED		£10,560	£0
Sellafield Ltd		£15,052	£0
SKANSKA CONSTRUCTION COMPANY LIMITED		£20,979	£0
Terra Drone Ltd		£30,199	£21,139

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VODAFONE GROUP SERVICES LIMITED		£15,200	£0
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Project description - provided by applicants

It's vitally important we keep our infrastructure, construction & industrial sites running. In 2018 construction provided 3m jobs and contributed £250 billion to the UK economy or 15% of UK GDP. More broadly, engineering enterprises employed 19% of the UK labour force and generated 23% of the UK's turnover.

Against a backdrop of skills shortages costing UK businesses £1.7bn / year, the COVID-19 pandemic is making a bad situation worse - with additional labour shortages; reduced workforce efficiency; and planners unsure who will show up for work.

This pandemic may continue for many more months, perhaps even years. As such, we urgently need to accelerate remote inspection and monitoring. This project aims to address this need.

Conventional drone services are delivered under visual line of sight (VLOS) regulations. Scaling these services requires building a large team of drone pilots and managing their travel to/from mission sites. This approach is resource constrained, inconsistent and expensive - and as a result is very difficult to scale.

In contrast, sees.ai's solution teams pilots in remote control rooms with highly-automated drones on the client site, to enable the remote execution of complex missions BVLOS. This concentration of resources in a control room significantly improves scalability (zero travel means fewer pilots required) and introduces economies of scale, scope and learning which result in improved quality, capability and cost.

In the context of COVID-19 this project will help us return to normal operation, safety levels and quality control, as follows:

- 1\). By accelerating remote inspection & monitoring, this solution will reduce the number of site workers involved, freeing them for productive work.
- 2\). By providing office workers with better information at their desks, this solution will help them optimise build and maintenance work without needing to visit site.
- 3\). By reducing the number of people visiting site, this solution will help operators reduce infection risk which could potentially lead to site shutdown.

Beyond COVID-19 the sees.ai solution represents the state-of-the-art in a long-term trend towards enabling remote inspection and monitoring - linked to the evolution of BIM, reality capture and the digital twin.

Project partners include some of the UK's biggest users of drones today and some of the companies most likely to benefit from drones in the future. These companies see the value in aerial intelligence and see the sees.ai solution as a potential way to access it at the scale and quality required.

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DGP INTELSIUS LIMITED	Enabling UK Inter-site Medical Delivery Drone Operations: Meeting the logistical and operational challenges presented by SARS-CoV-2	£80,000	£56,000
Bedfordshire Hospitals NHS Foundation Trust		£0	£0
BLUE BEAR SYSTEMS RESEARCH LTD		£90,000	£63,000
Cranfield University		£72,000	£72,000
HEROTECH8 LTD		£69,884	£48,919
King's College London		£8,000	£8,000
Milton Keynes Borough Council		£0	£0
Milton Keynes NHS Foundation Trust Hospital		£0	£0

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THE DRONE OFFICE LTD		£89,650	£62,755
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Project description - provided by applicants

Covid-19 crisis highlighted the potential benefits of using drones as an alternative, resilient, fast, flexible transport mode for inter-sites medical logistics. This recognition came at a time when inventories of supplies, surgical tools, samples were badly needed, but were not necessarily at the right place at the right time.

The use of drones supports social distancing, limits cross-contamination, and reduces medical and logistics staff exposure to unnecessary health risk. Yet, from the medical and healthcare communities' perspective, the knowledge and understanding gap, as well as the practical operational and physical infrastructure capability gaps to integrate routine drone operations are significant.

This project will create and validate national operational standards and technical requirements enabling the secure despatch, in-flight monitoring and receipt of medical supplies between UK medical centres by centre staff. The project partners, working closely with Milton Keynes, Bedford and Luton & Dunstable hospitals, will specifically;

- 1\). Identify through national impact study where and how medical drone flight operations can deliver the greatest need within the shortest timescales
- 2\). Create the first UK set of standard operational procedures (SOPs) for routine drone enabled delivery operations through collaboration with hospitals & NHS trusts
- 3\). Demonstrate within hospital environments; the automatic take-off, remote piloting and precision drone landing by hospital staff using SOPs
- 4\). Demonstrate the launch and receipt of a medical use package via BVLOS drone flight from/to a hospital by hospital staff.
- 5\). Understand through simulations the air space management and operational requirements for future critical medical delivery nationally.

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