Lead organisation	Summary	Description
James Hutton Limited	In-field optical detection of potato disease (Poptical)	The withdrawal of numerous pesticides under EU Directives is central to promoting low pesticide-input farming in EU Member States. EU-wide standards for Integrated Pest Management rely on adoption of alternative methods to control pests and diseases. The UK potato industry is particularly vulnerable to a reduction of pesticide use with a likely loss of production across market sectors valued at > £520M. Novel methods of disease management are needed. In this project, we use cutting edge UAV optical platforms to identify a number of diseases in potato before visual symptoms occur in the field, to allow accurate mapping of disease and targeted application of pesticide or equivalent to manage disease at an early stage.
Barnard Microsystems Limited	Airborne Detect and Avoid System 2020 (ADAS2020)	Developing Remotely Piloted Aircraft ("RPA") for use in scientific (ice thickness monitoring), commercial (oil, gas and mineral exploration) and state (border patrol) applications. Aim to tackle the challenge of effective collision detection combined with airborne collision avoidance by developing and characterising an electro-optic sensor based on the use of two high resolution, thermal imaging cameras in a stereo vision configuration augmented by a linear electromagnetic imaging array to enable the detection, ranging and tracking of airborne objects (a) during day and night, (b) in cloud and (c) approaching from the sun. We will combine this technology with ongoing developments in international RPA regulations.
Triumph Actuation Systems UK Limited	High Availability Redundant Actuation Systems (HARAS)	Aim to targeting UAV electrical actuation systems and develop high availability, fault tolerant electrical actuation solutions. An example is a flight control surface which most notably has a requirement for combined functionality (such as combined aileron, elevator and rudder) with restrictions in maximum component diameter, but available space across the length of the surface. Output will be a demonstrator that is anticipated to be suited towards an aircraft of MTOW 7,000-10,000 kg that will provide a basis for development in technological areas such as fault-tolerance, health monitoring, advanced motor design, and maintenance-free (for life) fitting.
BeTomorrow UK	Simultaneous Localisation and Aerial Mapping in the Built Environment (SLAMBE)	Defects in construction work cost billions globally (>£9bn pa in GB). Current surveying/monitoring techniques are labour-intensive, slow and prone to errors. No solution currently exists to autonomously survey the inside of a construction project, where most problems are hidden (even if drones can do so externally). We will develop an autonomous drone-based solution that can quickly, cost-effectively and reliably verify accuracy of an internal environment with respect to its proposed design, in order to identify construction defects.
Swarm Systems Ltd	Persistence through Reliable Perching (PEP)	Multi-rotor, battery SUAS have endurance of around 20 mins, while a common request is for persistence of hours or more and 'perch and stare' capability. This PEP proposal has a goal of achieving greater than 99% reliability in perching on unprepared, outdoor locations in challenging weather conditions and taking off again for SUAS sub-200g. The PEP research includes: adding new passive and active sensors, creating soft sensors from combinations of existing sensors, researching a novel automatic abort using 'disturbance from internal model' techniques and innovating undercarriage design including multi-surface gripping. A commercial goal is to add a key new capability to Swarm Systems product, enabling it to win export orders.

Swarm Systems Ltd. (SSL)	Robust and Reduced SWaP Obstacle Sensing	While technology to operate SUAS autonomously in wide open spaces is relatively mature, operation in complex environments, such as urban, is still challenging. A miniature obstacle avoidance module is proposed incorporating two cameras, a processor and an active rangefinder. The objective is a low cost module capable of sensing obstacle presence and relative position. The module, when incorporated with an SUAS, will enable new applications.
Flylogix	Tern	FlyLogix is currently working with the CAA on BVLoS flights, addressing limitations of current technology by developing a low cost control system extending range >100 miles. The first application will be inspection for offshore platforms and wind turbines.
Muretex Ltd	Enabling Ubiquitous Control of RAS	Muretex is developing a prototype system for intuitive control of RAS, using an easy to use and safe langauge or method of human/ machine interaction (portable across different sectors). The protoype uses a system of abstracted commands delivered to the RAS via a data glove. Real-time visual feedback and position information from the RAS is continuously delivered to the operator's smart glasses, allowing the operator to see what, where and how the RAS is performing.
Callen-Lenz Associates Limited	Airworthiness of BVLOS Autonomous UAV operations	Enhancing Safety, Reliability and Airworthiness of BVLOS Autonomous UAV operations project seeks to bridge the gap between the unmanned and manned aerospace domains, combining the structured approach to certification for manned aircraft with the innovation in unmanned aircraft. Through the increase of autonomy in a controlled and validated manner, UAS will be able to deliver more capability and reduce hazards for human operations, in particular in demanding inspection environments in fields such as oil and gas, civil engineering and logistics in austere environments.
Metis Aerospace Ltd	Autonomous and Intelligent UAV Detection	UAV detection system, using AI, to provide a high confidence report of UAV activity derived from multiple sensors with reduced reliance on human input. The system will learn over time, lowering false alarms, enabling follow on action to be taken with confidence. SKYPERION supports C-UAV requirements from small area/ short duration events, such as media events, to the persistent protection of large, fixed sites such as national infrastructure and other sensitive facilities.
Cadscan Limited	GUFO: An airborne robotic assistant for older people	Improved life expectancy is set to become one of the greatest challenges of the 21st century. Finding solutions to how older people can live independently in their own homes has become a priority for the UK government. This project will address this by developing Gufo, a new robotic system purpose-designed to help people live independently in their own homes for longer. A small, autonomous airborne vehicle will be developed to perform helpful and potentially life-saving functions, interacting with the user through a digital assistant, voice-operated via smart-watch and purpose-built user-interface.
Herotech8 Ltd	Infrastructure for Drone Operations	Vision to create wide-scale, clean and sustainable infrastructure hardware for drones, to provide the necessary safety assurances without a requirement for a human operator.
HYBIRD LTD	Autonomous Confined Space Inspection using Drones	Confined spaces currently account for around 15 deaths per year in the UK, which can be diminished to zero through the use of technology in large infrastructure projects. HyBird is developing small, lightweight, collision-tolerant smart drones, autonomous deployment docking stations, and an AI-based in-situ material characterisation and threat detection and inspection software. Deployment of such a system can reduce the cost of inspection by in excess of 80%, and improve productivity through early defect detection, and reduced down-time.

PERCEPTUAL ROBOTICS LIMITED	Autonomous Offshore Wind Farm Inspection	Offshore wind is a key energy source for the UK. The project will develop and test key technologies for autonomous inspection of offshore turbines integrated with autonomous surface boat, creating a system which will autonomously, automatically deploy and recover the inspection drone without the need for human interaction. Working together to solve the problems associated with operating an autonomous system in the extreme environment found offshore, the team will use modern control theory, sensors, materials, computer technology and AI algorithms to create a platform which can carry out rapid, robust inspections in the marine environment. Modern sensing allowsthe UAV to fly closer and more accurately with respect to the blades, thereby improving the images and maximising the flight envelope. This in turn will offer the potential for accurate condition monitoring and possible lifetime extensions.
PepsiCo International Limited	Optimising oat yield and quality to deliver sustainable production and economic impact (Opti-Oat)	This project will provide UK oat producers with world leading agronomic tools to maximise grower returns and capitalise on the increasing demand for food grade oats. The objectives are 1) Develop and validate algorithms for translating visual / spectral sensor data from Unmanned Aircraft Systems (UAS) into quantifiable crop parameters to enable growers to optimise management for yield and quality across fields; 2) develop an Oat Crop Model and associated decision support tools; 3) develop an Oat Growth Guide which will provide a reference to assess crops status against key development bench-marks. Focused dissemination of these innovative tools will increase average yields by at least 1t/ha, contribute to sustainable intensification, reduce supply risk for millers, reduce imports, catalyse product innovation & consumer access to healthy grains and stimulate milled product export.
Athene Works Ltd	The Little Owl	The Little Owl is an industry led project to research into a novel method of 'clean' efficient propulsion for an unmanned air system with associated technologies to facilitate extended time-on-station and long endurance.
SalusUAV Ltd	UK Beyond Visual Line of Sight UAV Operations	To develop sensors and operating procedures that would allow a UAS to operate BVLOS, developing autonomous detect and avoid systems and make ATC and other aircraft aware of the drone's position at all times.
NESTA	Flying High	The Flying High programme will address three major hurdles to the development of integrated drone technologies, support the realisation of the industry's potential in challenging environments and unlock a latent market opportunity in the UK by: 1) Integrating a wide range of drone technologies and systems; 2) Catalysing public engagement and enthusiasm; 3) Enabling the market and shaping the regulatory environment.
Rinicom Limited	VIDEO-MESH II	To develop a novel surveillance system, integrating HD dual optical-thermal cameras and a robust mesh communications system to enable the distribution of multiple high-quality live video streams to authorised devices, real-time wireless broadband transmission and seamless access to video meta data and information exchange. VIDEO-MESH II provides direct device-to-device broadband communications and adds the network access point functionality to extend network reach connecting multiple information producers (e.g., dual-cam systems, third-party camera systems, remotely operated systems) and consumers (e.g., mobile stations, unmanned vehicles). This innovation introduces a unique, high performing, adaptive, secure and cost-effective dual-cam mesh networking surveillance system that is beyond the current market state-of-the-art and delivers improved protection of citizens, critical infrastructures and border control.