

# Expertise in aircraft electrification and urban air mobility

**Cranfield can provide a whole range of expertise and major facilities, including Cranfield's global research airport, to drive forwards aircraft electrification and urban air mobility. We have over 100 academic staff with relevant expertise.**

	Topic	Prime contacts	Expertise
Cranfield global research airport with extensive large scale rigs and test facilities for this transformative future technology.	<b>Aircraft design and systems engineering</b>	Professor Howard Smith Professor Shijun Guo Dr Craig Lawson  Dr Huamin Jia  Dr Tim Mackley  Professor Essam Shehab  Dr Joni Pelham  Professor Guy Gratton	Whole aircraft design, thermal and battery management, modelling and simulation, trajectory optimisation and the overall impact on Air Traffic Management (ATM).  Aircraft avionics integration architecture, data buses, airborne system and software functions development and design, and safety assessment.  Systems Engineering including design of large scale thermal management rigs.  Digital twinning.  Air transport management.  Experienced experimental/flight test pilot including electric aircraft.
	<b>Aircraft propulsion</b>	Professor Pericles Pilidis  Professor David MacManus  Dr Panagiotis Laskaridis	Technoeconomic Environmental Risk Analysis (TERA).  Propulsion integration.  Hybrid gas turbine performance, aerodynamic integration of electric propulsion, modelling and analysis of integrated hybrid electric including thermal management, system architecture, size and match electrical, energy storage, thermal management and propulsion modules and advanced energy management.
	<b>Unmanned Aerial Systems (UAS) technology</b>	Professor Antonios Tsourdos Dr Hyo-Sang Shin Dr John Economou Dr Argyrios Zolotas	AI based control strategies for UAS power management, trade-off between fuel consumption and flight duration, design and sizing of propulsion systems, thermoelectric power generation, autonomous ground recharge stations and Unmanned Air Traffic Management (UTM).
	<b>Batteries, energy storage, electric motors and generators</b>	Dr Daniel Auger  Professor Patrick Luk Dr James Whidborne  Dr Kim Blackburn  Dr Marko Tirovic	Management of Ultralight batteries, characterisation, algorithms to estimate internal state of charge/health and test facilities.  High power density motors, modelling and feedback control of motors, generators and electrical systems, rapid charging, superconducting propulsion and wireless power transfer on-the-fly.  Battery swap techniques and cooling system.  Electric brake actuation.

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<b>Materials</b>	Professor Krzysztof Koziol  Professor Stewart Williams	High performance copper composite wires and pure carbon nanotube wires, nanocarbon composites for lighter motor housing, nanotube/graphene films for electric anti-icing, fire resistant nanocarbon composites, piezoelectric and thermoelectric generators for on-board sensors and nanocarbon based electrical machines.  Wire + Arc Additive Manufacturing (WAAM) to incorporate conductive and insulating tracks.
<b>Integrated Vehicle Health Management</b>	Professor Ian Jennions Dr Suresh Perinpanayagam Dr Ip-Shing Fan	Prognostics health management, reliable power electronics, health monitoring of motors/generators, self-learning, self-monitoring conscious aircraft and fault resilience.
<b>Rotorcraft</b>	Professor Vassilios Pachidis	Aerodynamic modelling, aeroelastics, mission profiling, hybrid and turboelectric power plant modelling, systems modelling and power plant management, noise prediction, investment cost analysis, airport and air traffic system assessments.
<b>Airline ecosystem and power supply</b>	Professor Keith Mason Mr Andrew Foster Dr Thomas Budd Dr Henrik Rothe	Vehicle recharging infrastructure and airport design, airline economics and route development, integration of electric aircraft into legacy systems and supply chains, environment impact, passenger experience and acceptance and regulation.
<b>Production and distribution of electrical power</b>	Professor Phil Hart, Director of Energy and Power	Electrical power generation and distribution, energy harvesting, power charging, machines, motors and drives and power storage.
<b>Aviation and the environment</b>	Professor Neil Harris  Professor Jim Harris  Dr Adrian Williams Dr Iq Mead  Dr Simon Jude Dr Toby Waine Dr Monica Rivas Casado	Airborne atmospheric measurement (with FAAM – the Facility of Airborne Atmospheric Measurement – which is based at Cranfield).  Airport design and the environment and grey-green-blue infrastructure integration and design.  Airport air quality measurements, assessing ecosystem services, climate impacts and lifecycle impacts.  Application of drones for remote sensing of environmental features, and interpretation of earth observation and UAV data for agritech and environmental applications.
<b>Cranfield Aerospace Solutions Limited</b>	Paul Hutton, CEO	Design, build and test fly capability for whole new electric and hybrid-electric aircraft concepts with all relevant CAA/ EASA approvals.
<b>Urban Air Mobility (UAM)</b>	Dr Abbas Fotouhi  Professor Emel Aktas  Professor Michael Bourlakis  Professor Iain Gray, Director of Aerospace Professor Graham Braithwaite, Director of Transport Systems	Multi-modal fleet management systems.  Urban intermodal transport.  Future urban and smart supply chains.  Urban Air Mobility draws on all of the above.