**PROJECT TITLE**

E-Drone: A social science perspective of unmanned aerial vehicles (UAVs) in NHS logistics – stakeholder and public concerns and pathways to adoption

**PROJECT SUMMARY**

E-Drone is an UKRI funded project that is examining the challenges of introducing UAVs into NHS delivery solutions using a case study in the Solent and Dorset region. The overall E-Drone research vision is to examine the energy reduction potential of logistics solutions involving UAVs operating alongside sustainable last-mile delivery solutions (cargo cycles and walking porters). It will provide a fundamental new understanding of a socio-technical transition and provide insight for regulation of UAVs and operating criteria related to energy efficiency.

Medical logistics could be the first domain to utilise UAVs on a commercial scale, with preliminary analysis on pathology logistics within Southampton indicating that UAVs would significantly reduce CO$_2$ emissions. With the NHS spending an estimated £2.5 billion annually on pathology logistics and with patient numbers rising, there is a need to re-think how logistics costs could be reduced whilst improving diagnosis times for patients and reducing energy demand.

This PhD studentship is part of the E-Drone project and will focus predominantly on understanding stakeholder concerns about UAVs and the social practices around their use. This is anticipated to involve stakeholder interviews/questionnaires and analysis of contemporary media to explore representations of UAVs in order to understand public concerns and determine how they empower or constrain pathways to adoption. This will inform policy/governance interventions and an animated training tool to help stakeholders and the general public understand the environmental and governance implications of introducing UAVs under various future scenarios. The project outcomes will inform UAV management policies and new social practices integrating UAVs with land logistics which have been highlighted as a key requirement by the Department for Transport, CAA, NATS and logistics partners in the project. The study will contribute to international research on autonomous vehicle adoption.

The PhD studentship specifically responds to calls for more profound understanding of how people frame autonomous vehicles, especially UAVs given current reputational damage from rogue use, and a need for stakeholders and the wider public to interact with realistic UAV use settings to inform guidance on the design and use of logistics systems incorporating UAVs.

The successful candidate will gain experience of working with an interdisciplinary research team, commercial partners and public sector organisations tackling an important contemporary challenge. There will be opportunities for involvement in a live UAV trial, to publish with the team, present findings at conferences and gain experience of other dissemination and knowledge exchange activities.

The successful candidate will have a social science background, an interest in socio-technical transitions and the ability to travel within the UK and overseas. We encourage applications from candidates with a background in geography, psychology, sociology or other social science disciplines. Skills in interview and questionnaire methods are desirable.

**ACADEMIC IMPACT**

The successful candidate will contribute to a project that will be of relevance to and benefit academics across areas of social science, transport energy demand, logistics, simulation/modelling, medical and business operations management and airspace management systems because E-Drone will:

1. Provide fundamental understanding in how new shared airspace regulations may impact on energy performance of Unmanned Aerial Vehicle (UAV) deliveries and how this might reframe current knowledge of UAV logistics opportunities.
2. Advance knowledge in how multi-modal supply chains involving land-to-UAV and UAV-to-land logistics interchanges might be best optimised using powerful metaheuristic algorithms to reduce overall energy demand.
3. Explore new business models based on shared UAV-primary logistics fleets and the operational and
4. Contribute to theoretical knowledge of societal understandings of UAV use, that extend beyond end-user acceptance studies, providing knowledge that will help determine UAV operation parameters in logistics and other fields.

The studentship will focus on number 4, but contribute knowledge to 1, 2 and 3.

The fact that the project is undertaking a trial with commercial partners (Meachers Global Logistics, Steve Porter Transport, Zedify, Parcelly, Southampton Airport, Motion robotics) and public organisations (NHS, Southampton City Council, NATS) will help the academic community learn from a live business application of the concepts being developed. This will also quickly ascertain their wider transferability to other logistics related sectors and the barriers and challenges that will be faced. The techniques and skills developed during the project, particularly in the areas of shared airspace regulation, schedule optimisation of UAV-to-land logistics and societal understandings of UAVs will advance academic studies in the core disciplines of airspace and transport management and planning, operational research and social science. The successful candidate will contribute to societal understandings of UAVs.

### Societal Impact

The successful candidate will contribute to the anticipated societal impact from the wider E-drone project which includes:

- **Logistics providers** trialling UAVs with key benefits anticipated to arise from i) new business models based on UAV integration in logistics fleets that would be viable for reducing energy demand, ii) improved response times for time-critical service needs opening up new UAV markets, iii) understandings of risks, costs, human resource needs and time.

- **Local Authorities** - will be able to evaluate the viability of UAV strategies for their locations with benefits related to CO$_2$ emissions and congestion together with improved air quality.

- **NATS and Airports** – will understand the controller requirements for UAV management and be able to plan national strategies for mixed airspace management based on new understanding of regulatory needs, different operating criteria, multiple uncertainties (e.g. shifts in demand), risks and the system energy efficiency.

- **NHS services** - will realise opportunities to improve the effectiveness of public services and quality of life benefits for patients through: i) reduced logistics energy demand and costs leading to savings on, for example, the estimated £2.5 billion spent annually on pathology logistics; and ii) more even demand on laboratory staff through time-efficient deliveries of products throughout the day and improved diagnosis times for patients.

- **UAV developers** – will be able to develop guidance for UAV manufacturers in terms of design criteria which consider actual flight paths, separation rules, collision avoidance and risk mitigation requirements as well as the effectiveness and energy efficiency of different types of UAV in a variety of logistics scenarios and operating conditions.

The general public - will benefit through more effective public services reducing overall traffic levels, energy consumption and greenhouse gas emissions. This leads to quality of life benefits related to improved health service provision and direct health benefits due to reduced air pollution.

The studentship contribution will focus on stakeholder/public concerns and the implications of these for pathways to adoption of UAVs.

### Development Opportunities

The successful candidate will be provided with diverse pathways for academic skills development through: i) working in a large interdisciplinary team including experts in social science, aviation, logistics, animation and simulation/modelling; ii) collaboration with diverse stakeholders including the NHS, NATs, local authorities and logistics providers to understand commercial opportunities; iii) input into animated training tools that facilitate interaction with simulations to aid stakeholder and public understanding of choices. The successful candidate will be offered opportunities for joint paper authorship with researchers from the larger team at University of Southampton, UCL and University of Leeds, visits to partner sites and opportunities to collect data with the industrial collaborators. The successful candidate will present their work at key national and international practitioner and academic conferences.

### Supervisory Team
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<tr>
<th>First Supervisor</th>
<th>Prof Janet Dickinson</th>
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<tbody>
<tr>
<td>Additional Supervisors</td>
<td>Dr Katherine King</td>
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<td></td>
<td>Prof Tom Cherrett (University of Southampton)</td>
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**INFORMAL ENQUIRIES**

Please contact the lead supervisor on the following email for informal enquiries: jdickinson@bournemouth.ac.uk

**ELIGIBILITY CRITERIA**

The BU PhD and MRes Studentships are open to UK, EU and International students.

Candidates for a PhD Studentship should demonstrate outstanding qualities and be motivated to complete a PhD in 4 years and must demonstrate:

- outstanding academic potential as measured normally by either a 1st class honours degree (or equivalent Grade Point Average (GPA) or a Master’s degree with distinction or equivalent
- an IELTS (Academic) score of 6.5 minimum (with a minimum 6.0 in each component, or equivalent) for candidates for whom English is not their first language and this must be evidenced at point of application.

**ADDITIONAL ELIGIBILITY CRITERIA**

BU PhD Studentship Project Description
**HOW TO APPLY**

Please complete the online application form by **21st February 2021**.

Further information on the application process can be found at: [www.bournemouth.ac.uk/studentships](http://www.bournemouth.ac.uk/studentships)