

# 1. Posters that fully meet the assessment criteria.

## Undergraduate

# Advancements in Unmanned Naval Systems

## AND HOW THEY ENABLE HYBRID WARFARE TODAY



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### ABSTRACT

Unmanned naval systems - namely Unmanned Underwater Vehicles (UUVs) and Unmanned Surface Vessels (USVs) - underpin the Black Sea theatre the Russo-Ukrainian War. While these technologies have existed for decades, their widespread military use is more recent, where they have seen use as part of the wider hybrid conflict. This literature review seeks to identify the key technological enablers that have allowed naval drones to conduct hybrid warfare, and provide recommendations on their future use.

### INTRODUCTION

#### Hybrid Warfare:

- The coordinated use of traditional and non-traditional military action to achieve strategic military to political objectives.
- Conducting offensive operations that fall below the threshold for a conventional military response by the opposing force, allowing for early intervention and plausible deniability.



#### Maritime Hybrid Warfare in the Ukrainian conflict:

- Ukrainian naval drones are the cornerstone of the AFU's A2/AD network in the Black Sea, pushing the Russian fleet out of Sevastopol.
- Russian autonomous systems interfere with Western states supporting Ukraine's war effort, with actions that fall below the threshold for conventional response.



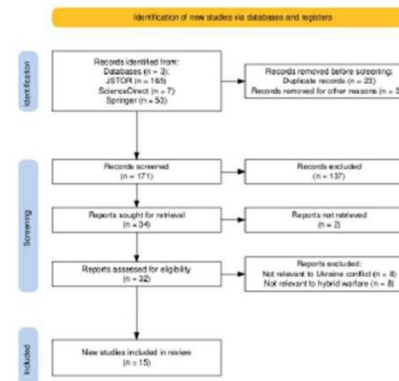
#### A Technology Centred Conflict:

- The employment of new technological enablers, often from civilian industry, has rapidly changed Ukrainian and Russian force structures.
- Naval drones are emerging as a key feature of maritime hybrid warfare that forces around the world should expect to encounter in an increasingly tumultuous future.



### METHOD

For this literature review on how emerging technology has facilitated naval drones as enablers of hybrid warfare, the PRISMA method was employed. A flowchart demonstrating this has been included below:



- Keywords included "Naval Drones" AND "Hybrid Warfare"
- Reports were excluded if:
  - Predated 2022
  - Did not originate from military institution / literature
  - Were not relevant to Ukraine conflict or hybrid warfare
- Three reviewers read over articles independently
- 15 studies finalised this review

### REFERENCES

- Bergeron, J. (2023) 'Maritime NATO After the Russian Invasion of Ukraine', *Atlantisch Perspectief*, 47(4), pp. 34-38.
- Habib, M. T., Shamir Al Ar, D. M. (2015) 'Maritime asymmetric warfare strategy for smaller states: lessons from Ukraine', *Small Wars & Insurgencies*, 36(1), pp. 29-56.
- Molloy, O. (2024) Occasional Paper No 29 - Drones in Modern Warfare: Lessons from the war in Ukraine. Australian Army Research Centre, 2024.
- Burnett, R. (2023) 'A Full Spectrum of Conflict Design: How Doctrine Should Embrace Irregular Warfare', *Irregular Warfare Initiative*.

### DISCUSSION

Key technological enablers with case studies from the Russo-Ukrainian War are provided below:

#### LEO Communication Satellite Constellations

- Constellations of satellites in LEO require much smaller terminals and provides much higher bandwidth
- Real-time control 800 km away from control station
- The Ukrainian *Magura v3* and Russian *Murena 300S* use such systems



#### Multi-mission USV configuration

- Ukrainian USVs are built around the 1-way attack profile
- Flexible platforms allow for modifications to aid this mission, namely *rockets* and *IR missiles*, and *FPV drones*



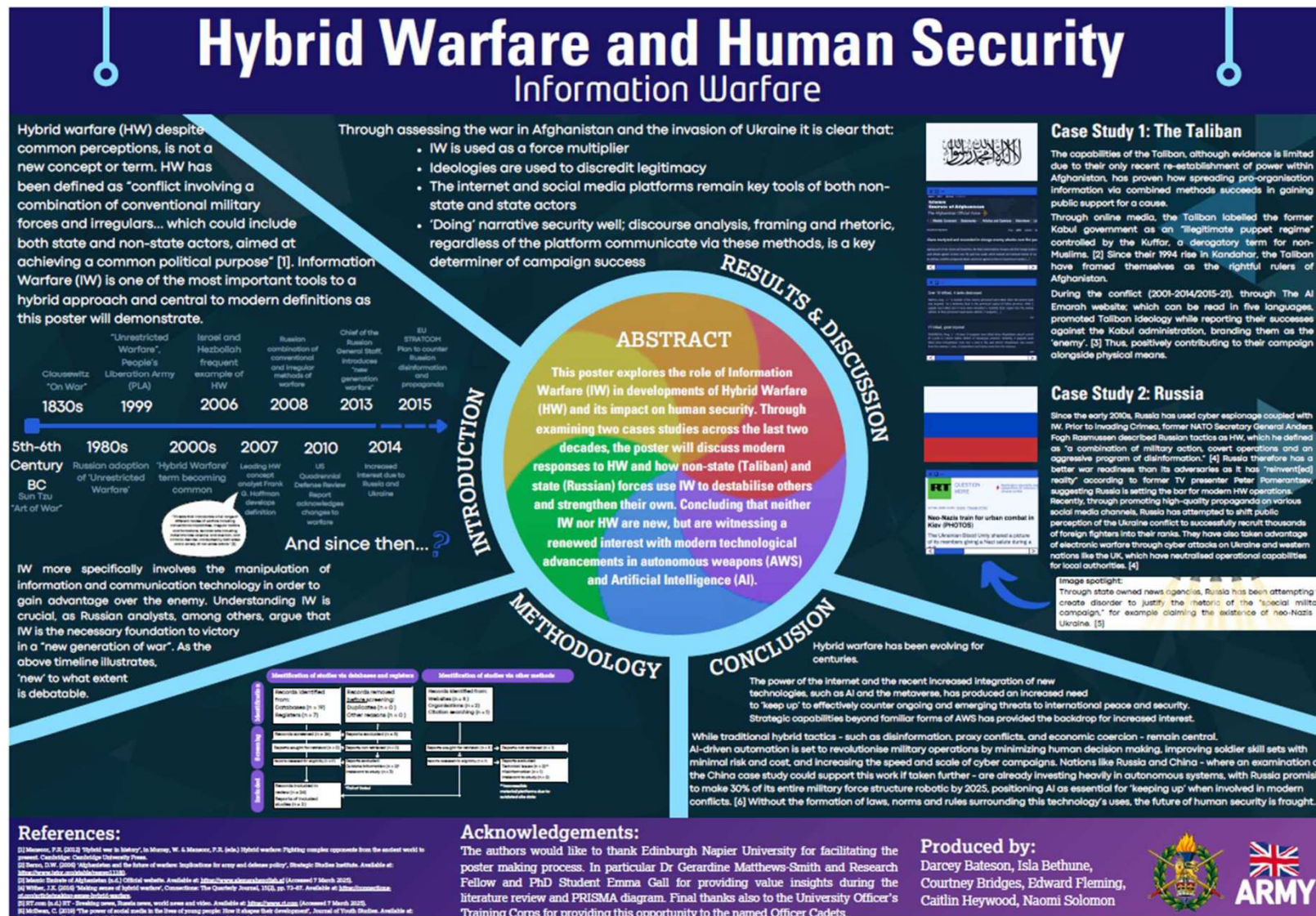
#### Improved UUV Communication and Autonomy

- Improved communication reduces dependence on tether, increasing independence, range, and autonomy
- Russia is developing the *ANGAPP* among other UUVs for seabed operations



### CONCLUSIONS

- Unmanned systems are becoming increasingly central to maritime conflicts, and can be used to conduct or defend against hybrid attacks on critical national infrastructure
- Much of the recent military success of unmanned systems in Ukraine stems from recent technological developments in civilian fields, rapidly adapted to military capability
- Western / NATO forces must adapt to counter future hybrid threats that will stem from the proliferation of naval drones





## Introduction:

Commercial drones have become an increasing threat to domestic security. Moving forward, we must take action to acknowledge this technological change in the environment of hybrid warfare and ensure steps are taken in human security approaches to peacefully mitigate and protect our nations through the prevention and regulation of such airpower technologies.

FPV drones (First-Person-View) are unmanned aerial vehicles (UAV) that are designed for exploration flying due to their small size and manoeuvrability. However, these small air technologies have become an increasing concern for state stability and control in their constant production and modification making it difficult for regulations to keep up and protect from these growing from minor inconveniences into state threats of security from terrorist activities. There now exists a marriage of convenience between commercial drones and terrorist organisations. Drones are becoming more 'lethal and more difficult to counter' due to the drone industry being driven by continuous innovation. Therefore, this highlights the importance of this study regarding the current VUCA world environment of today.

'The ability of a small group or individual to conduct multiple simultaneous attacks, at a relatively low cost and with significant standoff distance, will lead to the use of drones as a primary tactic of future terrorist attacks.' (Thomas A. Pledger)

The challenge faced with this topic was uncovered in the lack of academic literature. The novelty of this type of warfare has revealed a vacuum in International Security analysis with the rate of technological innovation and modification. It only further reinforces the necessity to act against these threats with agency.

## Current and Future Security Challenges: The Growing Threat of Commercial Drone Terrorism

Historically FPV Drones have been used in several terror related attacks. 2018 attack on the Venezuelan President using 2 explosive drones and In 2015 a drone was used to drop Radioactive sand on the Prime Ministers House. Drones can also be used to attack not just people but also facilities, in Ukraine a drone was used to blow up billions of dollars of military equipment in an ammunition dump in 2017 showing the effectiveness of small drones to infiltrate and cause major damage possible in the hybrid war setting between Ukraine and Russia 2014-2022. Recently unknown drones have been used to fly around active RAF and USAF bases in the UK, posing a serious threat to security. Likely Russia is behind this proving the effectiveness of using drones when in a Hybrid War.

As drone technology rapidly evolves, security risks are increasing. Key threats include:

### Biomimicry:

Some drones are now designed to mimic birds or insects, copying their flight patterns and natural appearance. This makes them harder to detect with traditional radar and security systems, allowing them to bypass defences unnoticed.

### Swarm Drone Attacks:

Dozens—or even hundreds—of small drones can work together in a coordinated attack, overwhelming security systems and causing widespread disruption. These swarms can be programmed to carry explosives, create diversions, or even disable critical infrastructure.

### Bioterrorism:

Drones could be used to spread harmful biological agents, such as viruses or toxins, overcrowded areas or vital resources. Their ability to fly undetected and cover large distances makes them a potential tool for large-scale bioterror attacks.

With drones becoming more advanced, adaptable, and accessible, security measures must keep pace. Governments and organisations need improved detection technology and strict regulations to counter these growing threats.

## Prisma:

This systematic literature review, conducted following a PRISMA 2020 flowchart process, aimed to find sources on terrorism, commercial drones and global security through a comprehensive analysis of both academic and grey literature.

A targeted search was carried out across four primary sources: Google Scholar (1,340 results), Cardiff University Library (863 results), Sage Journals (22 results), and grey literature via Google search (1,520 results). The search terms—terrorism, commercial drones, and global security—were applied with filters restricting results to English-language, review articles published between 2021 and 2025.

After screening duplicates and retrieval access, 2,697 records were evaluated for relevance based on their titles and abstracts or introductions. Through the subsequent eliminations and final eligibility on relevant population, intervention, control and outcome grounds in journals and relevance of grey literature, 29 sources were ultimately selected for inclusion in the final synthesis; 21 academic and 9 non-academic grey literature, such as news reports and institutional documents.

The PRISMA flow chart was employed to document the systematic selection process, ensuring transparency and replicability in the methodology. The final set of 29 documents looked to provide a relevant view, drawing from scholarly studies and practical insights, to make significant contributions to understanding the rapidly advancing relationship between commercial drones and security in the context of global terrorism.

## Commercial Drones and Their Impact on Domestic Security in a VUCA World



*"What is used on the battlefield will be adapted and used on domestic soil"*

Neil Basu UK Counter Terrorism Expert



Peace  
Security &  
Prosperity



## The Ethical Dilemmas of Drones in Domestic Security:

As drones become more integrated into domestic security, they raise significant ethical and strategic concerns: (Drone Theory - Chamayou)  
Drones as Instruments of Fear – Persistent surveillance by law enforcement and security agencies can create a climate of psychological control, eroding civil liberties and fostering distrust between the public and authorities.

### Erosion of Privacy and Sovereignty

– The use of drones for warrantless surveillance and crowd monitoring challenges legal and ethical boundaries, raising concerns over mass data collection and government overreach.

### Moral and Strategic Paradoxes

– While drones enhance public safety and crime prevention, their ease of deployment risks lowering the threshold for force, increasing the potential for misuse and excessive policing.

### Psychological Toll on Operators

– Drone pilots tasked with constant surveillance and tactical operations may experience stress, desensitisation, and moral injury, struggling with the implications of remote policing.

### Changing Notions of Security and Control

– The shift from traditional policing to automated surveillance alters the balance of power, potentially leading to a "security state" where control is maintained through constant monitoring rather than community trust.

As drones reshape domestic security, it is crucial to balance safety, privacy, and accountability to prevent the erosion of democratic freedoms.

## Mitigating the Threat of Commercial Drone Terrorism:

As drone technology evolves, so do the methods used by terrorists. Counterterrorism experts must stay ahead by developing effective strategies to combat these threats. Research highlights three key areas for mitigating drone terrorism: Regulation, Prevention, and Protection.

### 1. Regulation: Controlling Access & Use

- A) Drones are cheap, widely available, and often legally sourced, making them attractive for malicious use.
- B) Licensing and registration of drone traders and distributors can help monitor and restrict access to potentially dangerous technology.
- C) Tech companies should implement automated content detection systems to remove extremist material and prevent the spread of harmful drone-related knowledge.

### 2. Prevention: Stopping Threats Before They Happen

- A) Lone actors and small terrorist cells pose a unique challenge as they operate under the radar of law enforcement.
- B) AI-driven content moderation and screening can detect and flag suspicious drone-related activities.
- C) Public awareness campaigns can improve communication and help civilians recognize potential threats before they escalate.

### 3. Protection: Detecting & Countering Drone Attacks Through Detection

Identifying rogue drones requires a mix of advanced sensor technologies, including:

- A) RF analysis – Detects communication signals between drones and their operators.
- B) Acoustic sensors – Identifies drones by their sound patterns.
- C) Optical sensors – Uses cameras and infrared imaging for visual confirmation.
- D) Radar systems – Tracks drone movements over larger distances.
- E) A multi-sensor detection system combining these methods can improve drone tracking and identification.

## Conclusion and Acknowledgements:

### Navigating the VUCA World of Commercial Drone Threats

In an increasingly VUCA world, commercial drones present both opportunities and unprecedented security challenges. Their rapid adaptability, low cost, and accessibility make them a weapon of choice for emerging threats, from lone actors to organised terror groups. As risks grow in complexity and unpredictability, governments, law enforcement, and tech companies must work together to implement robust regulations, advanced detection systems, and innovative countermeasures. Staying ahead in this high-stakes race is not just an option—it's a necessity for global security.

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Postgraduate (See notes for additional requirements from doctoral students)

# BETWEEN CIVILIAN AND MILITARY WORLDS: IDENTITY, LIMINALITY AND WELLBEING AMONG MILITARY PARTNERS

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### Background

Military partners play a crucial role in sustaining family stability and the operational readiness of armed forces personnel, yet their experiences remain comparatively under-researched. Frequent relocations, deployment cycles and employment disruption can negatively affect partners' mental health, social integration and career trajectories. Despite policy recognition of military families, many partners report feeling undervalued within the forces, highlighting a gap between policy intentions and lived experience.

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### Research Aim

This research explores how military partners construct and maintain identity and wellbeing within the organisational context of active service life.

The study focuses on partners of actively serving personnel living in Scotland, examining how military structures, social expectations and life transitions shape identity and wellbeing.

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### Theoretical Framework

This research integrates several identity perspectives:

- 1 **Social Identity Theory**  
Identity shaped through belonging to groups and communities.
- 2 **Self-Concept Theory**  
Identity influenced by personal roles, aspirations and relationships.
- 3 **Organisational Identity**  
Institutional culture shapes expectations and identity formation.

However, these theories do not fully explain the ambiguous position of military partners.

**Key Concept**  
Liminal Space

"in-between" state where identity is uncertain and continuously negotiated

**Phase 1 – Literature Review**  
A comprehensive literature review explored research on military partner wellbeing and identity. Exploratory search due to limited existing research.

Range of interdisciplinary sources across military sociology, psychology and family studies. Thematic analysis used to identify key patterns in the literature. Themes informed the development of a working conceptual model of military partner identity and wellbeing.

Gall (2026)

**Phase 2 – Doctoral Study Design**  
The doctoral study will use a qualitative interpretative phenomenological approach to explore partners' lived experiences.

**Methods**  
In-depth qualitative interviews  
Participants: military partners living in Scotland  
Recruitment through armed forces family networks and support organisations.

This approach enables exploration of meaning, identity construction and lived experience within military contexts.

### Key themes from literature

Wellbeing

Transition

Identity

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### Key Argument

Military partners are expected to sustain the armed forces system while remaining only partially recognised within it.

Understanding partner wellbeing therefore requires examining identity within the organisational and cultural context of military life.

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### Implications

This research contributes to:

- Improved recognition of military partners as independent subjects of wellbeing
- better family-inclusive defence policy
- evidence for improved support services for military families

Improving partner wellbeing may also positively influence family stability, morale and personnel retention within the armed forces.

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### Key Sources

- Ashbury, E. T., & Martin, D. (2012). Military Deployment and the Spouse Left Behind. *The Family Journal*, 20(1), 45–50. <https://doi.org/10.1177/1066426711429433>
- Ashforth, B. E., & Schmitt, S. (2014). Identity under construction: How individuals come to define themselves in organizations. *Annual review of organizational psychology and organizational behavior*, 35, 111–137.
- Corry, N. H., Radakrishnan, S., Williams, C. S., Sparks, A. C., Woodall, K. A., Fairbank, J. A., & Stander, V. A. (2019). Association of military life experiences and health indicators among military spouses. *BMC Public Health*, 19(1).
- Gribble, B., Crowe-Urbankik, D. L., Crow, A., Senko, E., & Huddleston, E. (2013). Broadening Understandings of "Identity" Among Military Partners: A Multidisciplinary Reflection from the United Kingdom. *A Research Note, Armed Forces and Society*. <https://doi.org/10.1177/0095327213501866>
- Johansson, M., & Cogan, N. (2011). "He messaged me the other night and said you are my saviour": An interpretative phenomenological analysis of intimate partners' roles in supporting Veterans with mental health difficulties. *Journal of Military, Veteran and Family Health*, 7(2), 61–70. <https://doi.org/10.3188/jmvfh-2019-0055>
- Lung, E. (2022). *Living Liminal Lives: Army Partners' Spontaneous and Experienced Experiences of Deployment*. *Armed Forces and Society*, 48(3), 589–608. <https://doi.org/10.1177/0095327221990966>