Beyond the Battlefield: Navigating the Future of AI and Autonomous Systems in Electronic Warfare

By Matt Thompson

In an era where technological advancements are reshaping the landscape of warfare, the integration of artificial intelligence (AI), machine learning (ML) and autonomous systems into defense strategies is no longer a futuristic concept but a realistic evolution. The significance of these technologies in enhancing the capabilities of electronic warfare (EW) cannot be overstated, as they offer significant advantages in terms of speed, efficiency and complexity of operations. I am a believer that cheaper, smaller warfare with an overwhelming abundance of assets is on the horizon, I have commented this often in discussions about the war in Ukraine. Some of these key ideas were also found at the Collaborative EW Symposium 2024 in Pt. Mugu, California. The AOC event hosted a myriad of briefs and speakers and I wanted to highlight a few key takeaways to keep an eye on for the future.

Swarm Tactics and Cognitive Electronic Warfare

One of the potential transformative strategies in modern warfare is the application of swarm tactics, which involve the use of multiple autonomous units to perform coordinated tasks. This concept was expertly addressed in Mr. Robert Wilkerson's presentation on "Swarming Assets for Cognitive Electronic Warfare," highlighting how these tactics can overwhelm enemy systems with a barrage of simultaneous threats. The integration of AI allows these swarms to operate with autonomous decision-making capabilities, significantly

increasing their effectiveness. Such systems can dynamically adjust their tactics based on real-time battlefield data, effectively adapting to countermeasures and exploiting vulnerabilities in enemy defenses.

AI-Driven Autonomous Systems: The New Frontier in Warfare

There were also several discussions as the shift towards fully autonomous systems continues, emphasizing their potential to revolutionize warfare. This was particularly evident in the session “EW Game of Drones” led by Mr. Gonzalo Figueroa and Ms. Stacy Jannelley Eang, where the focus was on the use of drones in EW operations powered by AI. These autonomous systems can execute complex missions, processing vast amounts of sensory and signal data to make split-second decisions about jamming, deception or avoidance. The ability of the systems to operate independently reduces the cognitive load on human operators and allows for more complex, multi-layered defense strategies. Are drones operating independently a good thing? How do we avoid blue on blue? How can we prevent compromise or hacking?

Trust and Reliability in Autonomous Warfare

Integrating AI into critical military systems brings its own set of challenges, notably in ensuring the reliability and trustworthiness of decisions made by these systems. Mr. Damon Plyler addressed some of these concerns in his talk on “Trust in Advanced Electronic Warfare Systems Through High Fidelity Models.” There was an emphasis on the need that AI systems in warfare can perform with a high degree of predictability and are thoroughly vetted through simulations that mimic real-world conditions. This not only ensures operational success but also prevents catastrophic failures that could arise from erroneous AI decisions. How do we have these types of training? Will we have the personnel to update and change these systems in real time?

Conclusion

As we look towards the future of warfare, the integration of

AI and autonomous systems into electronic warfare strategies offers a promising yet challenging frontier. The sessions at the symposium, such as those led by Mr. Wilkerson, Mr. Figueroa and Ms. Eang, alongside Mr. Plyler’s insights into system trustworthiness, underscore the potential of these technologies to redefine military operations. However, the success and safety of these advancements hinge on robust testing, validation, and continuous improvement to align with ethical standards and strategic objectives.

This evolution in warfare requires not only technological advancement but also a solid framework for governance and oversight to ensure that these powerful tools are used responsibly and effectively. There have been many topics and discussions and general excitement about these newer technologies, but I also see a few significant items to keep focus on that currently remain overlooked. How do we control these assets? Who controls these assets? Has the decision been made if these are expendable like ammunition or is there still an expectation they will be retained. I always like to take a 30,000 foot view and work my way down to the details. One of the biggest takeaways for me and on that is mildly concerning – no one was discussing the 30,000-foot view and control. They were all at the operational level. I understand the need for that but there is also a need to strategically fit all the new whiz bangs items together. This is an important aspect that will filter into design and builds at the level found at the symposium.