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## **A Holistic Approach to Machine Learning for Electronic Warfare**

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Abstract:

Electronic warfare (EW) is in a constant state of change, driven by evolving adversarial capabilities, advancements in hardware platforms, and the rapid growth of machine learning (ML) capabilities. Electronic Attack (EA) techniques are particularly sensitive to these underlying developments. The Army must adopt a comprehensive strategy that addresses these challenges while rapidly deploying cost-effective solutions using existing hardware.

At Parsons, our approach to ML solution development—including our EW and EA products—is influenced by three interconnected areas:

**Core Research and Development:** We drive advancements in electromagnetic signal analysis and response optimization through focused research initiatives. This includes advanced model architectures, efficient hardware integration, and innovative data generation techniques. Our research extends to enhancing model robustness, addressing data scarcity, and optimizing performance in tactical environments.

**Model Lifecycle Management:** We integrate cloud-based development with tactical deployment, enabling collaborative iteration and continuous improvement. Additionally, we are developing standards for compact frameworks and integration methods to provide integration paths for model deployment into existing hardware with minimal modifications.

**Continuous Evaluation and Demonstration:** Our state-of-the-art integration facilities provide testing and evaluation on Army platforms to ensure real-world effectiveness. These laboratories are low-risk venues for rapid prototyping and demonstration using realistic data sets. This collaborative environment provides for rapid feedback loops, swift determination of capability viability, and continuous improvement.

This holistic approach enables us to stay at the forefront of EW and EA capabilities, ensuring that our solutions evolve as rapidly as the threats they counter. By combining cutting-edge research, flexible deployment strategies, and rigorous evaluation processes, we provide the Army with adaptive, efficient, and effective tools to maintain spectrum dominance in an ever-changing operational landscape.

