

# **Algorithmic Warfare: Establishing Legal and Ethical Guardrails for Autonomous AI in Cyber Defense and Offense**

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**Abstract:** The integration of artificial intelligence (AI) into military cyber operations marks a transformative shift in the character of modern conflict, indicating an era of ‘algorithmic warfare’. This new model involves the use of autonomous systems to execute both defensive and offensive cyber actions at machine speed, creating capabilities that far exceed human limitations. While offering advantages in network defense and strategic offense, this development concurrently introduces profound challenges to the established international legal and ethical order. This article contends with that of the existing frameworks of international law, including the jus ad bellum and jus in bello, are conceptually and practically not equipped to govern the intricacy of autonomous AI in cyberspace.

**Keywords:** Algorithmic Warfare, Artificial Intelligence, Cyber Security, Autonomous Weapons Systems, International Humanitarian Law, Jus ad Bellum, Jus in Bello, Meaningful Human Control, Accountability Gap, Cyber Conflict

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