



## ***Swarm Troopers: How Small Drones Will Conquer the World***

**By David Hambling**

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**Reviewed by Dr. Robert J. Bunker**

The author, David Hambling, is a South London-based technology journalist who has written for *Wired*, *Aviation Week*, and other technology magazines as well as authoring an earlier book about military technologies that eventually were applied to civilian applications (*Weapons Grade*, Da Capo Press, 2006). In the new work, *Swarm Troopers*, he focuses on the world of small drones or unmanned aerial systems (UAS) and their future military potential. He argues that the scientific research balance has now shifted, with consumer electronic advances outstripping military electronic advances. As a result, we are the cusp of a technology revolution which will see the future fielding of mass swarms of small, cheap, smart, and deadly UAS on the battlefield.

These future UAS — or drone — swarms will be said to be made with off-the-shelf electronics and draw upon the characteristics of robustness, low cost, and rapid evolution. Such armed drones can be thought of as “flying minefields” and, while not singularly threatening, en masse will be impossible to defeat. Given ongoing U.S. Soldier concerns related to static improvised explosive device (IED) use by insurgents in Afghanistan and Iraq, the threat of IEDs — especially smart ones — chasing after or, even worse, relentlessly hunting down our troops is a chilling concept. Additionally, such UAS can be armed with pistols, light machine guns, and even anti-tank type systems.

The book opens with a short introduction to the subject matter and the book’s companion website ([www.swarm-troopers.com](http://www.swarm-troopers.com)). The individual chapters include content relating to drone history; Predator and Raven use; solar power and energy harvesting for drones; the science of swarming behavior; small drones as weapons; counter-UAS (C-UAS) technologies; and weaponized drone swarm futures. Each chapter has a modest listing of references that is adequate but rather undeveloped. The website is very useful with an image gallery of older and newer UAS systems (since none are found in the book); an updated blog also provides new drone technological developments.

A detracting component of the work is that the author at times has very much of an outsider’s take on UAS threat activities and C-UAS military developments. Active C-UAS programs are being implemented by a number of U.S. governmental and affiliated non-profit groups. As a result, many of the insights and conclusions provided are somewhat off-base though the overall thesis of the book — that autonomous and weaponized drone swarms of thousands, possibly tens of thousands of devices, drawing upon off-the-shelf commercial technologies will be deployed on future battlefields — is still sound.

For U.S. Infantry personnel, *Swarm Troopers* represents a good basic primer and introduction to this emerging threat — and new Army capability — area. While Army troops are already familiar with the Raven UAS for scouting and situational awareness capabilities, we are at the beginning of far larger battlefield changes. This has already incrementally begun with the fielding of the compact Switchblade UAS system that can be fired from a tube launcher and operates as an attack (e.g. kamikaze) drone with a small explosive warhead. Fast-forward a decade or two, however, and one can imagine a battlefield populated by thousands upon thousands of teleoperated and autonomous robots. These systems will not only be operating in the deserts of Iraq and the mountainous terrain of Afghanistan but also in the slums of mid-21st century megacities. On one hand, such autonomous and armed UAS will be the infantry’s best friend while other such drones — that fly, drive, walk, and crawl — will represent a dystopian “terminator-like” threat as human and machine forces are integrated into new forms of combined arms operations.