ROBOTICS AND MILITARY OPERATIONS

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In the wake of two extended wars, Western militaries find themselves looking to the future while confronting amorphous nonstate threats and shrinking defense budgets. The 2015 Kingston Conference on International Security (KCIS) examined how robotics and autonomous systems that enhance soldier effectiveness may offer attractive investment opportunities for developing a more efficient force capable of operating effectively in the future environment. The 2015 KCIS explored drivers influencing strategic choices associated with these technologies and offered preliminary policy recommendations to advance a comprehensive technology investment strategy.

The 2015 conference was designed to explore robotics in military operations through a series of seven panel presentations. As an organizing principle, the panels considered three technology time-horizons. The first three panels examined current technologies, employment, and legal or policy standards. This time horizon focused on capabilities employed by forces today, and mature technologies immediately available for military use tomorrow. The next three panels examined future technologies and the ethical, operational-strategic, and force development issues associated with employing them. The implications of the future force panels will challenge the military intellectually, operationally, and ethically. Indeed, the integration of these systems could challenge the military's most fundamental beliefs regarding conflict and the conduct of war. The final panel synthesized the conference content into specific policy recommendations.

This monograph includes select conference papers, chosen to be published as the inaugural monograph for the KCIS conference series. It contains three chapters, each addressing common themes that resonated throughout the conference. The primary theme centered on clarifying the debate surrounding robots in military operations, contributing to a more informed dialogue regarding robotics in military operations. As with many public dialogue topics, discussions about robotics in military operations lack a common lexicon outside the community of technical experts that have been engaged in it for years. Several authors adopted a variant of Peter Singer's *Wired for War* definition of a robot: a machine with sensors to monitor the environment, processors or artificial intelligence to decide how to respond, and some set of tools to conduct that response. Elinor Sloan's chapter differentiates between remote controlled, semi-autonomous, and autonomous robots. Alongside the functions robots perform, this categorization clarity contributes to a more refined conversation about the ethical implications of using robots in military operations. A second aspect of clarifying an informed dialogue involves myth busting in the form of pragmatic assessments of the state of robotic technology maturity. Considering the ubiquity of the aspirational futures dialogue that dominates discussions of robots in military operations, Dr. Simon Monckton's chapter echoes a consistent observation among the scientists and engineers that a tactically useful autonomous robot is not currently achievable in the near-term.

The ethical implications of using robots in military operations only marginally trailed the debate-clarifying theme at the conference. Each of the chapters in this monograph addresses the ethical implications of robotics in a military context. Most presenters of the KCIS conference started the ethical implication discussion by acknowledging

that most current robotic systems are designed to perform dull, dirty, and dangerous military functions. These applications do not pose the greatest ethical dilemmas. However, fielded systems can be, and have been, adapted to perform lethal functions with relative ease. This aspect of fielding robotic technology, no matter how unsophisticated or banal in function, has the potential of introducing significant ethical dimensions for operators to consider. Therefore, the informed and deliberate consideration of these ethical questions among both scholars and practitioners is occurring behind the operational employment of the systems.

Dr. Elinor Sloan effectively captures the potentially positive ethical components of employing robots in military operations—namely, removing the unpredictable aspect of human behavior. Dr. Sloan points out that while robots contribute to avoiding the ethical clouding effect of self-preservation and the probability of an anger response, they also present a double-edged ethical concern. Unemotional decision-making, detached from local context and assured of limited collateral damage, may increase the likelihood that lethal force is used. Despite the pragmatic recognition that the employment of autonomous lethal systems is a long way off, the ethical debate regarding their use was clearly the most animated. Two of the most insightful contributions to this debate were proffered by Tony Battista and Elinor Sloan. Tony Battista suggests that despite semi-autonomous and autonomous systems being future ethical dilemmas, the informed discussion of the ethical issues surrounding their employment is overdue. Elinor Sloan makes the interesting, and potentially contrarian, prediction that arguments constraining the use of lethal autonomous systems are more dependent on a changing ethical environment than any pre-determined ethical reasoning.

The pragmatic recommendations about which current and future technologies should be resources were most succinctly captured in Monckton's chapter. Dr. Monckton suggests that focusing resources on inexpensive miniaturization, Global Positioning/Internal Navigation Systems (GPS/INS), and telecommunication combined with computer processing and memory will provide the most promise over the next decade. He also suggests that longer-range science and technology research should focus on probabilistic robotics, networking, and parallel processing to lay the foundation for future advancements.

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