

Uninhabited Systems in the Civilian Realm: Some Ethical Concerns

In his editorial introduction to an *IEEE Technology and Society Magazine* Special Section on Lethal Robots (Spring 2009), Keith Miller quite rightly wrote that while we were not paying attention, uninhabited systems (a.k.a. unmanned systems)¹ have become ubiquitous weapons in the military realm [1]. This has much to do with the fact that in 2000, the U.S. Congress quietly set two major goals in an attempt to integrate uninhabited aerial vehicles (UAVs) and unmanned ground vehicles (UGVs) into the military force structure. The first goal mandated that by 2010 one third of U.S. operational deep strike aircraft be uninhabited, and the second mandated that by 2015 one third of the U.S. Army's operational ground combat vehicles also be uninhabited. In 2006, the U.S. Congress then called for the United States Department of Defense to establish policy that would identify a preference for uninhabited vehicles in new weapons acquisitions and address the need for the joint development of uninhabited systems and associated components [2]. While some of these congressional mandates have since been relaxed due to economic pressures, the debate concerning the ethics of uninhabited systems has struggled to keep pace with the rise of the technology.

The vast majority of the literature concerning the use of these systems has been published by a small

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but dedicated group of concerned ethicists, lawyers, military practitioners, peace researchers, and roboticists, all of whom have been diligently working on the topic for a number of years. Over this period, *T&S* has served as a valuable dissemination point for their research and ideas, with key individuals such as Ron Arkin [3]–[4], Peter Asaro [5], John Canning [6], Noel Sharkey [7], and Rob Sparrow [8]–[9] all using this magazine to raise their concerns about the military's use of these systems. Together, they are worried that while uninhabited systems may make armed conflict “more ethical” in some respects, they might also introduce unintended consequences. The questions they raise about these systems are manifold. Will they make the decision to go to war an easier one? Do they create a “responsibility gap”? Do they introduce an unfair asymmetry in warfare? Are they technically capable of discriminating targets? Will they lead

us towards fully autonomous weapons capable of making their own lethal decisions? Will they result in cognitive dissonance for UAV operators? Do they encourage targeted killings by non-military agencies such as the Central Intelligence Agency? Will they proliferate to other nations and terrorist groups? All of these are legitimate questions that deserve careful consideration. In some instances, the problems at the center of these concerns may prove to countervail any ethical benefit that can be derived from a military's use of these systems. Indeed, I have argued this elsewhere [10].

Needless to say, there is a need to continue contemplating the issues associated with the use of uninhabited systems in the military sphere. However, we cannot afford to lose sight of the fact that military technologies have a time-proven tendency to proliferate into the

¹ I prefer the term “uninhabited systems” over “unmanned systems” as: the latter is a clear misnomer, given that they are, in fact, manned, albeit from afar; and both men and women are known to have operated these systems, rendering the use of gendered language inappropriate.

civilian sphere. Patrick Lin reminds us that it would be difficult to imagine our modern day society without the numerous military-inspired technologies that we have come to embrace [11]. For instance, the Internet, the Global Positioning System, and the humble microwave, all have deep roots in military technologies. Similarly, uninhabited systems can have a variety of civilian uses, with potential applications in search and rescue, fire-fighting operations, border surveillance and policing, through to more commercial applications in oil, gas and mineral exploration, advertising, and news reporting, to name only a few. With United States-led wars winding down, it is also likely that the number of civil applications will only increase as military manufacturers attempt to re-market their products. So far, civilian systems have not seen widespread use due to legal restrictions. However, with the passing of the Federal Aviation Administration (FAA) Modernization and Reform Act of 2012 [12], Congress has paved the way for government, private, and commercial UAVs to enter the civilian sphere *en masse*. In other words, drones, best known for killing terrorists, may soon be in the sky near you! Like Congress's earlier mandate on the military use of uninhabited systems, the passing of this Act ought to provide *T&S's* readers and contributors with cause for concern. As with the Internet and other military-derived technologies, these systems are likely to raise many ethical concerns, just as they do in the military realm, with some likely to be complicated or exacerbated by the presence of civilians. It is also important to realise that once the "genie is out of the bottle," so to speak, there is no going back.

Hence, we need to start asking ourselves some serious questions. There are two that seem particularly important:

Are uninhabited systems safe enough to be employed in the civilian realm? This is the first question we must consider prior to allowing these systems to fly in, over, and around our neighborhoods. Section 332 of the abovementioned Act requires the FAA to develop a comprehensive plan to safely accelerate the integration of uninhabited systems into the civil airspace system "as soon as practicable, but not later than September 30, 2015" [12]. The problem, of course, is that from both technical and ethical standpoints, time and safety demands often conflict, and when they do, they often cause some form of harm to persons or their environments. In order to fly pilotlessly throughout the skies, UAVs must, apart from being generally airworthy, be capable of sensing when they get too close to other aircraft or static objects and must also have an effective control system to avoid collisions and dangerous near

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misses. Proponents of uninhabited systems highlight that there have been few accidents involving military UAVs. There are, however, some notable exceptions, including a recent mid-air collision between a relatively small RQ-7 Shadow drone and a C-130 Hercules warplane, which totally destroyed the UAV and caused an emergency landing for the larger warplane [13]. The problem in the civilian realm is that a plane crashing to the ground is much more likely to cause serious damage, primarily due to the density of the urban environment. Air traffic over the United States is also much more dense than over an ordinary war zone and consists of many larger passenger-carrying aircraft. Another pertinent difference between the military and civilian realms is that those in the former generally expect to face – or some philosophers would even say "consent to" [14] – the risk of harm, whereas civilians do not. Hence, civilians should be afforded certain protections that are not normally extended to combatants.

Will the use of uninhabited systems erode our sense of privacy? It is not too difficult to imagine how these systems raise privacy concerns. As Ryan Calo has pointed out, these robotic systems have purposely been designed to sense, process, and record the world around them [15]. They go places and see things that humans cannot, or perhaps, *should* not. A limited number of law enforcement agencies already have special permission to use UAVs to surveil both domestic and foreign populations for crime-prevention and border protection purposes. Section 334 of the FAA Modernization Act dictates that programs, processes, and permissions be put in place to authorize and expedite the operation of UAVs for public uses [12]. With this, public agencies are essentially being given the green light to scale up their reliance on robotic surveillance technologies. This may do some good, but there are all sorts of questions concerning what should happen to the information that these systems obtain from what were traditionally private spaces. Is it stored? Who has access? How is it interpreted? What happens, for instance, if a drone surveilling a stolen car happens, by chance, to record you, in the privacy of your own backyard, kicking the family dog? Is the system networked and the information shared? Are you later fined for animal cruelty? How does the law enforcement agent reviewing the information know you were not defending yourself? There is also potential for the automation of certain elements of law enforcement and other public services, which raises many other concerns that I will not discuss here. Perhaps more worrying is that uninhabited systems present as a new observation tool for individuals and

corporations, also giving them access to traditionally private spaces. Anyone can now buy small and easily operated UAVs that can be used to spy on neighbors or scantily clad beachgoers. With the desire for unique images and video growing in the news media and technology becoming more affordable, we are also likely to see the emergence of “drone journalism,” making it much more difficult to escape journalists or paparazzi [16]. Advanced thermal imaging technologies may even mean that privacy is not even protected in one’s own home. It is debatable as to whether this degree of transparency is in the public interest, but it is likely to fuel paranoia and may even be linked to depression and suicide [17]. It must also be remembered that while we have come to expect great degrees of transparency from those in public roles, it is much more difficult to demand the same from the general population. Most civilians do not perform any sort of public function and any case for monitoring them is therefore less convincing.

These two questions provide a good starting point for a refocused discussion within *T&S* on the ethical issues associated with the non-military use of uninhabited systems. Of course, these have been raised elsewhere and there are also other questions and problems we ought to concern ourselves with. The “responsibility gap” that has regularly featured in the debate about the military’s use of uninhabited systems obviously remains a concern with non-military uses of these systems. However, it is not simply a matter of revisiting the old debate. In the civilian sphere, attributing moral and legal blame for errors and failures would seem to be more complicated in that there is no clear chain of command or an easily identifiable system of operational processes as there usually is in the military. There are also questions concerning what level of liability engineers and manufacturers should hold for products they know are intended for use among the vulnerable civilian population. Furthermore, there are concerns about job losses as a result of automation, technological complacency, and deskilling, all of which are particularly important in the civilian realm due to the sheer number of people that stand to be affected. Further still, there are concerns that the use of uninhabited systems in civilian airspace might make it easier for “home-grown” terrorists to launch attacks. For instance, drones could feature in a Unabomber 2.0 style attack. These are all worries that need to be taken into consideration and weighed against the moral reasons for using uninhabited systems. The military has a fairly clear moral justification for employing these systems: they minimize the risk of harm to

soldiers who are taking significant burdens and risks by serving their country [18]. The moral justification for employing these systems in the civilian sphere, particularly in a commercial capacity, is less clear.

In short, while some research has already been conducted, there is much that remains to be said about the non-military use of uninhabited systems and their effect on civilian society. Those engineers and meta-technologists that represent a significant portion of *T&S*’s readership base are well placed to offer a unique perspective on the use of these systems. I call on those individuals to at least consider some of the questions I have raised here, to consult relevant pieces of literature and to encourage further open debate, whether in the form of contributions to *T&S* or other journals, conferences, and so on. In three years’ time, we do not want to again be reflecting on what happened while we were not paying attention. The remedy, as Janet Rochester advocates, is to take some time to “stand and stare” at the matters involved [19].

Are uninhabited systems safe enough to be employed in the civilian realm?

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SSIT Announces IEEE Barus Award to Environmental Engineer Marc Edwards

The IEEE-SSIT Carl Barus Award for Outstanding Service in the Public Interest will be presented in 2012 to Marc Edwards, a Civil and Environmental Engineer who worked to expose safety and quality problems in U.S. public drinking water supplies.

SSIT Ethics Committee Chair Steve Unger writes of Mr. Edwards:

"Marc Edwards, in the course of his research on water distribution systems, found that many homes in Washington, DC, were receiving water contaminated with lead to an extent far exceeding acceptable levels. The health of many thousands of people, especially

children, was thereby jeopardized. The very agencies whose mission it was to protect the public against such hazards used faulty data and analysis to reject his conclusions and his recommendations for remedial action. Despite a loss of funding, and attacks on his competence, Edwards refused to back down. He probed more deeply into the subject, paying student assistants and other expenses out of his own pocket. His work discredited a defective CDC report that, in effect, encouraged water suppliers all over the nation to underestimate the problem of lead in drinking water. For more than a decade, on this project, Marc Edwards demonstrated courageous, persistent, unselfish dedication to the public welfare."

SSIT will present the Barus Award to Marc Edwards at a meeting later this year.

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