"Just Say No" to Drones

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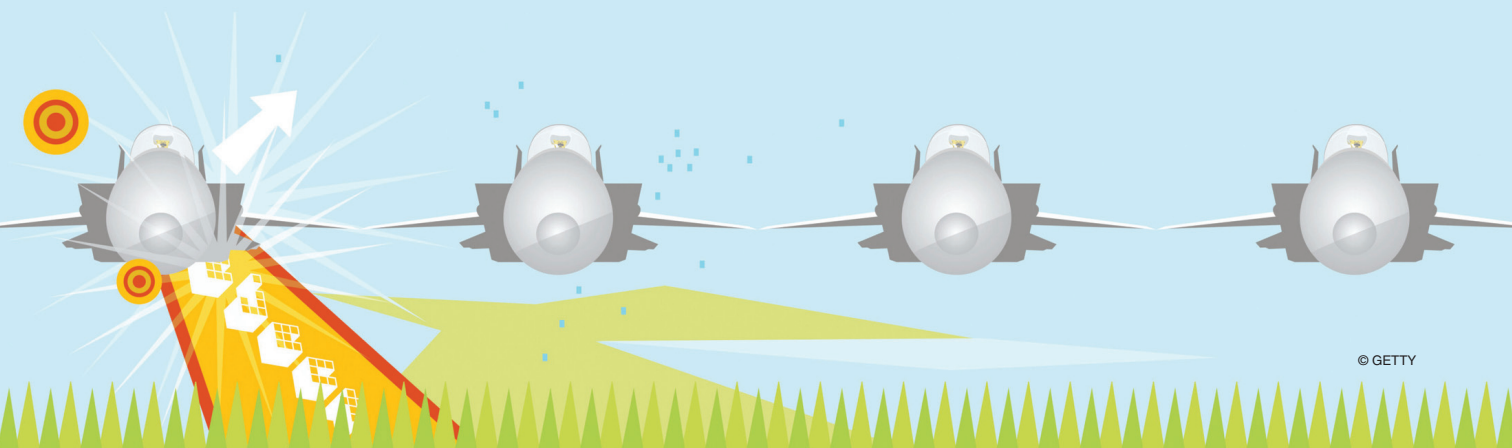

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It is difficult to find a figure for the exact percentage of robotics research that is currently funded by the military. However, it is clear that military organizations and budgets fund a significant amount of – and perhaps even most – robotics research today. Recent technological progress, which has greatly increased the number of roles that it is plausible for robots to undertake; the potential for robots to help keep soldiers "out of harm's way"; and the perceived success of the U.S.'s Predator and Reaper drones in Afghanistan, have led to a massive influx of funding from governments all around the world for research on military robots. Consequently, large numbers of engineers – at universities, in industry, and in military research laboratories – are working to develop and perfect the technologies for the next generation of unmanned aerial vehicles, unmanned ground vehicles, unmanned surface vehicles, and unmanned submersibles. In many ways, this military funding is like a drug for roboticists: constantly available, tempting to try, habit-forming, and hard to kick. Like drugs, funding from the military becomes more attractive still when times are hard and other sources of meaningful employment become scarce. Most importantly, like (some) drugs, military funding is bad for the moral and psychological health of those who grow to rely upon it.

This essay appeals to the engineering profession to "just say no" to drones – and to other military applications of robotics – and so to begin the difficult process of kicking the habit of military funding.[1] My approach will be somewhat provocative: my primary aim is to encourage a conversation about the ethics of accepting military funding today rather than to try to settle the matter in this short essay. Moreover, I believe this conversation must include discussions about the nature of the military and about the armed conflicts in which robots are being used, which will inevitably be controversial. As I am a professional philosopher, writing for a readership of engineers, my challenge is a challenge from outside the profession; I hope my readers will not dismiss my concerns out of hand on that basis. In the course of my research on the ethics of military robotics [1]–[4], I have spoken with many engineers who *are* concerned about the impact that military funding is having on robotics today; some have even refused to accept such funding and have spoken and written eloquently about their reasons for doing so [5]–[6]. However, when the issue at hand is precisely how much robotics engineers have come to rely upon and identify with military funding, there may be virtue in an outsider's perspective. Moreover, many of the most important questions involved in determining the ethics of accepting military funding are political, social, and ethical questions that engineers typically have limited opportunity to study over the course of their training. It is not unreasonable, then, to think that a philosopher might have something useful to contribute to a discussion of these issues.

The Evils of War and Militarism

Any discussion of the ethics and implications of accepting military funding must begin with an examination of the military and the purposes towards which they direct research. Any examination of the military must begin – but not end – with the nature of war.

It is hardly controversial to insist that war is a terrible thing and something to be avoided if at all possible. Yet, in an era in which the horrors of war are largely visited on people living in Africa and the Middle East, it is worth reminding ourselves of the reality of what happens when weapons are used. War means death, destruction, suffering, brutality, and environmental devastation. It means young men and women dying in agony in the dirt or coming home with traumatic brain injury or missing limbs. Even in this age of smart bombs and Predator drones, most of those killed in wars are civilians. The soldiers who are killed or maimed are not the people who make the decisions that provoked the war. Indeed, overwhelmingly they are young men and women who were forced to fight or who joined the military because it offered one of the few ways out of poverty and entrenched lack of opportunities.

According to the most radical critics of war – pacifists – war is *never* justified. The reasons for which wars are fought – defense of territory, culture, or a particular government – never justify the death and suffering that results [7]-[8]. It follows reasonably straightforwardly from this perspective that one should also not lend one's efforts to the project of preparing for war.

Most people, however, will admit the possibility that some wars are justified. The "just war" tradition is the body of legal and philosophical thought that has evolved to help settle when this might be the case. Just war theory sets out a number of tests that the justification for going to war must pass in order to constitute a "just cause" for war and also a number of further conditions that the means used to pursue military victory must meet [9]. A war that fails even one of these tests is not just war.

Because no state goes to war without arguing that its cause and

[1]For the sake of convenience, I will write as though the members of my intended audience are all "engineers," even though many people working in robotics identify themselves primarily as scientists, computer programmers, mathematicians, or physicists.

means are just, it is not always properly appreciated that the just war tradition implies that the chances that one is justified in fighting a particular war are at best 50% and are usually much much lower than this. In every war, at least one side is fighting an unjust war and in many wars neither side will have just cause or use just means. Thus, even within the just war tradition, the vast majority of wars are not justified. This means that if one is working for the military, the chances are that one will ultimately be serving the cause of injustice.

Of course, everyone wants to think that *their* nation is different and only fights in a just cause. Perhaps this is true for some: it cannot be true for all. It is also true that many of those in the armed services think of themselves as serving the cause of peace by deterring possible enemies and thus preventing conflict. Yet, if military preparedness is supposed to prevent war, it has a high failure rate! Nor should this be a surprise: arms races are just as likely to provoke as prevent conflict.

The most radical critique of the military argues that it is an institution that exists primarily to protect the rulers against the ruled rather than the nation against external threats [8], [10]. On this account, the use of the armed forces against a nation's own citizens, as is occurring in Syria and Egypt as I write, and as occurred in Tiananmen Square, Kent State, the former Soviet Union, and countless military coups throughout the ages, is not exceptional but rather the military carrying out its core mission. If this is true, the military has no virtuous purpose and all the time, money, and effort spent "preparing" for war is wasted.

However, one need not believe this to recognize that, as suggested above, the costs of maintaining military forces do not stop at the costs of war. It is an ongoing tragedy just how many of the world scientists and engineers are working to produce weapons and technologies which, in the best case, will never be used [11]. The level of military spending by first world nations is especially obscene given that citizens of first world nations have never been safer from external military threats. It is even more offensive when we consider the number of non-military threats, such as global warming, massive species extinction, desertification, and the social and political consequences of global inequality, facing us today [11]. The cost of not dealing with these problems needs to be included in the calculation of the ultimate cost of maintaining armed forces.

Maintaining military "preparedness" also has a number of other destructive social and political consequences. Societies that expend a lot of time and effort preparing for war are likely to become accustomed to the idea that obedience to authority and the capacity to wield force are virtues, which may in turn impact negatively on their culture and thus on individuals. The nationalism necessary to sustain public support for military spending encourages a "groupthink" mentality that corrodes democracy by discouraging dissent. The military represents a constant temptation to other *loci* of social power to impose their views on society.

These considerations may be sufficient to convince some engineers that it is wrong to become involved in the military-industrial-scientific complex by accepting funding from the military. From many others, however, these arguments will be too abstract: what matters when it comes to the ethics of working to military ends is not the ethics of war in general but the ethics of particular wars.

War Today

A number of the scientists who were willing participants in the development of the atomic bomb when they believed it was necessary to defeat the Nazis, had second thoughts when they realized the bomb was going to be used against Japan and, later, that nuclear weapons would be aimed at the Soviet Union [12]–[13]. More recently, the role played by military funding in the sciences became controversial during the Vietnam War and the 1980s (with the development of the Star Wars project) because the goals and activities of the military were controversial at these times. Similarly, the ethics of working on military robotics today is intimately connected to the nature of the recent war in Iraq and the ongoing war in Afghanistan, as these are the conflicts in which military robots have "come of age" and which are setting the agenda for the design of the next generation of robotic weapons.[2] If it turns out that, by and large, robots are *not* defending our homelands against foreign invaders or "terrorists" but rather killing people overseas in unjust wars then this raises serious questions about the ethics of building robots for the military in the current period.

Argument about the extent to which the U.S.-led invasions and occupations of Iraq and Afghanistan were, or are, just wars has largely focused on the validity of the grounds that were used to justify the original invasions. Given that neither of these nations had attacked the United States, it was always going to be difficult to demonstrate a just cause for attacking them. The controversy following the failure to locate

[2]As I was first writing this paper, U.S. President Obama declared the end of "combat operations" in Iraq – news that was followed shortly thereafter by reports that U.S. troops had been involved in a firefight and that two service personnel had been killed. Given the political instability of Iraq, the continuing high level of violence there, and the geopolitical interests in the region, it may still be premature to be confident that this war is "over."

weapons of mass destruction in Iraq and the revelations that the allegations that Iraq possessed such weapons were deliberate fabrications [14]–[17] are ultimately distractions in this context. If possession of WMDs is sufficient to justify attacking a nation, then the international community would be justified in attacking the United States, France, Russia, Israel, India, Pakistan, China, and the United Kingdom. If the justification was supposed to be that "rogue" nations cannot be allowed to possess WMDs, then several of these nations have much longer histories of international military aggression than did Iraq.

It might be argued that the justice or lack thereof of the original cause for going to war in Iraq and Afghanistan is no longer relevant to the justice of the subsequent – and, in Afghanistan, continuing – military operations in these nations, which may be defended with reference to the other political circumstances in these lands. In fact, this seems unlikely: a war does not become any less unjust simply by virtue of being long. Regardless, in this context it is worth briefly mentioning the just war criteria of "proportionality" and "reasonable chance of success" as together setting a test that the military campaign in Iraq clearly failed and the current military campaign Afghanistan also fails. "Proportionality" requires that the good that going to war is intended to achieve is sufficient to justify the death and destruction that will occur in its course. The "reasonable chance of success" criterion requires that there be a reasonable chance that a war will achieve the goals that are supposed to justify it [9]. The constant repetition by political leaders of the need to "finish the mission" or "stay the course" in Afghanistan and Iraq has occurred in the context of a notable reluctance to explain what "the mission" was (and is) or where "the course" might end. This is no coincidence: rather, it reflects the difficulty of setting out a definition of "the mission" that could serve to justify these invasions in the first place or the subsequent presence of foreign troops in these countries and that it is plausible to think armed force could achieve. If the mission was to establish democracy in the Middle East or to protect the human rights of Afghan (or Iraqi) women then there was (and is) little prospect of military force achieving these goals. If, on the other hand, the mission was to achieve some more realistic goal like replacing one brutal regime with another, slightly more amenable to Western interests, then this is highly unlikely to justify the death and destruction required to achieve it.[3]

Finally, it is worth observing that both of these wars were (and, in Afghanistan, still are) obviously immoral by virtue of the sheer waste involved in them. It is hard to see how the interests of ordinary U.S. citizens have been served by spending $748 billion to overthrow the government of Iraq or by spending $304 billion to restart a civil war in Afghanistan [19]. More importantly, over the period in which these monies were spent, around the world, several hundred thousand people died of preventable diseases – lives that could have been saved had they been spent on more productive purposes.

Again, let me emphasize that my reason for discussing these matters here is the conviction that the ethics of working on military robotics today cannot be entirely divorced from the ethics of the ends to which military robots are used. Obviously, a full discussion of the justice of these two wars is much larger task than I can undertake here: I can only insist that it is vital that roboticists consider these issues. Political arguments about the justification of the wars in Iraq and Afghanistan *matter* to the ethics of working on military robots in the current environment.

Engineers, War, and Democracy

There are two important lines of argument that reject the idea that engineers should be making moral judgments about the wars their nations are involved in. The first asserts the importance of citizens in a democracy respecting and supporting the decisions of their elected leaders. The second emphasizes the moral weight of the obligations we have to fellow citizens.

Democracy requires that minorities be willing to abide by the decision of majorities. It might therefore be argued that it would be improper for engineers to second-guess the decisions of the government and to refuse to support the wars or weapons projects it has decided upon.

This argument is flawed in two respects. First, while the social contract that underpins a democratic society requires that citizens abide by majority decisions about matters where it is not possible for citizens to "live and let live," no individual citizen is morally obliged to support the state in any particular role. Thus it is simply untrue that just because the government has decided upon a war we are duty-bound to contribute to the war effort. The second problem with this argument is that there are important limits to the scope of the obligation that majority decisions may impose upon minorities. While these limits are hard to locate precisely, at the very least they prevent governments from demanding obedience in matters of conscience or contrary to duties to humanity. For instance, I presume that few of my readers would feel comfortable designing gas chambers or instruments of torture just because the government had

[3] *The New York Times* – hardly a mouthpiece of radical opinion – recently editorialized that the Iraq war was a "tragic, pointless war" [18]. It is hard to see how the war in Afghanistan will escape the same judgment.

decided that these were necessary. The fact that there are such limits also means that individuals must retain the right to judge when they have been reached. Thus, given that participation in an unjust war is one of the worst crimes a nation may commit, citizens – including engineers – must retain the right to withdraw their active support from wars they judge to be unjustified by refusing to work on military projects.

It might, however, be argued that an obligation to support the armed forces by building them better robots arises not out of a duty to the government but to the members of the armed forces themselves. Once a nation has gone to war then the lives of members of its armed forces will be at risk. Regardless of what we think of the decision of the government that sent them to war, we have a duty to defend the lives of our fellow citizens.

Clearly this is an admirable motive for military service. However, whether it is sufficient to excuse us of an obligation to assess the justice of the cause in which our fellow citizens fight is less clear. To start with, this way of thinking places a lot of weight – arguably too much weight – on ties of nationality and not enough on justice or humanity. The lives of our compatriots are not the only lives that we should care about. The "defense" of our fellow citizens in Afghanistan may involve killing Afghani civilians, who no more deserve to die than the young men and women that our own government has sent overseas to fight. Moreover, if the lives of our compatriots are at risk because our government has committed them to an unjust war then, in supporting them, we cannot avoid becoming complicit in this injustice. Our willingness to provide such support also allows the government to continue to risk their lives by fighting these wars. Thus, while it is understandable that many engineers feel that their first duty is to defend the lives of their fellow citizens who are at war, a universalistic ethics suggests that it would be more ethical to support our fellow citizens *and* foreign citizens by refusing to contribute to unjust wars, while a longer term perspective suggests that this might be a more effective way to defend our compatriots.

Peace, Security, and Robots

The question of the ethics of accepting military funding arises for people working in the sciences generally, given the depressingly high percentage of the funding available for research that is dedicated to military goals. Nevertheless, I want to argue that it is an especially urgent problem for roboticists.

This might seem a surprising claim given that, as far as weapons go, robots have some distinct advantages over other military technologies, including ethical advantages.[4] Most robots will presumably take at least one person "out of harm's way" when used in a military role, which is not an insignificant factor in the moral calculus. For various reasons that I have discussed elsewhere, robotic weapons will often make the use of lethal force more "precise," perhaps reducing civilian casualties in doing so [1], [3].

Yet there are a number of other considerations that suggest that further development of robotic weapons may actually be disastrous for the cause of peace and stability [21]. Robotic weapons may render governments more willing to go to war, lower the threshold of conflict, trigger accidental wars, and thus ultimately lead to *more* death and destruction [2].

The capacity of robot weapons to keep warfighters out of harm's way is, as Noel Sharkey has observed [22], a double-edged sword. While it will prevent deaths among the warfighters of nations that are able to field robots, it will also make it easier for governments to initiate wars by encouraging them to believe that they can fight a war without television images of soldiers returning in body bags costing votes in the next election. In particular, governments will be tempted to try to resolve political problems by carrying out "targeted killings" – assassinations – and "surgical strikes" [23]. Yet few political problems can be solved simply by killing people. Many conflicts can only be resolved by occupying territory and/or by winning "hearts and minds" – tasks that robots are highly unlikely to be able to succeed in for the foreseeable future. Paradoxically, then, further developments in robotic weapons may result in more members of the armed forces being placed in harm's way, as governments are drawn into wars that they cannot win without placing human lives at risk [3].

Improvements in remotely-operated and autonomous weapon systems are also likely to significantly lower the threshold of conflict. Uninhabited systems, especially uninhabited aerial vehicles and uninhabited submersible vehicles, will have longer ranges, longer "loiter" times, and greater capacity for "stealth" attacks than manned systems. They will also be suitable for deployment in more hazardous roles. All of these features increase their usefulness for preemptive attacks and consequently the temptation to attempt such attacks. Thus, in the future, states will need to be prepared for the possibility of sophisticated attacks involving robotic weapons with very little warning time. This increases the risk of accidental war and also the temptation to

[4]The ethical case "for" robots as weapons has been made at length by Ron Arkin [20]. I discuss Arkin's arguments in [1]. In an interview recently published in this magazine, Arkin discusses the ethical concerns he has about military applications of robotics, even given his ultimate conclusion that research on military robots is justified [24].

hand over responsibility for countermeasures to autonomous and robotic systems [2]. If autonomous weapon systems are granted the power to decide when to open fire in offensive operations this will further increase the risk of accidental war [25].

If one believes that there is any chance of "strong" Artificial Intelligence (AI) emerging out of contemporary robotics research, this is yet another reason to hold that such research should not be conducted until there has been adequate public debate about the desirability of creating non-human human-level intelligences [26]. This debate is unlikely to take place if the research that might create AIs is being done in military laboratories or in university laboratories funded to do secret military research.

Another distressing consequence of the proportion of robotics research that is funded by the military is that it has resulted in a profound failure of the imagination as regards what robots might be capable of. These marvelous machines, which were supposed to liberate human beings from backbreaking labor and drudgery, are in fact mostly being built to kill people. Other, more imaginative and productive applications for robots are being neglected. In the long run, if the robotics community continues to devote most of its energies to building robots that can only serve in such destructive roles, it risks losing the public support that currently exists alongside the public fascination with robots.

There are, therefore, real risks involved in the current program of research on military robotics. On the other hand, very few of the nations that are developing military robots would be threatened if they did not develop them. While robotic weapons may be "better weapons" they are not (yet) necessary ones. We are, I think, in a brief period where it might be possible to avoid a destructive arms race to build more, more powerful, and more sophisticated, robotic weapons. It is for this reason that Peter Asaro, Juergen Altmann, Noel Sharkey, and I convened the "International committee for robot arms-control" that held its first workshop in Berlin in September 2010 [27]. The risks involved in such an arms race, which would direct an even higher percentage of robotics engineers into military research, as well as increase the likelihood that robots will be used in wars, is itself a further reason why engineers should "just say no" to military funding [2].

"A Searching and Fearless Moral Inventory"

Nothing I have said here is intended to deny that there are many decent, well-intentioned, and conscientious people working on military robots – some of whom I would like to count as friends.[5] As I said at the outset, my goal here is to provoke discussion and to emphasize the need for such discussion to include moral and political questions about the justification of military spending in current circumstances and also of particular conflicts. Yet it must also be acknowledged that those who are addicted to military funding are unlikely to admit that they have a problem. At least briefly, then, I want to respond to several unconvincing arguments that defend the ethics of military research and also acknowledge the pressures that lead many engineers to accept military funding despite their own reservations about doing so.

I suspect that working on projects funded by the military is only possible for many engineers because of the psychological distance between their own activities and the consequences of war. Computer scientists working on an algorithm for machine vision for the military may not see the connection between what they do and the mangled corpses that result from the operations of military robots. Moreover, engineers can quite properly point to the intervening responsibility of others for the uses to which their research is put.

It would be implausible to insist that the responsibility of engineers who design military robots was no different to that of the warfighters who operate or command them. Equally well, however, it is too swift to conclude that engineers have no responsibility for the ultimate uses to which their research is put. Most human projects involve a number of people who must share responsibility for the outcomes of their actions and there is a large literature on responsibility for joint and collective projects – much larger than I could plausibly survey here [28].

However, there are two considerations that are crucial to determining when – and how much – people should be held responsible for consequences brought about by the actions of others. The first is the extent to which it is foreseeable that our actions will contribute to or facilitate the immoral acts of others. The second is the extent to which our actions and the actions of others constitute joint action – action to a common purpose – or collective action – as part of the activities of a collective agent such as a corporation or nation.

Both of these considerations suggest that engineers working on projects funded by the military do have significant responsibility for the uses to which their research is put. If one is being funded by the military, it can hardly be a surprise when one's research is put to use killing people. Funding from the military will usually involve a group of people working to a common purpose that will largely be defined by the reasons why the military provided the

[5]My own father – a deeply moral man – worked for many years as a research scientist in the (Australian) Defence Science and Technology Organisation's Aeronautical Research Laboratories.

> If military preparedness is supposed to prevent war, it has a high failure rate.

funding. All these individuals will then have some responsibility for the outcomes of the joint project as well as for their particular contribution to it. Whether or not engineers funded by the military contribute to the actions of a collective agent is more controversial. However, military organizations are themselves paradigmatic examples of collective agents, being so tightly structured and organized as to be capable of acting in ways (for instance, invading Afghanistan) that individuals are not. In cases where the links between researchers and military organizations are particularly strong, as, for instance, when they are extensive and/or long-standing, when the military is the primary source of funding for a research group, or when engineers are directly employed by the military, engineers may well come to be part of a collective agent dedicated to military goals and to inherit some responsibility for the actions of this agent.

Another thought that allows people to rationalize working on projects that they themselves feel uneasy about is "If I don't do it, someone else will". This is often true – although equally well it sits uneasily alongside the belief that one is uniquely talented, which itself is often necessary to achieve success in highly competitive fields such as engineering. However, this argument neglects that we are responsible for what we do and not just for what happens as a result of our choices. That others might do what we choose not to does not absolve us of responsibility for our actions. There are always people willing to deal drugs, after all, but most of us do not conclude that it might as well be us.

A related argument emphasizes how much robotics research is "dual use" and then suggests that, as there is no way to prevent the results of civilian research being adopted by the military, there is little point in refusing military funding [5], [24]. Again, this elides the distinction between our own actions and the actions of unrelated parties. Other people will try to draw the line at working on offensive weaponry, while being happy to work on defensive systems. This distinction can sustain less moral weight than first appears because defensive systems make offensive operations possible: one contributes to the military achieving its ends either way.

A particularly unconvincing argument for participating in research on military projects is that it is justified by the civilian spin-offs it generates. This argument is too quick to concede that if research isn't funded by the military then it will not be funded at all. Spending money on any project will generate unanticipated benefits. Indeed, even "pure" research typically leads to spin-offs. If we are looking for technologies for civilian purposes, we would do much better to research them directly.

I do want to acknowledge, however, that individuals, particularly aspiring engineers, may pay a high personal price for refusing to work on projects that receive military funding. Given just how much robotics research is funded by the military, engineering students looking for a job or a place to undertake their doctorates may face a choice between working on a military project or not gaining entry into their desired profession at all. This is a dilemma that is unlikely to be faced by philosophers! Even if one is a more senior researcher, if one refuses military funding, one's research may not be funded, and one's career may be seriously affected.

An Appeal to the Engineering Profession

For this reason, the argument that engineers should "just say no" to military funding is best addressed to the robotics community as a whole rather than to individual engineers. Asking individuals to "just say no" to military funding has the same problem as asking them to "just say no" to drugs. The reasons why people become hooked on these things are largely social and relate to their environment and, in particular, to the alternatives available to them. If we want people to be able to kick the habit, we need to look at these environmental factors and try to change them through social policy rather than just rely upon individuals' strength of will. Those individuals who do want to "say no" will be better able to resist the social pressures that lead to addiction if they band together to do so.

My hope, then, is that this essay will spur discussion within the robotics community as to how it might support those who do refuse military funding and whether it might encourage others to do so. When professional associations of engineers or computer programmers meet, when codes of ethics are being drafted, or professional standards are being set, I hope the question of the ethics of accepting military funding will be raised and debated.[6] The most ambitious goal, for those who have found the argument I have made here compelling, would be to have a clear statement adopted by the association or written into the code of ethics or standards, that engineers should

[6]Future iterations of the Euron Roboethics Roadmap [29] would also represent an important opportunity for such discussion.

refrain from accepting military funding.

Given how thoroughly contemporary robotics research is infused with military money, this is probably unlikely. However, even an unsuccessful campaign to this end would generate many benefits in terms of encouraging engineers to carefully think through their own perspectives on this topic. It also would allow like-minded people, who *do* wish to refuse military funding, to become aware of each other's presence and to support each other in their struggle by developing alternative programs of research. Campaigns to query the ethics of accepting military funding for robotics might also profitably be carried out at the level of individual universities and research institutions, with students and faculty coming together to debate the question and perhaps deciding to prioritize other, less morally compromised, sources of funding.

Of course, as I noted above, the attractiveness of military money in the current period is largely a function of the scarcity of available alternatives. In order to have any chance of being successful in the longer term or on a larger scale, then, a political mobilization against military funding of robotics would have to include a campaign to increase the funding for robotics research from other sources. This might have the further benefit of partially mitigating some of the divisions that would inevitably result from any serious challenge to the current preponderance of military robotics research. Hopefully most, if not all, engineers can agree, along with the rest of the community, that we would all be better served if, in the future, robots were being researched, designed, and built to confront some of the urgent social and environmental challenges facing humanity today rather than to kill or to wield political power in foreign lands.

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