

We must ban killer robots

Toby Walsh

How will Artificial Intelligence change war? Hollywood has it wrong. It won't be Terminator, robots with sentience, that transform warfare. It will be much simpler technologies that are, depending on your perspective, at best or at worst less than a decade away. Indeed, it is stupid AI that I fear. We will soon be giving machines that are not sufficiently capable the right to make life or death decisions.

Take a Predator drone. This is a semi-autonomous weapon. It can fly itself much of the time. However, there is still a soldier, typically in a container in Nevada, in overall control. And importantly, it is still a soldier who makes the final life-or-death decision to fire one of its Hellfire missiles.

But it is a small technical step to replace that soldier with a computer.

Indeed, it is technically possible today. And once we build such simple autonomous weapons, there will be an arms race to develop more and more sophisticated versions. Indeed, we can see the beginnings of this arms race. In every theatre of war, in the air, on land, on and under the sea, there are prototype autonomous weapons under development.

This will be a terrible development in warfare. But it is not inevitable. In fact, we get to choose whether we go down this particular road. Since 2015, I and thousands of my colleagues, other researchers in AI and Robotics have been warning of

these dangerous developments. We have been joined by founders of AI and robotics companies, Nobel Peace Laureates, church leaders, and many members of the public.

Why would we want killer robots?

The attractions of autonomous weapons to the military are obvious. The weakest link in a Predator drone is the radio link back to base. Indeed, drones have been sabotaged by jamming their radio link. So if you can have the drone fly, track and target itself, you have a much more robust weapon.

A fully autonomous drone lets you dispense with a lot of expensive drone pilots. The United States Air Force could be renamed the United States Drone Force. It has more drone pilots than pilots of any other type of plane. And soon it won't be just more drone pilots than pilots of any other type of plane but more drone pilots than all other pilots put together. And while those drone pilots aren't risking their lives on combat missions, they suffer post-traumatic stress disorder at similar rates to the pilots flying in planes.

Autonomous weapons offer many other operational advantages to the military. They don't need to be fed or paid. They will fight 24/7. They will have super-human accuracy and reflexes. They will not need evacuating from the battlefield. They will obey every order to the letter. They will not commit atrocities or violate international humanitarian law. They would be perfect soldiers, sailors and pilots.

Strategically, autonomous weapons are a military dream. They let a military scale their operations unhindered by manpower constraints. One programmer can command hundreds, even thousands of autonomous weapons. This will

industrialise warfare. Autonomous weapons will greatly increase strategic options. They will take humans out of harm's way opening up the opportunity to take on the riskiest of missions. You could call it War 4.0.

In September 2017, Vladimir Putin was reported to have said that whoever leads in AI will rule the world. He predicted that future wars will be fought by drones, and when one side's drones are destroyed by drones of another, it will have no other choice but to surrender.

Why should we ban killer robots?

There are many reasons why the military's dream of lethal autonomous weapons will turn into a nightmare. First and foremost, there is a strong moral argument against killer robots. We give up an essential part of our humanity if we hand over the decision to a machine of whether someone should live. Machines have no emotions, compassion or empathy. Are machines then fit to decide who lives and who dies?

Beyond the moral arguments, there are many technical and legal reasons to be concerned about killer robots. In my view, one of the strongest reasons for a ban is that they will revolutionise warfare. In fact, it has been called the third revolution in warfare.

The first revolution was the invention of gun powder by the Chinese. The second was the invention of nuclear weapons by the United States. Lethal autonomous weapons will be the third revolution. Each was a step change in the speed and efficiency with which we could kill.

Autonomous weapons will be weapons of immense destruction. Previously, if you wanted to do harm, you had to

have an army of soldiers to wage war. You had to persuade this army to follow your orders. You had to train them, feed them, and pay them. Now just one programmer could control hundreds or even thousands of weapons.

Lethal autonomous weapons are more troubling, in some respects, than nuclear weapons. To build a nuclear bomb requires technical sophistication. You need the resources of a nation state, and access to fissile material. You need some skilled physicists and engineers. Nuclear weapons have not, as a result, proliferated greatly. Autonomous weapons require none of this.

Autonomous weapons will be perfect weapons of terror. Can you imagine how terrifying it will be to be chased by a swarm of autonomous drones? They will fall into the hands of terrorists and rogue states who will have no qualms about turning them on civilians. They will be an ideal weapon with which to suppress a civilian population. Unlike humans, they will not hesitate to commit atrocities, even genocide.

Would killer robots be ethical?

There are some who claim that robots can be more ethical than human soldiers. It is, in my view, the most interesting and challenging argument for autonomous weapons. But it ignores that we don't know today how to build autonomous weapons that will follow international humanitarian law.

The rules of war require you to target combatants and not civilians, to act proportional to the threat, to recognise and respect when a combatant is surrendering, or when they are injured and can no longer fight. We don't know yet how to build autonomous weapons that can make such distinctions. Perhaps

in one or two decades' time, after autonomous weapons have already become commonplace, we may work out how to give some values to machines. But we won't be able to stop such weapons from being hacked to behave in unethical ways.

Ironically, a number of countries like the United Kingdom oppose a ban on lethal autonomous weapons precisely because they violate international humanitarian law. No new legislation is needed, they argue, to deal with such weapons. History disagrees with such arguments. Chemical weapons violate international humanitarian law, in particular the 1925 Geneva Protocol. But in 1993, the Chemical Weapons Convention came into force to regulate them more strongly. The Convention was signed and ratified by the United Kingdom.

The Chemical Weapons Convention strengthened international law to prohibit use of any chemicals in warfare. It set up the Organisation for the Prohibition of Chemical Weapons (OPCW), an intergovernmental body based in The Hague, to monitor the development, production, stockpiling and use of chemical weapons. Today, over 90% of the world's declared stockpile of chemical weapons has now been destroyed. This just goes to show that weapon bans are needed and can have positive impacts on our safety and security.

Another fundamental problem with killer robots is the "accountability gap". Who is going to be held responsible when lethal autonomous weapons make mistakes? Who will be court-martialled? Who will be prosecuted in the Hague?

At the strategic level, lethal autonomous weapons also pose new threats that might destabilise current stand-offs like that between North and South Korea. A swarm of small stealthy and autonomous drones will be very difficult to defend against

today. This may tempt one side to launch a surprise attack. And the fear of such a surprise attack may lower the barriers to the use of greater, even nuclear, force.

Lethal autonomous weapons therefore threaten to upset the current balance of military power. You would no longer need to be an economic superpower to maintain a large and deadly army. It would only take a modest bank balance to have a powerful army of lethal autonomous weapons. They will be the Kalashnikovs of the future. Unlike nuclear weapons, they will be cheap and easy to produce. And they will turn up on the arms black markets of the world.

This does not mean that lethal autonomous weapons cannot be banned. Chemical weapons are cheap and easy to produce but have been banned. And we do not need to develop autonomous weapons as a deterrent against those who might ignore a ban. We do not develop chemical weapons to deter those who might sometimes use chemical weapons. We already have plenty of deterrents — military, economic and diplomatic — with which to deter those who choose to ignore international treaties.

What are the objections to a ban?

There are several arguments put forward against a ban on killer robots. In my view, none of these objections stand up to close examination. One of the most serious objections is that humans do terrible acts in the heat of battle, but robots will follow precise rules so could behave more ethically than human soldiers. But, as I argued earlier, we do not know yet how to build such ethical robots, or to build robots that can be hacked to behave in terrible ways. And we do not know if they

will ever have the compassion and empathy required to behave ethically.

Another objection to a ban is that robots will get our soldiers out of harm's way. Indeed, some critics go as far as to argue that we are therefore morally obliged to use them. Perhaps the most troublesome part of this argument is that it completely ignores those facing the killer robots. Killer robots will increase the speed with which we can kill the other side. Killer robots will lower the barriers to war. This, ultimately, could result in more deaths not less. We cannot care only about our own casualties. We must consider the women and children who will be the victims of attacks by lethal autonomous weapons.

A third objection to a ban is that it is impossible to define autonomous weapon. How can we ban something that we cannot even define? I would agree completely it is difficult to define autonomy. And even more so, autonomous weapons. In AI we are used to this. Most AI researchers have given up trying to define what "Artificial Intelligence" is. We just get on with building machines that are increasingly capable.

I would expect any ban would not define autonomous weapon. It would simply identify that there is a line in the sand that should not be crossed.

Various weapon systems would be clearly one side of the line. A fully autonomous drone that loiters for days over the battlefield would likely be considered to be on the banned side of the line. But international consensus might be that a defensive system like the autonomous Phalanx anti-missile system on naval ships today is on the non-banned side of the line. As new technologies arrive, consensus will emerge as to where they sit with respect to the line.

A fourth objection is that new military technologies have only made the world a safer and less violent place. We should therefore be embracing autonomous weapons. Arguments like those put forward by Pinker (2011) in *The Better Angels of Our Nature* are often invoked. Pinker makes a convincing argument that the world today is a less violent place, and has less genocide than at any previous point in history.

There is, however, nothing that Pinker says that contradicts the need for a ban. The destructive impact of new technologies has only been curbed by the adoption of international humanitarian law, and new weapon treaties. Indeed, it was the bombs dropped on Venice from balloons by Austria forces in 1849 — by most accounts the first aerial bombing campaign — that led to the Hague Peace Convention of 1899 banning aerial bombing. Like with other new technologies, a new law is needed to limit the use of killer robots.

A fifth objection is that, unlike other technologies that have been successfully banned, such as blinding lasers, we are talking about a very broad capability that could be added to almost any existing weapon. And many weapons today already have some limited forms of autonomy. It would be like trying to ban the use of electricity. Worse still, it will be impossible to check whether a semi-autonomous weapon has had a software upgrade to make it fully autonomous.

This argument misunderstands how arms treaties work. Arms treaties define the norms. Arms companies have many profitable ways to make money selling arms that will not get them on an UN black list. If we don't want killer robots to be found on black markets and to fall into the hands of terrorists, we need to decide collectively that this is not acceptable.

What is the way forward from here?

We stand at a crossroads on this issue. We can choose to do nothing. Let arms companies develop and sell lethal autonomous weapons. This will take us to a very unpleasant place. Or we can speak up and hopefully get the United Nations to take action.

The academic community has sent a clear message as to their view. So, too, has the robotics industry. And in my experience speaking about the topic around the world, most of the public also strongly support a ban. A 2017 IPSOS survey of people in 23 countries found that, in most countries, a majority of respondents opposed fully autonomous weapons.

What keeps me awake most at night is that with most previous weapons that have been banned, we had to witness their use before we took action. For instance, we had to witness the terrible effects of chemical weapons in World War I to take action and bring in the 1925 Geneva Protocol.

My fear then is that we will have to witness the terrifying impact of autonomous weapons before we have the courage and conviction to ban them. We have only one case, blinding lasers, where a ban was introduced pre-emptively.

Whatever happens, it needs to be morally unacceptable for machines to decide who lives and who dies. In this way, we may be able to save ourselves and our children from this terrible future. I pray we have that courage and conviction.

Reference

Pinker S (2011). *The Better Angels of our Nature*. Viking.