AI Warfare

Defense industries around the world are developing artificial intelligence (AI) weapons that can autonomously identify targets, locate them and destroy them – all without human guidance. "This is not a sci-fi nightmare, but rather an official R&D goal defined in Pentagon documents," says U.S. defense expert Jay Tuck as he maps out the future of warfare.

By Anup Oommen, Dubai

How is AI reshaping the defense industry?

The strategic planning of future defense forces will be dominated by three technologies: artificial intelligence, artificial intelligence and artificial intelligence.

There is no way that modern and future defense technologies can function without AI. The technologies are all so complicated; they are all producing such huge quantities of data that the only way to deal with that data is with the help of AI. They have gone way beyond the cognitive capabilities of a human being.

We have a brain weighing 1,300 grams, with 86 billion neurons and 20 watts of power, capable of scanning a few pages of information in real time. AI machines, such as Watson from IBM, are able to analyze 200 million pages of information in three seconds. There's no way – in computational terms – for the human brain to keep up with that speed and capability. In the military, there are hundreds of millions of pieces of data moving at lightning speed, and no human

brain can possibly manage to track or analyze all of these movements in real time.

Already, close to 95 percent of decisions in the defense industry are based on the information provided by artificial intelligence. For example, there are AI-based surveillance systems such as Argus, mounted on predator drones, which are capable of observing 200,000 people simultaneously and finding out who among them are being suspicious, based on their movements, contact with people, and signal intelligence such as telephone and social media behavior. These AI systems are defining targets.

Also, it's interesting to note that these are the capabilities of a growing AI: a technology that is taking its very first baby steps. AI is growing exponentially. Some people like to ask, when will AI be smarter than we are? Well, in many ways, AI is already much smarter than we are.

Will AI-based autonomous systems boost defense capabilities?

Firstly, human beings are getting more and more inadequate compared to AI machines. For instance, the capabilities of a fighter jet are limited primarily by the presence of a human in it. Humans cannot withstand very strong acceleration, a high number of Gs, extremely high altitudes and so on. On the other hand, autonomous planes or drones are technically capable of making sharp right angle turns in the air without being restricted by human limitations, making them more efficient. Then, there's the cost advantage of autonomous systems. It costs a fortune to train a modern-day pilot. Another important factor in the military is the reduction of human risk with the use of autonomous systems. There's no life lost if the autonomous plane or drone is shot down.

Right now, we have begun taking humans out of the cockpit. We live in a world where an American pilot is sitting in a secure location somewhere in Arizona or New Mexico and is flying drones and killing people on the other side of the globe.

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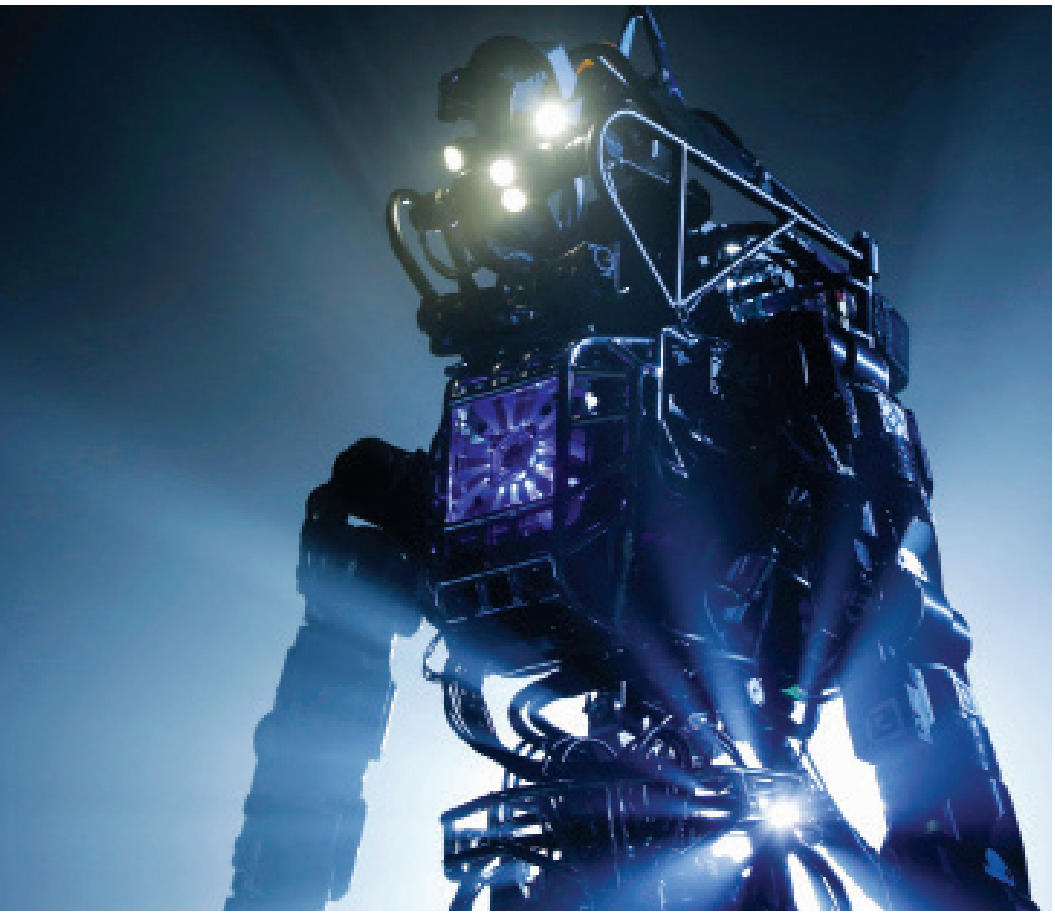
We have grown accustomed to technological advancements in these drones as they fly higher, faster and further than ever before.

However, these are old-fashioned drones. Remote pilots will not control the new generation of drones. These new drones will pilot themselves autonomously. More significantly, they are now capable of choosing their targets – and destroying them – autonomously. The unmanned Predator and Reaper drones are slowly being removed from active weaponry service and are being replaced by more modern drones such as the X-47B or the Valkyrie, which have recently been released from the Air Force Research Laboratory. These are drones that are capable of making the "kill" decision.

Currently, U.S. law requires that human beings remain in the decision-making loop. Although AI systems are gathering and analyzing the data, the human has to decide to kill. However, it is the declared goal of the Pentagon and the U.S. – and I'm sure of many others, as well – that the entire decision-making process from identifying, locating and even killing the enemy will soon be made by the machine. There are many Pentagon Papers where this is officially stated, and software that does this is already being installed in a number of models.

Moreover, such autonomous drones whether used in air or as underwater submarine drones, may be used in "swarms" in the future. Some of the most exciting ▶



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and most secretive weapons systems are the micro- and nano-weapons systems being developed in the Air Force Research Laboratories at Wright-Patterson Air Force Base in Dayton, Ohio. For these drones to fly in "swarms" or autonomous formations, they will have to be AI-enabled and communicate with each other in real time to prevent crashing into each other.

Who are the biggest AI defense players? What makes them so?

Globally, the U.S. and China are emerging as the top players in the AI race. However, it's not because of the reasons that most people think. There's a general notion that it's really important to have high tech centers like Silicon Valley, or to have the smartest minds like MIT, or to have the biggest venture capital, or the fastest computers, but that's all wrong.

The most important thing if you want to lead the AI-based world of the future is: data, data and data. AI learns from data. It's a software program that learns every day, every hour, every minute and every second. If AI is looking for terrorists, it does much better when it combs through 100 million pieces of data rather than 100,000 pieces of data. This is the great advantage of China, and the great disadvantage of Europe and the West. The Chinese are collecting data with very little inhibition. They have all kinds of data on individual people in their population and they don't have the data protection restrictions that we have in the West. So that gives them a huge head start. Data protection is one of the great handicaps that we have in developing AI.

No human with our 20-watt brains can possibly keep track of all battlefield movements, analyze them and take decisions based on them. The U.S. is withdrawing its forces from many battlefields around the world. Yet, they don't want to leave those battlefields unwatched. So, they leave behind surveillance tools. Some of their best and most effective surveillance tools are nicknamed "tennis balls" because that's about their size. They are sensors thrown out of cruise missiles and distributed in the hundreds and thousands, across battlefield areas. When they land on the ground, they have different kinds of instruments within them: chemical sensors, video cameras, audio recorders, Geiger counters to detect radioactivity, and various other kinds of sensors that gather information and produce enormous quantities of data.

Here we have two problems. One is in terms of quantity: Big data. It's just too much data for humans to examine. And the other is what they call unstructured data: very different types and forms of data that need to be aggregated, structured and sensibly analyzed. This can only be done efficiently with AI computers, that give a very precise prediction of what kind of vehicles are on the battlefield; what kind of weapons are being used; how many soldiers are in action; when and where they came from and where they're going. That's the real-time data that you have about the battlefield remotely, without any Special Forces on the ground. And that's only possible with AI.

As for space, it is a superpower battlefield. In terms of weapons developed for space, there are only three major countries in the playing field: the U.S., China and Russia. In this arena, AI-based systems are being used in laser satellites. Space weapons are unthinkable without AI controlling surveillance. Most new

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materials and energy systems are reliant on AI. Modern sensor systems produce huge quantities of Big Data that can only be analyzed with the massive cognitive capabilities of AI.

What are the disadvantages of AI-based warfare?

Forget all the Hollywood movies. I have been confronted with these theories about Terminators. Hollywood movies need a bad guy and a good guy; they need emotion. However, AI is different. Artificial Intelligence is just cold code. It's just ones and zeroes. There is no feeling in it. It will never have an ambition; it will never have a fear of death. All of these things that drive us as human beings, they aren't in AI. The question is, therefore, not about feelings or whether AI can empathize with us, but rather a question of control. We're giving up or relinquishing our control over our lives. We are relinquishing every day a salami slice of control of who we are, and what our society is, and what's important in life. And that's where I see the dangers.

There will be conflict. For example, if we turn over the control of our environment to AI, it won't need too much time to figure out what the problem with our environment is. It's us humans who are the problem. So if the AI tries to clean that up, it's going to be in conflict with us. And this is true in every aspect of its existence: in medicine, in the stock market, and in the military. We're slowly giving up control, and we're doing it because AI is so good at doing what it does. And that's dangerous. It's very, very dangerous. This is one reason I titled my latest book "Evolution Without Us – Will AI Kill Us?".

U.S. defense and AI expert **Jay Tuck** has served twice as combat correspondent in Iraq. He is the founder of Airtime Dubai Ltd. and has served in multiple senior executive roles at Europe's ARD Television network. He is an expert on security policy, espionage activities, and weapons technologies. He was contracted by Abu Dhabi Shipbuilding, producer of Navy warships in the region, to produce an image film on the their new Baynunah-class corvette, shown at the defense exhibition IDEX. Known for his TEDx talk with more than two-and-a-half million views, Jay Tuck has also authored the books "High-Tech Espionage" and his latest "Evolution Without Us – Will AI Kill Us?" based on research from U.S. and European drone bases, the Pentagon, intelligence agencies, and AI research institutions.