AI in the Last 100 Yards

CPT (RETIRED) TROY J. ALBUCK
MAJ JOSHUA K. FRYE

Automated weapons have proliferated. General artificial intelligence (AI) permeates the operational environment. Human/robot teams operate at the tactical, operational, and strategic levels. New synergies and concepts fundamentally change tactics and doctrine. Adaptation, information, and rapid decision making reign supreme over numerical strength and conventional mindset.

All of this will greet us in the near future. Exponential increases in processing power and AI research are changing our world. We must be ready.

Our community recognizes the need for new weapons systems, constantly evolving doctrine, and realistic training. In order to remain prepared for the next war, and not necessarily against a near-peer nation state, our Army must continue to embrace the future of warfare.

Human beings are inextricably linked to technology. Information systems in previous wars were relegated to high echelon elements. Recently, battle management systems and real-time data sharing made debuts with the fighting leader. Land Warrior, Force XXI Battle Command Brigade and Below (FBCB2), Command Post of the Future (CPOF), and others shape or shaped the way we share understanding and execute mission command. These systems, while sophisticated, were essentially dumb. We propose a future where our systems think, listen, speak, feel, and advise us during all phases of operations.

Picture a future battlefield where robots, drones, and other similar automata perform recon, make entry first, clear an objective, and work hand in hand with augmented human Soldiers. This time will also witness an interplay between expert AI and Army leaders in real time. Just as AI practitioners managed to create software capable of defeating the best humans at the complex game of "Go," it's perfectly reasonable to expect that they will devise systems which will excel at the game of war.[1] Systems and networks will recognize cues in intelligence and the

(U.S. Army illustration)

evolving operational environment that point to high probability courses of action. At least in the near future there will be benefit in keeping a human in the loop. At some point though, a human decision-making cycle and OODA (observe, orient, decide, act) loop will be far too slow.

Target acquisition, identification, and engagement are low-hanging fruit in near-term AI integration. AI programs already exist which recognize disease in medical imaging and perform better than highly trained radiologists.[2] Software in weapons sights and attached to networked sensors will remain vigilant 24 hours a day and recognize camouflaged, concealed, and hidden targets a human would miss. They will also quickly suggest the best engagement method. A sensor on an unmanned ground vehicle may spot an expertly concealed enemy tank; it would then use a network to determine the assets available and capable of engagement. The AI might re-task another asset to confirm the target's identity using other sensors. Using a highly developed threat library, definite confirmation is possible. It would then apply rules of engagement, calculate risks to others in the area, and select the most proportional and efficient munitions option. A human in the loop might then be queried for a decision — all within seconds.

Imagine also a platoon conducting operations in an urban environment. Military operations on urban terrain (MOUT) remains one of the most hazardous task sets. Countless structures and gritty city battlefields will feature more in future conflicts.[3] A common sci-fi trope is nearer to reality today than ever before; robotic systems will exceed the performance of the best Infantryman. Robots continue to operate until exhausting their power source — or when faced with mechanical failure. Robots under advanced AI control will not tire or hesitate to make entry when ordered to clear a room. The perfect robot point man will make entry, scan a room, move, and destroy its target with mechanical precision. Today's Infantryman cannot compete with the reaction times or split second decision-making abilities of such a system. An AI in control of such a battlefield robot will analyze the contents of a room, all individuals present, weapons, intentions, and other variables within nanoseconds. It will use its capabilities to slew its weapons system and fire before a human brain is capable of even seeing it break through the door. Make entry, clear the fatal funnel, identify the enemy threats, and move to dominate the room.

Every Infantryman's worst nightmare is having part of the team go down. Casualty evacuation under fire is a dangerous and heartbreaking process. It's also resource intensive. For every Soldier wounded in combat, it may take up to five Soldiers out of the immediate fight. A general purpose combat robot would also excel here. While battlefield robots will come in many form factors, a humanoid body may prove the most flexible in many situations. The robot would instantly react to a human taking fire and respond in kind. It would then maneuver itself, and apply its superhuman strength and speed to extract the casualty. AI-powered robots may also possess the knowledge and skills of the best collection of trauma surgeons and stabilize their wounded human buddy. A robot could also carry a wounded Soldier for miles at an extremely rapid pace to a hastily coordinated casualty collection point or medical evacuation (MEDEVAC) location.

The Air Force's new operational concepts stress information dominance and sensor fusion.[4] Its F-35, paired with pilots, analysts, and leaders will fundamentally change the combat decision-making process in the air and on the ground. Similarly, the Army must also employ these concepts to mission command. Further, AI will serve as an expert advisor to even our most senior leaders. For example, when a brigade combat team commander faces an enemy force, his AI and human staff can work together to provide high-quality solutions in real time. An AI is capable of ingesting and processing countless variables and can review information feeds from thousands of sensors. The AI will recognize patterns the best human intelligence analysts would miss and run the most detailed war games thousands of times per minute. It would remain many steps ahead of an enemy opponent. Some AI systems today have even mastered the art of deception. AI will recognize enemy demonstrations, feints, and ruses while embedding deceptions in our own courses of action. The AI adviser would simultaneously run through cycles and versions of the military decision-making process (MDMP) in real time.

Academics, futurists, journalists, and scientists grapple with these possibilities today. The Army has done little to explore the ramifications of general AI within the operational force. While organizations like the Defense Advanced Research Projects Agency (DARPA) push the boundaries, it often takes years for capabilities to mature.[5] All the while, the pace of technological innovation continues to accelerate.

While AI may be our friend and helper now, some say that such an arrangement is far from permanent. Once we assign goals to intelligent systems, they will find novel ways to achieve their objectives. We must also prepare for the day that AI goes off the rails. An uncontrolled AI explosion could unleash the most cunning, ruthless opponent our

Army has ever faced. We should devote some time to contingency planning. If Elon Musk, the late Steven Hawking, and others' warnings come to pass, we will not be ready.[6]

We strongly urge this community and all aspects of our government/industry team to devote resources to further AI integration in our force. We also recommend that counter AI strategy be developed.[7] Our human opponents will master the technology, too. Finally, we must prepare ourselves for a time when an automated machine-led AI threat emerges to face us in both the kinetic and cyber realms.

Notes

[1] Colin Dwyer, "'Like A God,' Google A.I. Beats Human Champ Of Notoriously Complex Go Game," https://www.npr.org/sections/thetwo-way/2017/05/23/529673475/like-a-god-google-a-i-beats-human-champ-of-notoriously-complex-go-game.

[2] Taylor Kubota, "Stanford Algorithm Can Diagnose Pneumonia Better Than Radiologists," *Stanford News*, 15 November 2017, https://news.stanford.edu/2017/11/15/algorithm-outperforms-radiologists-diagnosing-pneumonia/.

[3] Meghann Myers, "Milley: Future Conflicts Will Require Smaller Army Units, More Mature Soldiers," *Army Times*, 21 March 2017, https://www.armytimes.com/news/your-army/2017/03/21/milley-future-conflicts-will-require-smaller-army-units-more-mature-soldiers/.

[4] MG Jeff Harrigian, USAF, COL Max Marosko, USAF, "Fifth Generation Air Combat," Joint Airpower Competence Centre, 2017, https://www.japcc.org/fifth-generation-air-combat/.

[5] DARPA, "DARPA Perspective on AI," DARPA, 2018, https://www.darpa.mil/about-us/darpa-perspective-on-ai.

[6] Elon Musk, "If you're not concerned about AI safety, you should be. Vastly more risk than North Korea," Twitter, 11 August 2017, https://twitter.com/elonmusk/status/896166762361704450?lang=en; Rory Cellan-Jones, "Stephen Hawking Warns Artificial Intelligence Could End Mankind," BBC, 2014, http://www.bbc.com/news/technology-30290540 .

[7] James Barrat, *Our Final Invention: Artificial Intelligence and the End of the Human Era* (NY: Thomas Dunne Books, 2013).

CPT (Retired) Troy J. Albuck is currently a Military Science instructor at Wheaton College ROTC with a focus on American military history. He holds a Bachelor of Arts in History from Illinois State University. His last assignment was as commander of C Company, 2nd Battalion 130th Infantry Regiment, 33rd Infantry Brigade Combat Team. He deployed under Operation Just Cause, Operations Desert Shield and Desert Storm, and Operations Enduring Freedom and Iraqi Freedom.

MAJ Joshua K. Frye currently serves as Assistant Professor of Military Science at Wheaton College ROTC. He holds a Bachelor of Science in Criminology from East Tennessee State University and a Master of Science in Journalism and Electronic Media from the University of Tennessee. He commanded the 304th Military Police Company (Combat Support), served as Provost Marshal of the 2nd Cavalry Regiment, and has deployed to Guantanamo Bay, Cuba, and as a part of Operation Enduring Freedom.