Modernisation in Military Training and Combat: The Advantages of Augmented Reality

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Modernisation and innovation in the military are crucial for keeping up with technological advancements. Geopolitical and geo-economic shifts, such as the modernisation of Russia's armed forces and China's increasing international assertiveness, have turned defence modernisation into a competitive business. Meanwhile, the battlefield is shifting to cyberspace, so new and innovative solutions will be necessary to handle these contemporary threats. Western armies have no choice but to step up and to keep up with technological developments

In light of increased defence competition, Doug Bush, the US Army's new Assistant Secretary for acquisition, logistics and technology, will be overseeing the military's immense modernisation effort that spans from new network tools to modern combat vehicles. Bush noted that he is very satisfied with the status of the Army's modernisation priorities in the US, but there are a few areas of improvement in software and operational testing.

One of Bush's primary priorities is improving the Army's software practices, moving away from the linear waterfall development model (of conception, analysis, design, coding, testing, deployment and maintenance) to more iterative development, which will enable programmers to adjust software plans later in the process. Bush also stated that the service needs to take advantage of the software talent within the Army from all ranks. To that end, he wants "to leverage all the talent across the Army to get better at software."

Bush notes that "We are facing more and more sophisticated adversaries, we need ways to test against their capabilities" (Eversden, 2022). To test against adversary capabilities, the Army uses simulation programs, which need to have high credibility to make sure they seem valid. Bush wants to make sure the Army does cyber testing for these programs earlier on its acquisition to improve operational testing of its programs against what real adversaries can do. This is important, as the Pentagon's chief weapons tester detected that many of the Army's best programs struggled against cyber threats. Therefore, testing needs to be done along the entire development process, not just at the end (Eversden, 2022).

One of the methods used for simulation training is augmented reality (AR). AR goggles superimpose digital data onto the physical world, thereby showing an image with virtual and real imagery combined. This is different from virtual reality, which only shows digital imagery. AR goggles can be used for battlefield simulations, as well as for military medical training. In military health care, AR can be a solution for teaching staff shortages, which is a well-known problem with medical training. A study on the effectiveness of teletraining that leverages AR showed that AR is a useful tool to learn about anatomy and step-by-step procedure components. Dr Ivette Motola, a specialist in emergency medicine with the University of Miami Health System, said, "The integration of teletraining with augmented reality could become a valuable method for both training military health care personnel and treating soldiers with battlefield injuries. Military medics could receive remote guidance in executing a procedure, saving time and even lives." (Harper, 2021)

The use of AR is part of the Army's Integrated Visual Augmentation System (IVAS), but the programme has hit delays due to issues with the field of view and effects on soldiers. In a press release, an Army representative stated that the delay "allows the Army and Industry team to continue to enhance the IVAS technology platform ensuring Soldiers achieve overmatch in Multi Domain Operations" (Maucione, 2021). Augmented reality can be a vital tool for the military, and as it keeps evolving, the number of uses of AR in the military grows exponentially.

AR currently provides three solutions for warfare augmentation and military improvement. Firstly, AR can provide tactical augmented reality (TAR). TAR can be seen as the addition of crucial information (spatial orientation data, weapons targeting, etc.) into the user's field of vision. As a result, TAR can show a soldier their exact location, the positions of the allied and enemy forces and help with targeting. The US Army's Communications-Electronics Research, Development and Engineering Center (CERDEC) is also working with TAR (Morozov, 2018). Staff Sergeant. Ronald Geer, a non-commissioned counterterrorism officer at CERDEC, said that with TAR, Soldiers don't have to look down at their GPS device. The GPS imaging is shown in the goggles mounted to the Soldier's helmet, in the same way night vision goggles are mounted (Vergun, 2017).

Secondly, an innovative helmet-mounted AR display was announced at the AUSA Global Force Symposium and Exposition, called HUD 3.0. This new AR display potentially offers the military enhanced aiming, navigation improvement and training against virtual enemies projected into the field of view. For example, HUD 3.0 displays a targeting reticle which is wirelessly connected to the rifle and shows precisely where the bullet would land when pulling the trigger. In addition, HUD 3.0 has the ability to superimpose completely virtual terrain, obstacles and enemies onto the user's field of vision, enabling units to practise more complex and demanding training scenarios (Freedberg, 2018).

Thirdly, synthetic training environments (STE) can be useful for the military as they better immerse soldiers in realistic combat training, putting them into more physically and mentally stressful environments. Being able to practise in stressful settings is important because it prepares soldiers for real combat. STE is a US programme designed to revolutionise military training opportunities. Brigadier General William Glaser, director of the Synthetic Training Environment Cross-Functional Team within Army Futures Command, believes it will still take some years for all the pieces of the Synthetic Training Environment to come together. The STE will eventually provide detailed and up-to-date simulations of fighting terrains across the world, along with a vast repository of training scenarios (Stone, 2021).

In order to provide AR training methods to soldiers, the US Army has awarded a whopping $22 billion to Microsoft for its battlefield augmented reality goggles. However, Bush noted they will probably not spend that much (Eversden, 2022). This substantial spending makes it clear that the Army understands AR's advantages for military training and combat and that it is ready to embrace augmented reality into its repertoire. Ultimately, military training with AR will provide the opportunity for soldiers to hone their skills, participating in exercises multiple times without the need to change the setup. The portable nature of AR devices also makes them useful because they can be used in multiple locations. In addition, AR technologies can potentially save money, create safer training environments and help soldiers develop cognitive skills.

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