

The exponential development of autonomous weapons systems, particularly robot soldiers, has ushered in a new era of warfare that integrates advanced technology and artificial intelligence. These robot soldiers possess unique advantages that can potentially revolutionize military operations and heighten combat effectiveness. This section aims to explore the key advantages of robot soldiers and the opportunities they provide in modern warfare.

One significant advantage of robot soldiers lies in their ability to engage targets with enhanced precision and accuracy. Equipped with advanced sensors, targeting systems, and real-time data processing capabilities, these autonomous systems can analyse complex scenarios swiftly and use the data to make informed decisions. In 2012, a report made by the *Defence Science Board* talks about the sensory features of modern military robots, likening them to the 5 senses of a human. According to their report, machines are capable of processing data into knowledge more effectively than people do, stating that "Automatically inducing knowledge from data has generally been found to be more effective than manual knowledge engineering." (p.41). With the ability to process vast amounts of information instantaneously, they can rapidly respond to evolving battlefield situations, combined with the fact that autonomous soldiers wouldn't hesitate to engage a target, it is safe to say they are able to operate with more precision and accuracy than human soldiers. This provides a strategic advantage by enabling quick decision-making, swift deployment, and timely execution of missions. This increased operational tempo enhances the effectiveness of military operations, allowing forces to gain a significant advantage over adversaries.

Deploying robot soldiers instead of human soldiers can also serve to mitigate the risk to human lives in combat. These machines are built to withstand extreme environments, heavy firepower, and carry out tasks that pose a significant threat to human soldiers. Voth, D. (2004) says that mine detection and destruction is the most common use of robots by the military. Schörnig, N. (2010) also agrees, stating that landmine detection has long been considered to be a fitting task for robots, as the job satisfies the "Three D's", being "dull, dirty and dangerous". One example of this robot can be seen in the M5 Ripsaw, a fully autonomous tank that is fitted with Mine Plow and IED Defeat Roller technology. By relieving human soldiers from physically demanding and dangerous duties, robot soldiers minimize casualties and protect military personnel, allowing them to focus on strategic and complex decision-making.

The physical and psychological strain experienced by human soldiers in warfare is a significant concern. By substituting human soldiers with robotic counterparts, the physical toll of prolonged deployments, fatigue, and exposure to trauma can be significantly reduced. "Robots do not tire, they carry out orders (so far?) unquestioningly, they do not require lengthy training, and they remain unaffected by boredom or emotional stress." (Schörnig, N. (2010)). This alleviation contributes to the overall well-being and mental health of military personnel, ensuring their readiness and effectiveness throughout missions and increasing their overall military might.

Robot soldiers also possess an inherent advantage in terms of endurance and persistence while on mission. Unlike humans, they do not suffer from fatigue, sleep deprivation, or the need for sustenance. These machines can operate continuously for extended periods

without a decline in performance. Sapaty, P. (2015) talks about the robots Boston Dynamics have developed to help human soldiers, namely the LS3 “robot mules”. These autonomous machines have the capability to carry up to 400 lbs of gear, and their fuel can allow them to function for as long as a 20 mile operation, lasting 24 hours. It is also equipped with terrain sensing and GPS technology for navigation. This enhanced combat stamina allows for sustained operations and increased operational effectiveness, providing a critical edge in prolonged engagements.

The versatility and customizability of robot soldiers are also an important factor to consider. Autonomous robot models can be tailored to meet specific mission requirements or be reprogrammed to adapt to various different environments. Their modular design enables the incorporation of specialized sensors, weaponry, or communication systems, augmenting their capabilities for specific operational needs. This flexibility empowers military forces to address evolving threats effectively and enhances overall mission success. The versatility and customizability of robot soldiers are paramount. These autonomous systems can be tailored to meet specific mission requirements and adapt to various environments. “Military robots also have different shapes and sizes according to their purposes” (Sapaty, P. (2015)). Their modular design allows for the incorporation of different specialized sensors, weaponry, or communication systems, augmenting their capabilities to cater for specific operational needs. This example can once again be seen in the Ripsaw M5 autonomous tank, which has configurable armour, suspension, and final drives. Overall, their flexibility and versatility enables military forces to engage in different combat scenarios effectively and enhances overall mission success.

In conclusion, the advantages and opportunities presented by integration of robot soldiers in modern warfare are undeniable. From enhancing precision and speed to reducing human casualties and increasing operation efficiency, autonomous robot soldiers offer a transformative opportunity for military operations. However, it is imperative to navigate these advancements responsibly, considering the ethical implications, legal frameworks, and ensuring strong safeguards. By harnessing the advantages while keeping in mind the associated challenges, the implementation of robot soldier technology can pave the way for a safer and more effective approach to modern warfare.