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A Study on Impact of Advance Robotics in Army

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Abstract: *Developments in Artificial intelligence, deep learning, and robotics allow new capabilities that will affect military strategies strongly. And also, military experts are discovering how to used artificial intelligence effectively for military applications, such as surveillance, underwater mine warfare, recon-naissance, cyber security, threat evaluation, intelligence analysis, command & control, education and military training. The consequences of these progresses will be felt across the range of military standards from knowledge investigation and identification to balance of offensive and defense as well as to the nuclear weapons program themselves. In this suite, AI applications within autonomous weapons and monitoring systems are the points of discussion about the moral and realistic challenges of handling the world-wide eruption in military AI research and development. The intention to maintain fast progress in machine learning from trigger in a global arms race in the backdrop of artificial intelligence poses a new existential threat to humanity. This journal paper reflects ongoing major projects and how AI & Robotics used in military applications and future researches, as well as how AI & Robotic effect to the Futuristic Military Field*

Keywords: Artificial, intelligence, Autonomous, weapons, Robotics

I. INTRODUCTION

Artificial intelligence (AI), precisely the subfields machine learning (ML) and deep learning (DL), has within a decade moved from prototyping at research institutions and universities to industry and real-world application. At the tactical level, AI can improve partly autonomous control in unmanned systems so that human operators can operate unmanned systems more efficiently to, eventually, increase battlefield influence. In the context of US, China and Russia rush its use of AI in military settings.

Future concepts, models, algorithms, data sharing, access to spread company power and sophisticated testing and training are proposed to make a data mobility framework AI is turning into an essential review of current warfare compared and regular structures in application to military set-ups furnished with AI are suited to take care of larger volumes of info all the more expertly. Also, AI progresses self-control, self-guidance, and self -activation of battle contexts. When we consider about military robotics, can be used to carry out unsafe works, dark, or repeated tasks with continuous accuracy and regular precision.

Hence, it is not to see why additional and extra makings are beginning to adopt robotics for different applications. This is due to their helpfulness. There are different kinds of robots. They differ in their uses, applications, and features. These come in varied models or types and have diverse features such as the distance it can cover, the amount of load it can facilitate, and how many axes their jointed arm holds. Military robots can work without time limitation.

They don't get tired or go for breaks like human labors. because robots are lifeless machineries, they can easily perform risky tasks that are otherwise challenging and unsafe for their human counterparts. The use of robotic technology similarly increases efficiency and improves cost-effectiveness. At the same time, it can remove labor-intensive tasks that could pose some threats to their physical well-being and result in accidents or injury.

As the emerging technologies of the Army‟s Future Combat System (FCS) are introduced to the battlefield, Soldiers will increasingly face new challenges in workload management. A shifting force structure will bring increasing responsibilities for the next generation Soldier, who will be tasked with effectively utilizing and protecting robotic assets in addition to performing other primary missions. Our overall program goal is to understand HRI issues in order to develop technologies and mitigations that enhance HRI performance in future combat environments.

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the world of modern technology, the robot-ROVER designed for active response to gunmen represents an impressive technological achievement. However, to fully understand its significance and role in our world, it's important to delve into its historical context and trace its evolution over time.

The idea of using robotic platforms for military purposes to enhance safety in dangerous situations has deep roots. During World War II, the first remotely operated telegraph machines were developed, capable of maneuvering in hazardous areas and transmitting images. However, the historical breakthrough occurred in the late 20th century.

The Era of Modern Military Robots.

The 1980s marked a period when military robot models began to actively evolve and be deployed. A pivotal moment was the creation of TALON, the world's first remotely operated telegraph robot specifically designed for defusing explosive devices and handling other perilous tasks

Over time, these machines became more sophisticated and versatile. They gained mobility, armor, video surveillance systems, and remote control capabilities, enabling them to operate effectively in the most hazardous scenarios.

The robot-ROVER has become an integral part of addressing contemporary conflicts and law enforcement operations. Its ability to work in conditions where there is a threat of gunfire or explosions makes it a valuable asset in ensuring safety and operational effectiveness in such situations.

With each passing year, these technological assistants become more intelligent and autonomous. Artificial intelligence allows them to make complex decisions and adapt to various scenarios. The future of these robots promises even greater progress and innovation, expanding their range of applications.

Modern ROVERs possess higher mobility and the ability to autonomously navigate. Equipped with advanced sensor systems, GPS, and artificial intelligence, they can traverse complex and unpredictable terrain, making decisions based on their surroundings. This enhances their efficiency in various scenarios, including combat and emergency situations.

II. REVIEW OF LITERATURE

1. Mobility and Autonomy: Modern ROVERs possess higher mobility and the ability to autonomously navigate. Equipped with advanced sensor systems, GPS, and artificial intelligence, they can traverse complex and unpredictable terrain, making decisions based on their surroundings. This enhances their efficiency in various scenarios, including combat and emergency situations.
2. Improved Telemetry and Control: Contemporary robot models have more reliable and faster communication tools with operators, enabling them to promptly transmit data and instructions. This reduces delays and enhances responsiveness in extreme situations.
3. Utilization of Artificial Intelligence: The latest ROVER iterations integrate with artificial intelligence for more effective data analysis and decision-making. This allows them to, for example, recognize threats, determine optimal routes, and perform more complex tasks without operator intervention.
4. Enhanced Safety and Durability: Modern robot-ROVERs typically feature stronger armor and blast protection, increasing their resilience in hazardous environments. They can also be equipped with weapon systems and additional defense mechanisms.

All these improvements make modern military robots more efficient and valuable compared to early models, enabling them to effectively carry out a wide range of tasks in military and law enforcement operations.

In conclusion, the robot-ROVER designed for active response to gunmen is the result of a long history of development. It began as an experimental device and evolved into an indispensable component of modern security and defense. Its history and evolution serve as compelling evidence of technology's potential in ensuring safety and improving the quality of life for people.

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2.1 Objectives of the Research

- To understand the concept of Robotics.
- To know the evolution of Robotics.

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III. RESEARCH METHODOLOGY

3.1 Secondary Data

This study is based on Secondary Data. Secondary data is collected from Books, Journal, Magazines, Internet, etc.

IV. FINDINGS

One of the most common types of military robots is transportation robots. This robotic technology can help soldiers transport different supplies like artillery, bombs, and other supplies. They can also be used to transport humans, including picking up casualties from the battlefield

Many of the military robots in development today can perform highly skilled tasks with remarkable precision. This includes robots that detect and remove landmines and sea mines and sophisticated robotic arms that neutralize suspicious objects or bombs without putting a single human life at risk.

Proponents of fully autonomous weapons systems argue that the technology will keep soldiers out of harm's way by keeping them off the battlefield. They will also allow for military decisions to be made at superhuman speed, allowing for radically improved defensive capabilities.

As robotics progress from hands-on tools to partners in combat, they significantly reduce the risk for soldiers on the battlefield. Robots in combat can be used for a variety of advantage-gaining tactics. For example, some robots may be used strictly for reconnaissance purposes

Adaptive logistics and decision-making are crucial in sustaining the Army's effectiveness and responsiveness in complex environments. AI can potentially revolutionize this aspect of military logistics by providing real-time information, sophisticated analytics, and advanced decision-support tools.

AI will replace both blue-collar and white-collar jobs that involve more straightforward and repetitive tasks. These jobs include drivers, factory workers, administrative assistants, paralegals and some copywriters.

V. SUGGESTIONS

During the invasion of Iraq in 2003, no use was made of robots, as conventional weapons were thought to yield enough ‘shock and awe’. However, the thousands of American soldiers and Iraqi civilians killed reduced popular support for the invasion and made the deployment of military robots desirable. By the end of 2008, there were 12,000 ground robots operating in Iraq, mostly being used to defuse roadside bombs, and 7,000 reconnaissance planes or drones were deployed [82]. The robot is therefore a technological development that has a great influence on contemporary military operations, and this is seen as a new military revolution. New robotics applications are constantly sought these days and are developed in order to perform dull, dangerous, and dirty jobs and to improve situational awareness, but also in order to kill targets.

During the last decade, advances have been made in the development of the armed military robot. From 2009, more ground-based pilots—or cubicle warriors—have been trained to use armed unmanned aircraft than have been trained as fighter pilots [102]. The expectation is that unmanned aircraft will increasingly replace manned aircraft, and in the medium term will even make manned aircraft obsolete. To this end, further technological developments are required, such as the development of self-protection systems for unmanned systems, so that they become less vulnerable, and the development of sense and avoid systems, so they can be safely controlled in civilian airspace. In the short term, we do not expect the introduction of armed ground robots on the battlefield. These have already been developed, but are deployed with little success in conflict zones.

A trend we are observing in military robotics development is a shift ‘from in-the-loop to on-the-loop to out-the loop’ [78]. We have seen that cubicle warriors are increasingly being assigned monitoring tasks rather than having a supervisory role. The next step would be for the cubicle warrior to become unnecessary and for the military robot to function autonomously. The autonomous robot is high on the US military agenda, and the US Air Force [98] assumes that by around 2050 it will be possible to fully deploy autonomous unmanned combat aerial vehicles (UCAV). Given current developments and investment in military robotics technology, this US Air Force prediction seems not to be utopian but a real image of the future. The wish to promote autonomous robots is mainly driven by the fact that tele-guided robots are more expensive, firstly because the production cost of tele-guided robots are higher and secondly because these robots incur personnel costs as they need human flight support. One of the main goals of the Future

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Combat Systems programme, therefore, is to deploy military robots as 'force multipliers' so that one military operator can run a multiple large-scale robot attack [76]. To this end, robots are programmed to cooperate in swarms so they can run coordinated missions. In 2003, the Americans deployed the first test with 120 small reconnaissance planes in a mutually coordinated flight [50]. This swarm technology is developing rapidly, and will probably become military practice in a few years' time. This is a future in which the automation of death will become reality.

VI. CONCLUSION

Overall, there are beneficial qualities that autonomy can bring to Soldier‟s performance in respect to workload and reducing interaction time with an unmanned system. Technology was developed to allow for intervention methodologies that create a safe and easy transition of control in the instances that autonomy fails. Steerable Waypoint was the technology developed to do such. In this experiment, the 17 Soldiers completed a reconnaissance mission using three modes of autonomy. They were responsible for driving the robot and maintaining SA of the mission through embedded communications. In general, they were able to drive the XUV in all the modes tested with minimal training time. Though the intervention of steerable waypoint was not statistically better than teleoperation or the teleoperation intervention, the potential benefits of an intervening technology was high. The Soldiers requested an easy transition between autonomy and intervention. The teleoperation intervention, while effective and easy to use, required the operator to stop the vehicle, as evidenced by the higher halt times in teleoperation mode than any other mode. The Soldiers requested the ability to transition between teleoperation and autonomy without stopping the vehicle, which they felt would replace the need for and potential benefits of an improved steerable waypoint. Ten of the thirteen Soldiers thought it was easier to intervene with teleoperation than the steerable waypoint due to a "lack of vehicle response" to the driving aid. Teleoperation provided more control and while the transition to teleportation was "a bit longer, overall the intervention was easier." If the implementation of the steerable waypoint was improved, we are likely to see a significant advantage in mobility and intervention performance. As with all current and future military systems, training is essential. In this experiment, the training time that the participants received was not sufficient for them to fully understand the critical characteristics of the autonomous system and the driving aid that was developed. They received a half of days' worth of classroom and in-vehicle training.

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