Geronimo, Rakkasans and Robots: How Joint Readiness Training Center Rotation 21-10 Accelerated the Army's Robotic Combat Vehicle Development

by MAJ Cory Wallace, MAJ Dan Groller and Todd J. Willert

For the first time in history, the Army integrated Robotic Combat Vehicle (RCV) surrogates into a force-on-force exercise that will add to the growing body of evidence supporting the value of the manned-unmanned teaming concept.

The exercise, Joint Readiness Training Center (JRTC) Rotation 21-10, held in September 2021 at Fort Polk, LA, collected an unprecedented amount of technical data and Soldier feedback that will inform future decisions regarding the potential fielding and use of RCVs in Army formations.

The information gained in the exercise will also help reduce the associated technical risk of RCVs.

This experiment specifically confirmed that unmanned vehicles increase survivability of the human formation and allow commanders to dedicate human combat power to solve complex problems while unmanned vehicles perform tasks such as blocking key road intersections, observing obstacles and denying access to helicopter landing zones.

Lessons-learned

The rotation used two Project Origin platforms that 1st Battalion (Airborne), 509th Infantry (Geronimo), employed while "fighting" 3/101st (Air Assault) (Rakkasans) during JRTC Rotation 21-10. The Next-Generation Combat Vehicles Cross-Functional Team (NGCV-CFT) and the Army Capability Manager-Infantry Brigade Combat Team had directed integration of two Project Origin platforms into Rotation 21-10, realizing that JRTC offered a complex and dynamic environment that would push current technology and unmanned ground-system behavior beyond limits established in previous experiments.

In other words, JRTC would stress systems to their breaking points and identify problems that would undoubtedly arise in the future.

As previously mentioned, Rotation 21-10 was the first time a rotational unit fought enemy unmanned ground-combat vehicles. Equipping Geronimo with RCV surrogates enabled the Army to begin to understand the tactics, techniques and procedures (TTPs) required to defeat robotic and autonomous systems (RASs).

Figure 1. The RCV in position at JRTC for Rotation 21-10. *(U.S. Army photo)*

Allowing a world-class opposing force (OPFOR) to push robotic platforms to their limits enabled the Army to learn critical lessons that will shape and inform RCV platform requirements, software and network capabilities. It will also help develop new TTPs to employ unmanned platforms.

Speaking to the first benefit, the Army confirmed a previous data point that system reliability and the ability to facilitate future payloads should be the near-term focus for developing RASs such as the RCV. For Rotation 21-10, Project Origin provided operators with capabilities such as a Common Remote Operated Weapon System-Javelin, a tethered unmanned aerial system (UAS), a smoke-obscuration module and autonomous-drive capability.

This capability set is a reduction of scope when compared to previous experiments, but operators and leaders stated that these capabilities, coupled with high system and network reliability, is perfect for "Version 1.0." Soldiers agreed that future operating environments will require mission-specific payloads; accordingly, the RCV must have both the growth and modularity to facilitate these future capabilities.

Soldiers and team leaders who used Project Origin in the rotation validated the benefits of bringing an RCV into the fight.

1LT Michael Volpe, a platoon leader in Pathfinder Company/1-509th, said that coupling system reliability with Project Origin's current capability set – as well as including the inherent capacity for future growth and development of RCV platforms – "will be one of the best things we could ever have."

JRTC Rotation 21-10 tested the Project Origin system in multiple ways – just as the vehicle's engineering team hoped. Not only did Project Origin have to contend with the

Project Origin

The Project Origin surrogate is an Army Development Command Ground Vehicle Systems Center prototyping effort that provides the Army with the ability to conduct rapid technology and autonomous-behavior integration. Soldiers assess the project during multiple touchpoints each year and thus drive development and refinement of RCV requirements, employment techniques and mission-support roles.

Ultimately Project Origin is one of several feedback mechanisms the Army is using to facilitate the development of unmanned vehicles tailored to the requirements of both operators and leaders.

Project Origin's key competency is its ability to collect Soldier feedback and technical data; use this information to rapidly iterate both its software and physical payloads; and evaluate the changes in relevant tactical environments. The lessons-learned during Project Origin experiments directly support development of the RCV concept and the Army's forthcoming ground autonomy software, user interfaces (Warrior Machine Interface) and modular architectures.

communications challenges presented by JRTC's congested network during the rotation, but a tropical storm hit Fort Polk while the Soldiers and robots were out in the field. Both the network challenges and the extreme weather enabled the Army to identify new problems for which the Army has the luxury of time to solve.

Previous experiments

Prior to Rotation 21-10, Project Origin's experiments hinged upon a scope and scale that rarely exceeded the platoon level. Network congestion was rarely an issue. Weather challenges – while clearly a part of any potential combat scenario – had not been present in previous Soldier touchpoints.

JRTC's expansive scope identified the same issues the Army will encounter in future large-scale robotic experiments. Project Origin requires very little resources and thus enabled the Army to learn these lessons for a fraction of the cost associated with larger-scale experiments. Further, many of the issues encountered at JRTC pertained to the systems' software and are relevant to other RAS efforts. Identifying these problems using a relatively low-cost system such as Project Origin will enable the Army to correct software deficiencies and distribute updated software throughout the RAS portfolio to optimize RAS performance in complex.

Operators and leaders know that adversaries will contest and degrade future networks. Therefore, facing those challenges now in a training rotation is critical to the advancement of RCV employment. As with any mission, being able to disseminate information rapidly throughout a formation is imperative for leaders to make informed decisions and remain inside their adversaries' decision process.

Learning how best to do that with robots in a degraded network environment is a key part of both the RCV campaign of learning and future Army operating concepts. JRTC Rotation 21-10 enabled the Army to learn these vital lessons early and will provide DEVCOM with the time required to develop solutions prior to the Army's arrival at is 2035 modernization aim point.

Robot tasks

Regarding use cases, this rotation validated the notation that robots can perform the "dumb, dirty and dangerous missions," enabling their human counterparts to focus on high-priority complex missions and tasks. Specifically, Geronimo tasked Project Origin with establishing blocking positions, denying helicopter-landing zones (HLZs) and conducting route reconnaissance when contact with the rotational unit was likely.

Project Origin established a blocking position of a key intersection for 36 hours. Two platforms, controlled by four operators and a noncommissioned officer, allowed Geronimo to re-task the two squads previously committed to a blocking position to other tasks.

Project Origin also conducted a route reconnaissance prior to Geronimo's attack on an urban objective. The robots identified an entire Delta (anti-armor) Company and facilitated its destruction in a fraction of the time typically required with such an operation.

Figure 2. An RCV focuses on a UAS during JRTC Rotation 21-20. *(U.S. Army photo)*

While conducting HLZ denial, Project Origin enabled Geronimo to disrupt the rotational unit's planned course of action and degrade its combat power at the same fraction of combat power required to establish the blocking positions.

To summarize, Geronimo learned that if a task was dangerous or required hours of mundane observation, they could pass the task to a robot so they could focus human combat power on dynamic and complex missions and reduce tactical risk.

Further expanding on this point, Geronimo has a unique skillset that involves a high degree of proficiency in conducting dismounted envelopments at night. The skills required to covertly and rapidly move through dense vegetation at night, identify a position of relative advantage and coordinate indirect fire to support dismounted maneuver is a complex and difficult problem. The amount of abstract thinking associated with this skillset aligns more with the supercomputer known as the human brain, as opposed to a robot.

Conversely, establishing blocking positions, making initial direct-fire contact during a route reconnaissance or observing potential enemy avenues are tasks better performed by robots because robots do not get tired, robots do not lose focus and robots do not bleed. Off-loading mundane and dangerous tasks onto robots allowed Geronimo to amplify the effects of its skillset by augmenting decisive operations with more humans who would otherwise be blocking road intersections or facing increased risk and potentially high casualty rates while conducting route reconnaissance.

Increased human survivability

Regarding tactical risk, Project Origin continues to demonstrate that unmanned systems increase Soldier survivability through the use of telepresence. Geronimo was able to effectively operate the Project Origin systems at a distance and produce many of the same operational results with a fraction of the typical casualties.

"With these units, the human survivability rate increases significantly," explained SFC Eugene Lackey (Pathfinder Company). "This system allowed us to close with and destroy the enemy safely from a distance. It [also enabled] us to the find the enemy before he could find us. It is a great tool, and I wish we could have it for little bit longer to really see how we can change the way wars are fought."

Project Origin will continue to develop the future of unmanned systems through the voice of the Soldier to facilitate the integration of unmanned systems into the Army.

JRTC Rotation 21-10 was a historic landmark in the Army's RCV campaign of learning. The feedback from Geronimo Soldiers and leaders, coupled with the terabytes of technical data, provided the Army with a multifaceted body of knowledge. The JRTC "acid test" identified issues that would potentially have gone unnoticed until larger experiments occurred, scheduled to begin in July 2022.

The Army now has the opportunity to address these issues and provide future operators with reliable and effective equipment capable of achieving the Army's 2035 modernization goals. Further, Project Origin and Geronimo provided the Army with a preview of future operating environments so that the Army can understand how to fight and win in these environments during peacetime, as opposed to developing these concepts during a time of conflict.

Figure 3. A project officer talks with Soldiers at Fort Polk about the RCV. Soldier feedback is vital to Project Origin. *(U.S. Army photo)*

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Acronym Quick-Scan

DEVCOM – Development Command
GVSC – Ground Vehicle Systems Center
HLZ – helicopter-landing zone
JRTC – Joint Readiness Training Center
NGCV-CFT – Next-Generation Combat Vehicles Cross-Functional Team
OLC – oak-leaf cluster
RAS – robotic and autonomous system
RCV – Robotic Combat Vehicle
TTP – tactics, techniques and procedure