The U.S. Army’s Future Combat Systems (FCS) will employ three classes of unmanned ground vehicles that will provide new capability to soldiers in Future Force units of action (UAs).

The armed robotic vehicle (ARV), the multifunction utility/logistics and equipment vehicle (MULE) and the small unmanned ground vehicle (SUGV) are in development now and will be key elements in the FCS system of systems, providing greatly enhanced operational capability in the FCS-equipped UAs—the Army’s future tactical warfighting echelon.
The armed robotic vehicle, in development at United Defense L.P. in Santa Clara, Calif., will provide the Army with the ability to see and strike the enemy first, while offering soldiers unprecedented protection and survivability.

The semiautonomous ARV is the largest unmanned ground vehicle in the Army’s Future Combat Systems program and will be an integral platform within platoons and companies in the FCS-equipped units of action. The ARV will be about the size of a large pickup truck and will be highly deployable, either two at a time on C-130 airplanes or individually with CH-47 helicopters. The ARV will offer the battlefield commander new and unmatched capabilities for reconnaissance, surveillance and target acquisition, as well as assault firepower.

A key capability for the ARV is the reconnaissance, surveillance and target acquisition (RSTA) sensor suite, providing long-range standard and thermal imagery, as well as laser targeting capability. The RSTA suite will be mounted on a telescoping mast incorporated in the two variants of the ARV in development. The two variants will share a common chassis.

The ARV reconnaissance, surveillance and target acquisition variant (ARV-R) will be assigned to FCS platoons equipped with mounted combat systems and reconnaissance and surveillance manned ground vehicles. The ARV-R will feature a RSTA mast that will extend up to five meters, carry a 25 mm cannon for self-defense, disperse unattended ground sensors and conduct battle damage assessments.

The second variant, the ARV assault (ARV-A), is designed to accompany FCS platoons equipped with infantry carrier vehicles. The ARV-A will integrate long-range beyond-line-of-sight missiles, a powerful 30 mm automatic cannon and a high-rate-of-fire suppressive M240 7.62 mm machine gun. The assault variant also will feature a medium-range electro-optical/infrared sensor on a mast that can be raised three meters.

The autonomous navigational system and automatic target recognition will provide the ARV with the capability to operate semiautomatically with minimal input from the operator. Soldiers will deploy and control the ARVs at extended ranges.

The ARV will be controlled from operator crew stations located inside manned ground vehicles or by FCS Land Warrior-equipped dismounted soldiers with a control de-
vice. The core technologies enabling semiautonomous operation will allow one soldier to control all aspects of the vehicle remotely. The ARVs will feature additional capabilities including chemical detection, anti-tampering and battle command and communications equipment.

United Defense is in the system design and development phase of the FCS ARV program. Under this effort, the company will field the first prototypes in 2010, with fielding to FCS-equipped units of action scheduled for 2012 to 2014. A typical unit of action will deploy with approximately 45 ARVs.

The multifunction utility/logistics and equipment (MULE) vehicle, in development at Lockheed Martin in Dallas, Texas, will offer an extraordinary capability that will support the U.S. Army’s transformation to a lighter and more mobile fighting force.

The MULE’s unique mobility will enable it to go everywhere the soldier can go and more. It will allow soldiers of the transformed Army to use technology to do the dull, dirty and dangerous jobs of the current forces, freeing them to focus on the success of their missions.

The MULE’s highly mobile platform is designed specifically to meet the requirements of the Future Force soldier for dismounted operations. It will climb at least a 1.5-meter wall, far exceeding requirements, and will provide the vehicle with the mobility performance and surefootedness required to safely follow dismounted troops over rough terrain, through rock and debris fields and over urban rubble. This technology will also allow the MULE to cross 1.5-meter gaps, traverse side slopes greater than 40 percent, ford water to depths of more than 1.25 meters and overpass obstacles as high as 0.5 meters, while compensating for varying payload weights and center of gravity locations.

The MULE, a 2.5-ton class vehicle for the FCS, includes three variants: transport, armed robotic vehicle-assault (light) and countermine.

The transport MULE configuration is designed to support the Future Force soldier by providing the volume and payload capacity to carry the equipment and supplies to support two dismounted infantry squads. It is suited to support casualty evacuation needs as well.

The armed robotic vehicle-assault (light) version will be armed with a rapid-fire suppressive weapon and an antitank capability. It is designed to provide immediate, heavy firepower to the dismounted soldier.

The countermine variant is designed to provide detection and neutralization of mines and marking of cleared lanes through minefields, greatly increasing the safety and mobility of the infantryman.

The small unmanned ground vehicle will be the soldiers’ robot within the FCS-equipped units of action and will allow soldiers expanded reconnaissance and surveillance capability even if deployed to any world hot spot in hours, not weeks, enabling U.S. forces to see first, act first and win decisively.

The SUGV, when deployed and operated by the soldier, will weigh less than 30 pounds, providing ready portability to support field operations and help minimize the risk to soldiers in hostile operations. The SUGV is an evolution of the combat-proven iRobot PackBot® tactical mobile robot used extensively in Afghanistan and Iraq.

The iRobot was developed with Defense Advanced Research Projects Agency support to go from concept to combat in 3.5 years. SUGV, like its big brother PackBot®, will be a highly integrated, waterproof, shockproof unit like today’s most powerful ultra-light laptop computers.

The SUGV will be small, rugged, modular and capable of handling up to seven different payloads. It is designed to handle high impacts, submersion and rugged environments. The SUGV will be remarkably immune to detracking. The SUGV program is focused on weight reduction and miniaturization, ruggedness and reliability, payload integration and minimizing average unit production price.

The SUGV’s manportable design fits into one standard issue U.S. Army MOLLE or ALICE pack. It will climb stairs and includes an active center of gravity shifting design. The SUGV’s unique articulated flipper design offers unprecedented mobility in rugged terrain or urban operations requiring ascending or descending stairs, exploring subterranean caves, tunnels and sewers.

The SUGV will also have a self-righting capability. Experience gained on PackBot® will benefit SUGV subsystems, such as chassis design, manipulator arms, unattended ground sensors, fiber spooler tethers, head and neck, computers, electro-optical sensors and communications systems.

iRobot has launched a SUGV systems integration lab to develop computer SUGV simulation models for testing mobility and functionality in complex environments, including military operations in urban terrain, rugged terrain and force-on-force battle scenarios.

The capabilities inherent in today’s PackBot® will fuel design of the lighter, smaller SUGV for the FCS-equipped units of action.