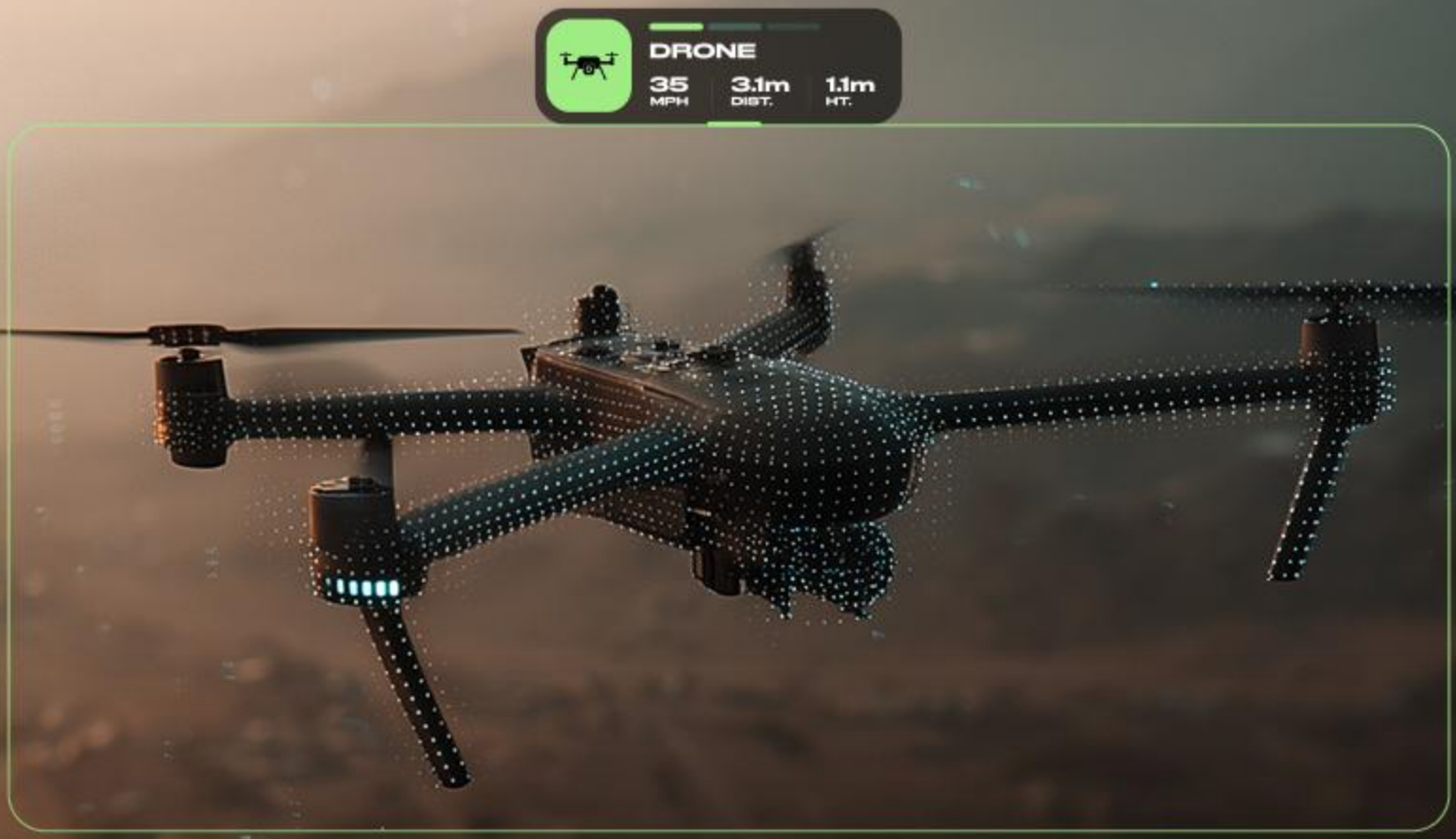
TERADAR



Defense

Teradar Delivers All-Weather Protection

Defense applications

The US and allied militaries stand to benefit from Teradar's primary commercial advanced driver assistance system (ADAS) sensor development for sensing objects around the vehicle for situation awareness, navigation, and protection functions. To overcome the limitations of other sensor modalities, Teradar invented new technology to generate images via sensing at terahertz (THz) frequencies. By employing cutting-edge on-chip designs and novel processing techniques, Teradar developed a new high-resolution, low-signature capability to range and sense objects despite hostile environment conditions, such as rain, snow, fog, dust, or lighting variations. Teradar is a fully solid-state system for low SWAP-C (size, weight, power, and cost) employment on ground vehicles, rotary wing aircraft, drones, and more. Potential defense applications include:

- Unmanned ground vehicle (UGV) navigation
- Manned vehicle degraded visual enhancement (DVE)
- Small Unmanned Aerial System (sUAS) detection and tracking

Teradar technology offers the potential to enable autonomous UGV maneuver and autonomous protection against first person video (FPV) drones and other threats. By operating at THz frequencies, TeraDAR offers a novel low-probability of detection active sensing capability for future ground forces.

UGV navigation

The most immediate impact Teradar may have on army operations is to significantly improve perception for autonomous off-road maneuver by robotic UGVs operating in Human-Machine Integrated Formations (HMIF). While significant advances are being made in both vehicle and formation autonomy movement and control software, there remains a sensing gap which will prevent the full realization of the Army's desired capability for H-MIF. Teradar's use of higher frequencies allows for order-of-magnitude better resolution while staying within the size, weight, and power allocated to present sensors making it a 'drop-in' replacement form factor for military applications. This innovative approach provides a level of accuracy and reliability that surpasses existing sensor solutions, making TeraDAR a game-changer in the industry. For the Army, TeraDAR will enable superior perception for autonomous vehicle control that soldiers can depend on to complete missions.

Current US Army off-road, autonomous ground vehicle prototypes primarily use LiDAR, and secondarily EO/IR cameras for perception. Overcoming changes in lighting conditions and seeing through fog/rain/dust/snow are all limitations to achieving higher levels of

autonomy. Additionally, computing power demands and image integration times for these sensors are limiting factors. Improvement in any of these areas would reduce risk to the US Army's technology base for UGVs. Teradar has the potential to provide significant advantages over current 77 GHz radar and LiDAR sensors. Like radar, TeraDAR is fully solid state for lower cost manufacturing and higher reliability in challenging automotive and ground combat vehicle environments. Like Lidar, Teradar provides dense point clouds but in all weather; however, Teradar is mountable behind fascia materials because it is not a visible spectrum sensor like LiDAR or cameras. This provides greater flexibility for vehicle integrators in the placement of sensors.

Manned vehicle DVE

The Army and Marine Corps have an opportunity to complement existing DVE capabilities with Teradar's advanced imaging to improve hazard detection in the harsh environmental conditions. Teradar's innovation has unique benefits for the US Army over other ADAS sensors due its all-weather performance, high-resolution for detecting dismounts and obstacles, and operation at high-frequencies for spectrum deconfliction and low probability of detection. Army operations require tactical vehicles to operate on domestic and foreign roads requiring ADAS functions such as forward collision warning, blind spot warnings, and brake assist as well as off-road near dismounted soldiers and equipment and other hazards. All-weather ranging sensors are critical to any DVE capability; especially for tactical vehicle movement, as cross-country driving increases the presence of dust, natural obstacles, and vegetation to further exacerbate the perception problem.

Protection against small UAS and other threats

The rapid proliferation of small, autonomous, and FPV unmanned aerial systems (UAS) for strike missions against tactical and strategic assets has created a critical demand for more effective sensors. Existing counter-UAS (cUAS) sensor technologies typically rely on either radar or electro-optical/infrared (EO/IR) cameras - each with significant limitations. Radar provides all-weather detection but lacks the resolution necessary for precise sUAS targeting, often serving only to cue higher-resolution camera systems. Meanwhile, camera-based solutions deliver detailed imaging but are compromised by poor weather and cannot accurately determine the range to target. Small UAS defense faces unique operational challenges. Small drones are difficult for radar to detect due to their low Radar Cross Section (RCS) and primarily plastic composition resulting in a very low "reflectivity" for the radar. Battery-powered propulsion produces a minimal infrared signature, making reliable tracking by EO/IR sensors difficult. This combination of factors exposes critical gaps in today's counter-UAS defenses and underscores the urgent need for advanced sensor solutions.

Teradar's on chip imaging sensor capability offers an entirely new sensing modality for detection, tracking, and targeting sUAS and other threats with greater resolution and lower SWAP-C than the counter UAS radars on the market today. Teradar introduces a breakthrough sensor solution for counter-drone operations, addressing the complex challenges posed by small unmanned aerial systems. With robust all-weather, 4D Imaging capabilities, Teradar enhances traditional EO/IR sensors by providing reliable target detection and precise range measurements, even at night or in adverse weather conditions. The streamlined design enables scalable deployment at low cost, making advanced protection against drones both practical and accessible.