

Teammate Advanced Drive Backgrounder

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WHAT TO KNOW:

- Teammate® advanced driver assistance technology is an SAE Level 2 system, based on Toyota’s Mobility Teammate Concept, that provides two functions: Advanced Drive and Advanced Park.
- It will be available on select 2022 Lexus LS 500h models with AWD, which are expected to arrive in U.S. dealerships this fall.
- Teammate’s Advanced Drive function was designed to partner with and assist the driver to promote safe and convenient while driving on the highway.
- When activated, Advanced Drive enables automatic steering, acceleration and braking on the highway under active supervision of the driver. It can also perform more complicated driving tasks, including maintaining a set distance between other vehicles, changing lanes, merging and passing or “overtaking” other vehicles.

- Advanced Drive integrates with the vehicle’s state-of-the-art navigation and localization system (“HD-Map”). It can plan actions for approximately 6 miles ahead to help reach the destination.
- Advanced Drive can benefit the driver by reducing fatigue over long periods of driving.
- Safety is a priority of our automated driving development program, and Advanced Drive is emblematic of this commitment. “Redundancy” is a key element of the system’s design, which includes a series of fail-safe operations designed to help prevent the loss of control for up to four seconds in the event of a system malfunction or limitation.
- Advanced Drive was developed in close coordination between Toyota Motor Corporation and Toyota Motor North America. Engineers used the same test vehicles and software in both the U.S. and Japan, allowing for U.S.-specific considerations, such as HOV lanes and draw bridges, to be incorporated into the design and performance of vehicle systems.

CORE TECHNICAL FEATURES:

Perceptive: The system has sensors covering the 360-degree periphery of the vehicle, including driver monitoring cameras, LiDAR (front-facing only at launch), front-facing long-range radar, front- and rear-side short-range radar, surrounding parking cameras, a front-facing telescope and locator cameras.

Intelligent: The system has onboard deep learning functions that allow for high adaptability to various driving scenarios, with onboard processing driven by four main electronic control units (“ECUs”) that handle recognition, judgement and operation.

Interactive: The vehicle’s human-machine interface enables two-way communication between the driver and vehicle that is easy to understand.

Reliable: Teammate Advanced Drive was designed with multiple back-up systems, including power, sensing and processing, actuator and communication to put safety at the core of the driving experience.

Upgradable: Over-the-Air software updates allow for the vehicle and system to upgrade remotely as new features become available.

SELECT FEATURES AND TECHNOLOGY:

Feature	Description
Advanced Park	<p>Advanced Park, the other function of Teammate, assists in the operations necessary for hands-free parking by automatically controlling steering, acceleration, braking and gear changes when parallel parking or backing into a parking space.</p> <p>Using 360-degree sensing, which integrates the functions of complete-circumference cameras and ultrasonic sensors, the system also provides a bird's-eye view display to allow the driver to check the vehicle's position relative to any obstacles during Advanced Park operation.</p>
HD-map Integration	<p>The system integrates the navigation system with an HD-map that adds topological and geometric data to make driving decisions to reach a specific point of interest, including identifying correct lanes in which to be at junctions and automatically making lane changes, after asking the driver to confirm vehicle blind spots.</p>
Emergency Driving Stop System (EDSS)	<p>Using a driver monitor camera that can detect where the driver is looking, their posture and whether or not their eyes are closed, the EDSS system guides the vehicle to the highway shoulder if it detects that the human driver is incapacitated or otherwise unable to drive the vehicle manually. Through a series of steps, including deceleration, deployment of hazard signals, attempted communications with the driver and identification of a safe place to stop, the vehicle can safely pull the vehicle over to the shoulder. If the vehicle cannot be pulled over to the shoulder, it will stop in its travel lane.</p>
Head-Up Display (HUD)	<p>Teammate's Advanced Drive function is the only hands-free Level 2 system to ensure the driver remains focused on the roadway ahead thanks to a large Head-Up Display located within the windshield that shows surrounding vehicles, the shape of the road, the vehicle's trajectory and future driving plans.</p>
People-Centric Driving Assist	<p>The system uses the available lane width to assist in maintaining adequate spacing on both sides of the vehicle when passing or driving next to another vehicle. It will also preemptively slow down when approaching a merging vehicle to maintain appropriate distance from other vehicles. When the driver or system decides to change lanes, the vehicle prompts the driver to take hold of the steering wheel and will work with the driver to both confirm the appropriate lane and initiate the lane change.</p> <p>Using a driver monitoring camera, Advanced Drive will also track the driver's line of vision and posture, as well as whether the driver's eyes are open, and issue a warning if it determines that the driver is looking away for the roadway ahead or has their eyes closed.</p>

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