LeddarTech®

LeddarVision™ LVF-H

Comprehensive Front-View Premium ADAS L2/L2+ Highway Assist and 5-Star NCAP 2025/GSR 2022 Low-Level Fusion and Perception Software Stack

Product Overview

LVF-H is a comprehensive fusion and perception software stack supporting premium front-view L2/L2+ ADAS highway assistance and 5-star NCAP 2025/GSR 2022 safety applications. LVF-H implements a premium stack handling sensors' interface, offline and online calibration and diagnostics, sensor synchronization, sensor fusion, object detection and classification, extended to include unclassified objects and events (e.g., cut-in), continuous tracking and stabilization, free space detection, road model, comprehensive traffic signs detection, highway traffic light detection, vehicle odometry interface, ego-motion localization and global localization with HD Map input. Stack further provides ability to fuse external sensors such as HD Map and V2X into a single and unified environmental model. Stack extends safety features support with detected objects trajectory prediction, perception decomposition, perception support to ODD analysis, sensor coverage and health monitoring. The complete stack extends perception, positioning and prediction features providing a comprehensive single and unified environmental model and API to premium L2/L2+ and highway assist ADAS applications.

Based on LeddarVision™ low-level fusion (LLF) and perception technology, it enables the **premium L2/L2+ and highway assist ADAS offering at lower sensor and hardware cost.** LLF technology optimally combines sensor modalities, pushing performance envelope far beyond legacy solutions and extending supported object detection fusion range over 200 m. LVF-H extends the front camera-based configuration to a **1V5R configuration,** having a **single wide FoV (120°) 3 Mpx class front camera, one medium-range front radar and four short-range front and back corner radars.** Front camera and medium-range radar extends the **fusion range over 200 m** and **ACC support up to 160 km/h.** The back short-range corner radars **extend the support of GSR 2022 and 5-star NCAP 2025 to overtaking/reverse/dooring scenarios** and the **highway assist features support to lane change collision warning.** LVF-H software stack is targeting low-cost ECU based on TI's TDA4L plus a single Hailo-8 AI processor offering together over 30 TOPS of deep-learning acceleration to support the premium perception.

LVF-H superior object detection performance further extends to occluded VRUs and vehicles, providing early warning in NCAP tested scenarios (e.g., occluded cyclist tests). Superior object separation and longitudinal position measurement accuracy in highway scenarios leads to higher performing ACC implementation. Inherent sensor redundancy provides a more reliable operation in presence of degraded (e.g., dirty lens), failing (e.g., failing camera) or conflicting sensors (e.g., false alarms from radars in presence of guard rails' multipath) and adverse scenarios and environments (e.g., dust, blinding light, etc.).

LVF-H product is part of a family of front-view products targeting entry- to premium-level ADAS. A comprehensive roadmap provides growing features support for different market segments. LVF-E companion product targets entry-level front-view ADAS, with lowest-cost 1V2R sensor configuration, having only a single wide FoV (120°) 1.2 Mpx class front camera and two short-range front corner radars to support GSR and five-star NCAP 2025 with comprehensive perception and positioning features.

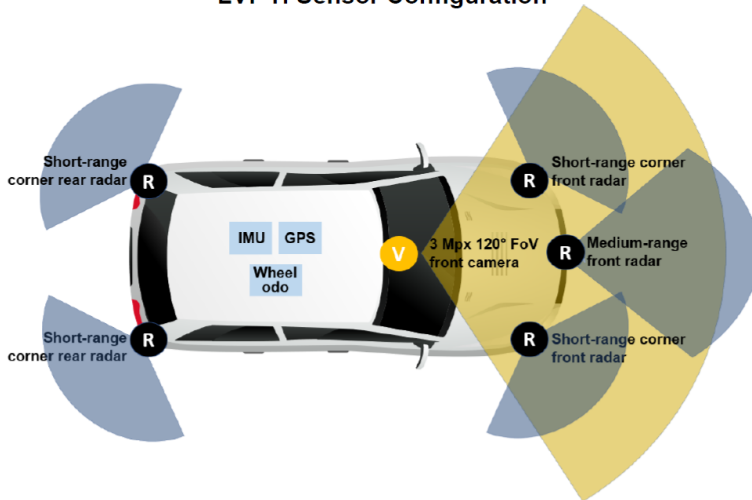LVF-H B-sample is planned for Q3 2023, targeting vehicle SOP in 2026.

Target Applications

- Economical premium L2/L2+ ADAS and highway assist applications
- Safety: GSR 2022 and 5-star NCAP 2025 (SA, VRU), including AEB C2C & VRU, LSS, SAS, ELK, LKA, BSD, TLR, TSR.
- Driving: L2/L2+ highway assist, including ACC (up to 160 km/h), LCA, TJA, HWA. Including semi auto-lane change support.
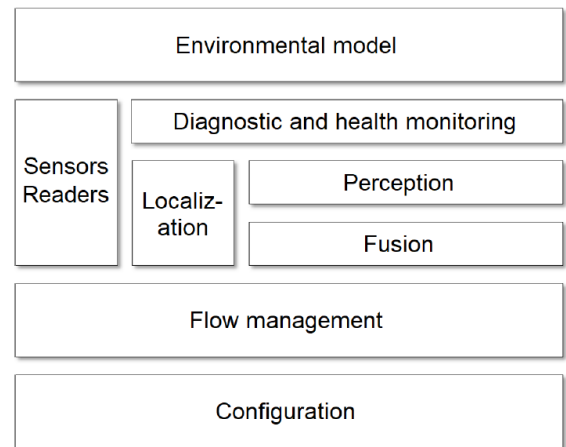
Hardware Platform

- Sensor configuration: 1V5R
- Front camera: 3 Mpx 120° FoV
- Front radar: One medium-range radar (Continental ARS510 or similar)
- Corner radars: Four short-range corner radars (Continental SRR520 or similar)
- SoC/memory: TI TDA4L, 8 GB
- AI processor: Hailo-8
- ECU: TBD

LVF-H Sensor Configuration

Software Functional Diagram

Software Stack Features

Fusion	Radar-camera low-level fusion
	Offline, online radar-to-camera calibration and diagnostics
Perception	Dynamic and static 3D object detection and classification, including vehicles and VRUs extended to L/R lanes
	Road model: L/C/R lanes based on lane lines detection (solid, dashed, color), traffic islands and road edges detection
	Speed traffic signs detection (SAS/ISA support)
	Object continuous tracking and stabilization, 15 FPS output
Premium perception	Unclassified object detection
	Event detection (e.g., cut-in)
	Free space detection
	Traffic signs and highway traffic light detection
	Fuses external sensors such as HD Map and V2X into a single and unified environmental model
Premium prediction	Detected objects trajectory prediction
Positioning	Ego-motion, GPS, IMU and vehicle dynamics-based odometry (wheels)
Premium positioning	Global localization with HD Map input
Premium safety	Global scene attributes detection for ODD analysis support

	Sensor coverage and health monitoring Perception decomposition
Supported ODDs	Weather/illumination: day / low light / night with streetlights, light rain Road topography and conditions: highway, poor road marking visibility, high lane curvatures. Highway special lanes, including entrances, exits, toll, service and ramps. ODD extended to cover 5-star NCAP 2025 test scenarios
Environmental model	Objects (3D, classification), free space, road model, ego-motion data in vehicle coordinates (in global coordinates – TBD) and diagnostics (TBD)
Operating system	Linux
Interfaces	Sensors: ROS2 Vehicle odometry: CAN GPS, IMU: CAN Environmental model: ROS2, ECAL

Perception Key Performance Indicators (KPIs)

Object detection	Vehicles (CIPV): Typ. range >200 m Vehicles (rear end): Typ. range >200 m VRUs (ego-path): Typ. range 60 m Ultra-low FPR on objects in danger zone (within 2.5 sec TTC) to support safety features in danger zone with perception decomposition
Object measurements	Vehicle (rear-end) accuracy: typ. std longitudinal (1.5 m), lateral (0.5 m), orientation (2 deg) @ 150 m Vehicle (CIPV) 3D bounding box accuracy: typ. std length (0.5 m), width (0.2 m), height (0.3 m) @ 150 m
Road model	CIPV assignment to ego-lane up to 200 m with recall 95%, precision 99%
Traffic signs detection	Numerical type signs with recall >95%, precision >99%
Traffic light detection	TBD
Global positioning accuracy	Ego-vehicle position <0.1 m, heading <0.2°
NCAP 2025 test scenarios	Perception shall support gaining >90% score of SA and VRU relevant tests.

LVF-H Features Roadmap Schedule

- TDA4L+ Hailo-8 platform: 2023
- ROS2 support: 2023
- TSR for SAS/ISA support: 2023
- Extended road model: 2023
- Extended object detection: 2023 (extended to L/R lanes to support 5-star NCAP overtaking/reverse/dooring scenarios)
- Extended ODD: 2024
- Comprehensive TSR/TLR: 2024
- Premium perception: 2024
- Premium positioning: 2024
- Premium safety: 2024

Certifications

- ASPICE: Developed according to ASPICE L2, targeted by Q3 2024.
- ASIL-B certification targeted.

Availability

- A-sample: Available since Q2 2022
- B-sample: Q3 2023
- C-sample: 2024
- Target vehicles: SOP 2026