PRODUCT BRIEF

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LeddarVision™ LVF-E

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

Product Overview

LVF-E is a comprehensive fusion and perception software stack supporting entry-level ADAS safety and highway assistance L2/L2+ applications. **Based on LeddarVision low-level fusion (LLF) and perception technology, LVF-E enables the entry-level ADAS offering at lowest sensor and hardware cost.** LLF technology optimally combines sensor modalities, pushing performance envelope far beyond legacy solutions, doubling supported object detection range to over 150 meters, thus **supporting GSR 2022 and 5-star NCAP 2025** requirements with 1V2R configuration, having only a **single wide FoV (120°) 1-2 Mpx** class front camera and **two short-range front corner radars.** LVF-E software stack is targeting low-cost ECU based on TI's TDA4VM-Q1 processor with limited 8 TOPS deep-learning acceleration.

LVF-E implements a complete stack handling sensors' interface, calibration and synchronization, sensor fusion, object detection and classification, continuous tracking and stabilization, road model, speed traffic signs detection, vehicle odometry interface and ego-motion localization, providing a comprehensive environmental model and API to entry-level L2/L2+ ADAS applications.

LVF-E 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) and adverse scenarios and environments (e.g., dust, blinding light, etc.).

The LVF-E product is part of a family of front-view products targeting entry- to premium-level ADAS. A comprehensive product roadmap provides growing features support for different market segments. LVF-H companion product targets premium front-view ADAS, extends sensor support to 1V5R sensor configuration, adding two back corner radars for extended 5-star NCAP support (overtaking/reverse/dooring scenarios), enhanced highway assistance support (semi-automated lane change), a front medium-range radar and 3 Mpx 120° FoV class camera for extended range and ACC and premium perception, positioning and prediction features.

LVF-E production sample ("B" sample), powered by TI's TDA4VM-Q1 processor, was released in June 2023, targeting vehicle SOP for 2025/6.
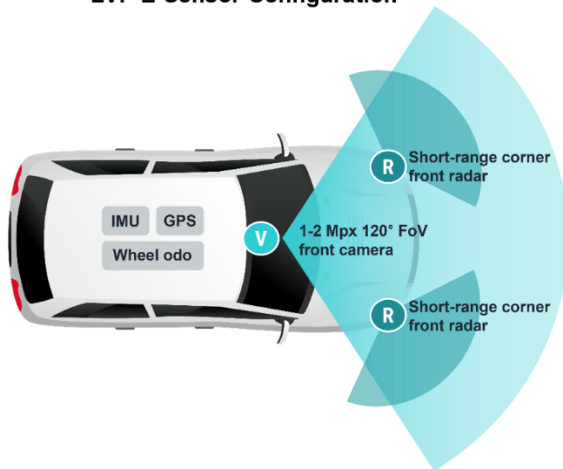
Target Applications

- Cost-effective entry-level ADAS
- Safety: GSR 2022 and 5-star NCAP 2025 (SA, VRU), including AEB C2C & VRU, FCW, LDW, FCTA, TLR, TSR, SAS, ELK, LKA. Excluding NCAP overtaking/reverse/dooring scenarios.
- Driving: L2/L2+ highway assist, including ACC (up to 130 km/h), LCC, TJA, HWA. Excluding lane change support.
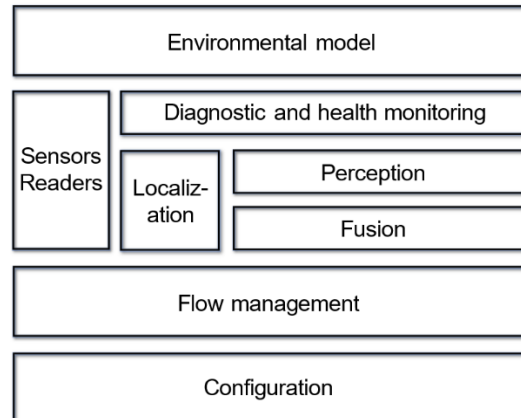
Hardware Platform

- Sensor configuration: 1V2R
- Front camera: 1-2 Mpx 120° FoV
- Front radars: Two short-range corner radars (Continental SRR520, upgraded 200 m ver., or similar)
- SoC/memory: TI TDA4VM-Q1 processor, 8 GB
- ECU: TBD

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LVF-E Sensor Configuration

IMU | GPS
Wheel odo

R Short-range corner front radar
V 1-2 Mpx 120° FoV front camera
R Short-range corner front radar

Software Functional Diagram

Environmental model

Sensors Readers | Diagnostic and health monitoring
Localiz-ation | Perception
Fusion

Flow management

Configuration

Software Stack Features

Fusion	Radar-camera low-level fusion
	Offline radar-to-camera calibration
Perception	Dynamic and static 3D object detection and classification, including vehicles and VRUs
	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
Positioning	Ego-motion, GPS, IMU and vehicle dynamics-based odometry (wheels)
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), road model and ego-motion data in vehicle coordinates
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 >150 m, recall 99%, precision 99.9%
	Vehicles (rear end): Typ. range >150 m, recall 95%, precision 99%
	VRUs (NCAP crossing): Typ. range 40 m
	VRUs (ego-path): Typ. range 60 m
	Low FPR on objects in danger zone (within 2.5 sec TTC) to support safety features in danger zone and typ. <0.1% in CIPV >100 m range

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 150 m with recall 99%, precision 99%
NCAP 2025 test scenarios	Perception shall support gaining >90% score of SA and VRU relevant tests.

LVF-E Features Roadmap Schedule

- TI TDA4VM-Q1 platform: June 2023
- ROS2 support: 2023
- TSR for SAS/ISA support: 2023
- Road model: 2023
- Extended ODD: 2024

Certifications

- ASPICE: developed according to ASPICE L2, targeted by Q3 2024.
- ISO 26262/ASIL B: ready for ADAS SAE L2, targeted by September 2024.

Availability

- "A" sample: Available since Q2 2022
- "B" sample: Available since Q2 2023
- "C" sample: 2024
- Target vehicles: SOP 2025/6