

Technology

Lane Departure Warning



Mobileye's Lane Departure Warning (LDW) application uses monocular image processing for detection of lane markings on the road, and for measuring the position of the vehicle relative to those markings. The LDW application provides indications of unintentional lane departures. The application operates on all vehicle types and on all roads, including highways, country roads and urban freeways, and in urban conditions.

The application can detect and differentiate between various types of lane markings: solid, dashed, boxed, Bott's Dots, and cat-eyes, regardless of lane width, or lane marking width. In the absence of lane markings, the LDW application utilizes road edges (the boundary between paved surface and ground) and curbs. The application fits a three-parameter road model that accounts for lateral position, slope and curvature. The curvature parameter is used for increasing the warning reliability under curved roads and for estimating time to lane crossing. In addition, the application retains multiple lane models in order to switch between them instantaneously in ambiguous conditions such as urban roads, merging lanes, or exit lane situations. Mobileye LDW also includes an algorithmic provisions to avoid confusion between passing vehicles'.

The LDW application incorporates an advance warning scheme that supports early warning capability, based on measuring lateral vehicle motion, to predict the time to lane crossing and providing a warning signal before the vehicle crosses

Features:

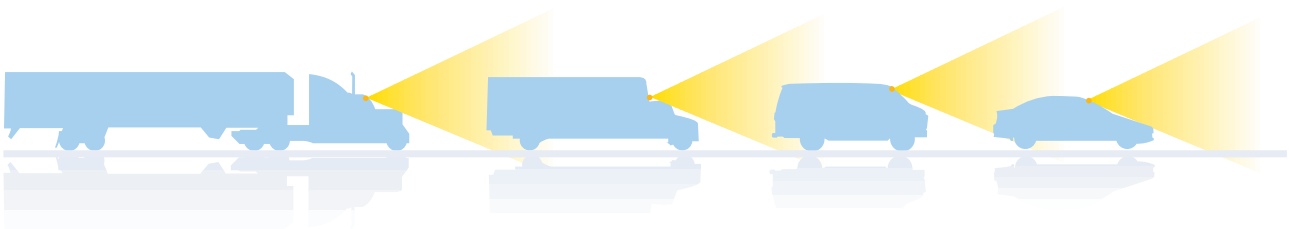
- Detection of all types of lane markings
- Curb and road border detection features
High availability, including night, rain and snow conditions
- Adjustable warning timing - upon or prior to lane change, based on online calculation of time to lane crossing
- Operates on straight as well as highly curved roads
- Automatic shutoff and driver notification under poor visibility conditions
- Operates on all vehicle types

the lane. The application also takes into account driver behavior and suppresses unnecessary warning signals. The application detects upcoming curves and adapts the warning tolerance accordingly.

The application operates under partially visible lane markings and in difficult conditions such as strong shadows, glare, and inclement weather, including rain and wet roads. The vision based LDW sensor does not require any additional sensory inputs.

Processing Platform

The LDW application runs at 10-15 FPS on Mobileye's automotive qualified EyeQ™ ASIC vision system on a chip. Mobileye EyeQ™ has integrated a dual channel CAN controller and a glue-less interface to various CMOS image sensors.





A complete automotive vision system can consist of a single high-dynamic range CMOS image sensor and a compact electronic board including the Mobileye EyeQ™ processor, program memory and communication interface to the car's network.

Application Options

The LDW application can be enhanced to support the following applications:

- Lane keeping and headway monitoring
- Road geometry prediction
- Lane position monitoring for transportation fleets
- Automatic headlamp activation
- Intelligent high-beam control
- Wet road detection
- LDW can be delivered as a standalone application or can be integrated with other driver assistance applications such as Adaptive Cruise Control, Forward Collision Warning, and Headway Monitoring Warning

Lane departure warnings are suppressed in cases of:

- Intentional lane departures (indicated by using the turn signal)
- No lane markings (e.g. within junctions)
- Inconsistent lane markings (e.g. road construction areas)
- Typically, the LDW application warning is activated at approximately 50 km/h.
- When poor visibility conditions exist, the application notifies the driver of possible degraded performance.

Benefits:

- Reduces the driver's load and increases driving safety
- Cost effective – suitable for mass implementation
- Compact size, single board solution
- High reliability and availability
- Performs a wide range of additional comfort functions

Country road with strong shadows



Detection of road's edge when no lane marking exists



Urban LDW - detection of curbs when no lane markings exists



Lane detection and road geometry estimation on a winding road



Lane detection in heavy rain



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