

MOBILEYE® SHIELD+™ V4

COLLISION AVOIDANCE SYSTEM

WITH NIGHT VISION DETECTION



MOBILEYE® SHIELD+™

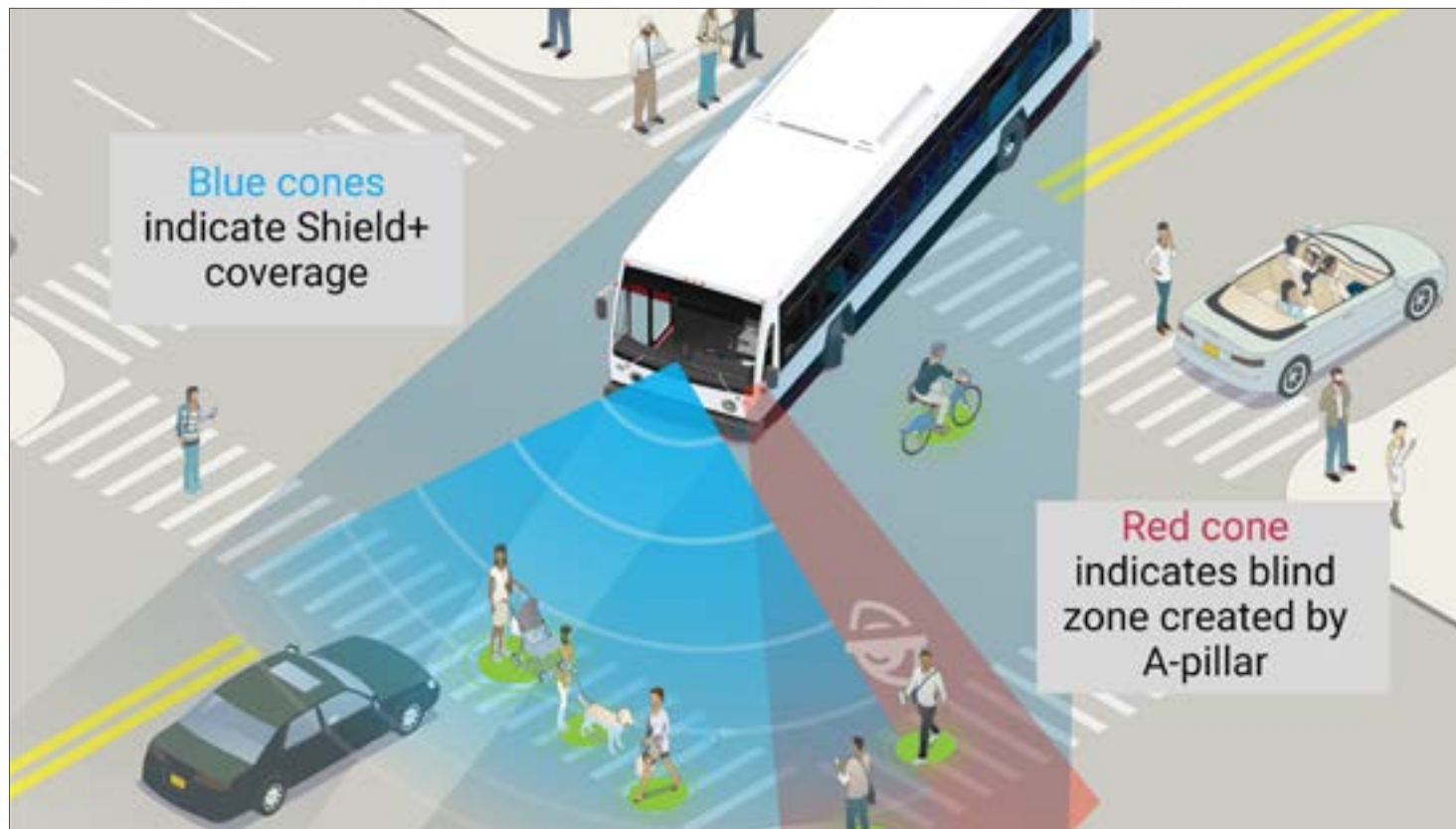
ADVANCED DRIVER ASSISTANCE SYSTEM

Mobileye® Shield+ is the most advanced collision avoidance system for long vehicles. Bus and truck operating conditions demand the highest level of awareness by the driver in all environments. Vulnerable Road Users (VRUs) including pedestrians and cyclists often are not seen by the operator due to large blind spots around the vehicle, especially when making turns. Shield+ increases awareness for drivers, while keeping passengers and VRUs safe on the streets.

Shield+ yields amazingly simple left, center, and right alarm interfaces that communicate audio and visual alerts to drivers based on the directional location of the VRU and the potential for collision. Whether a straightaway or turn, the smart vision multi-sensor system is tuned with sophisticated algorithms and years of Mobileye experience to assist drivers and avoid potential collisions. Utilizing intelligent vision sensors that work like a bionic eye, the system

identifies a diverse and extensive variety of potential dangers on the road, such as vehicles, cyclists, pedestrians and more. The distance and relative speeds are continuously measured to calculate the risk of collision. Even lane markings and traffic signs are detected! When danger is imminent, visual and audible alerts warn the driver to make the necessary corrections in sufficient time to avoid potential collisions or mitigate their severity.

INTERSECTION COMPLEXITY ON "WARP SPEED"



Pictured above is an example of one turn of likely thousands this bus will make over the course of a week. Smart vision sensors on the front and sides of the bus track possible collision courses and alert the driver in time to avoid or lessen incident severity.

REDUCE PEDESTRIAN COLLISIONS, SAVE LIVES



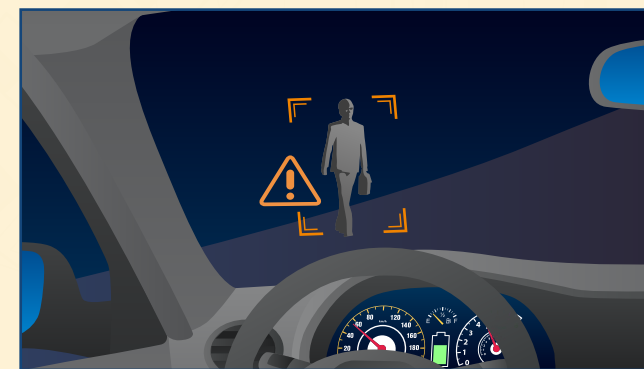
In addition to all the benefits of the original Mobileye® Collision Avoidance System, this unique, smart vision multi-sensor system provides drivers with alerts when pedestrians and cyclists are in the danger zones on the side of the bus as well as the front. Often times, pedestrians will dart out between cars to cross the street and into a driver's blind zone. Shield+ can minimize such safety concerns. The addition of the pedestrian and cyclist side-sensing makes the driver aware of VRUs in the bus' path, before an incident occurs, giving the driver time to react and take corrective action. These alerts can help save lives and improve your organization's safety record.

BLIND ZONES AROUND LARGE VEHICLE



- Assists large vehicle operators to prevent collisions with vulnerable road users.
- Assists decision makers by providing invaluable real-time big data on dangerous intersections.
- Provides continual updates of near crashes with pedestrians and cyclists.
- Identify exact geo-location of incidents.
- Real-time big data on dangerous intersections.

SHIELD+™ V4 NIGHT VISION CAPABILITY



The newest Shield+ System is now equipped with night vision VRU detection. The smart cameras can now detect pedestrians and cyclist in low light conditions* offering crucial assistance to drivers when needed most.

*15 LUX Minimum

OPTIONAL "INTELLIGENT" PEDESTRIAN AUDIO ALERT



The optional "intelligent", external alert system will send an audible alert to VRUs around the bus to ensure they are aware that the bus only when Shield+ detects an imminent collision between the vehicle and a VRU. This "intelligent" or smart technology alert reduces noise pollution and helps prevent VRUs from "tuning out" excessive alerts that sound at every turn.

SHIELD+ VERSION 4 COMPONENTS

Driver Alert Displays

- Green operational LED on center display
- Amber & red LED boards for caution & alarm status
- Integrated EyeWatch interface in center display
- Piezo speaker system for audible alerts
- Universal mounting features

Windshield Mounted Smart Sensors

- Smart vision sensors
- Multi-core chip
- Processing platform for all Mobileye® functions
- Leading automotive application chip
- Mobileye® algorithms for vehicle and pedestrian detection

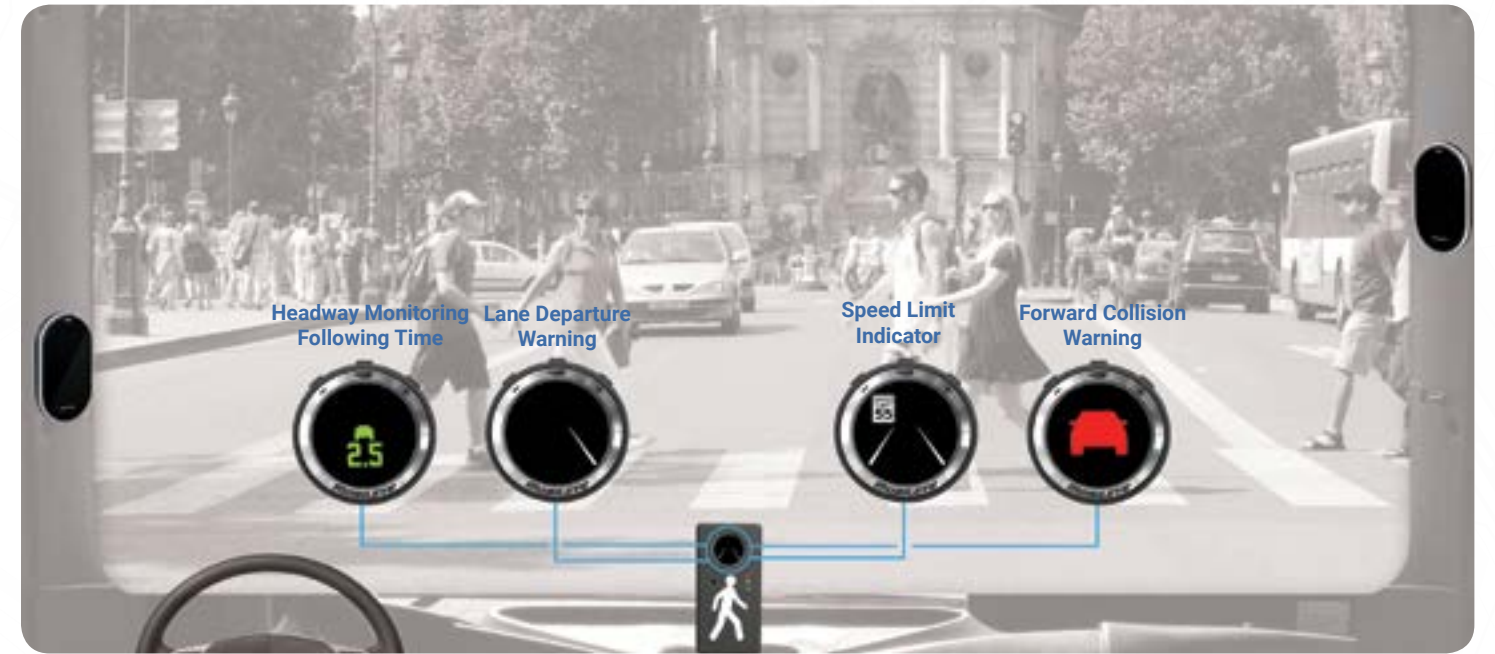


Exterior Smart Sensors

- Concealed wiring
- Heated interior chamber
- IP67 Rated

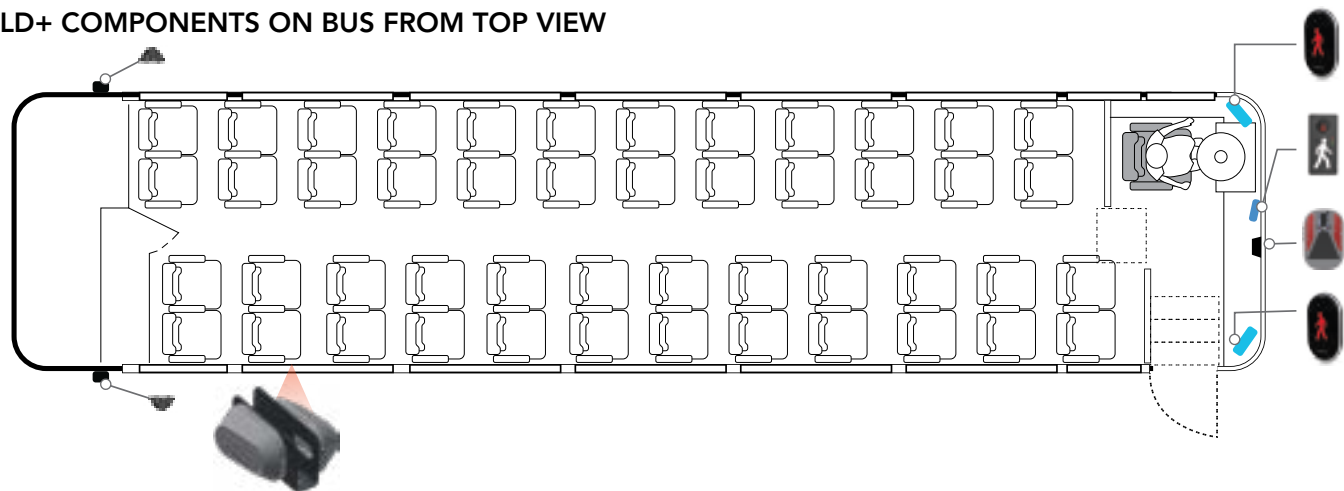
The exterior sensors withstand the rigors of the transit environment, including on-route service, bus wash, and high pressure cleaning.

DRIVER ALERT DISPLAY LOCATIONS

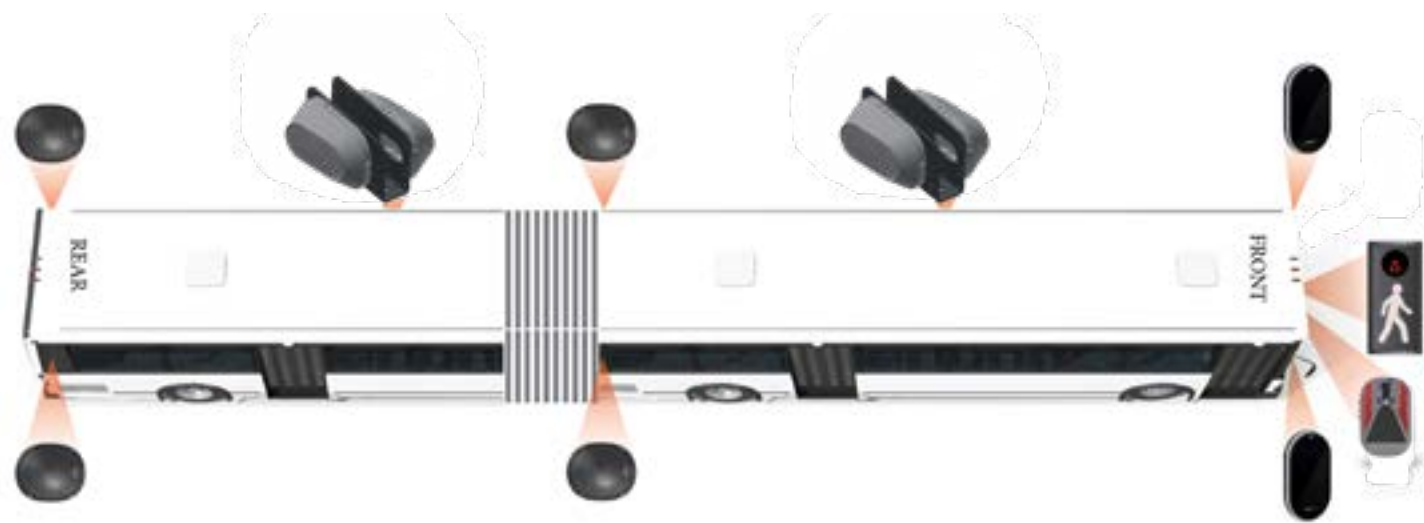


The Shield+ System for commercial vehicles includes three (3) display modules that alert the driver, visually and audibly, when the bus is in motion, and a pedestrian and/or cyclist is in one of the danger zones around the bus.

SHIELD+ COMPONENTS ON BUS FROM TOP VIEW



SHIELD+ COMPONENTS ON ARTICULATING BUS



DRIVER ALERT DISPLAY READOUTS

	FEATURE	DESCRIPTION
Center Display Only	Lane Departure Warning	Alerts when vehicle departs from driving lane without turn signals. Right/left lane icon as appropriate. Active above 34 mph.
	Speed Limit Indicator	Visual verification when the vehicle exceeds the last identified speed limit. Active at any speed.
	Headway Monitoring /Following	Displays the amount of time in seconds, to the vehicle in front when that time becomes 2.5 seconds or less. Green vehicle icon signifies safe headway; red icon unsafe. Active above 19 mph.
	Forward Collision Warning	Red vehicle icon warns of imminent rear-end collision. Active at any speed. Same red vehicle icon warns of a possible low speed collision starting at 0.6 mph up to 123 mph. Three sensitivity level settings.
	Green LED	Green LED indicates all the functions of the Shield+ System are operational.
	Amber Alert	Amber display alerts the driver that a pedestrian or cyclist is detected around the truck, but is in a safe area. The driver may continue operating with caution. Active from 0.6 mph to 43 mph.
	Red Alert	Red display and audible beeping alerts the driver of a pedestrian or cyclist that is in the bus collision trajectory. Driver should stop the truck immediately. Active from 0.6 mph to 43 mph.

IDENTIFYING POTENTIAL DANGER ZONES AND HOT SPOTS USING SHIELD+ TELEMATICS

The Shield+ Telematics System can locate and pinpoint potential "hot spots" on driving routes. A vast majority of collisions involving pedestrians and cyclists proved to be preventable with the right technology.

Mobileye Shield+ Map



The hot spots identified by the Shield+ Telematics System correspond to the data of cyclist injuries found on the Vision Zero View map.

Vision Zero View Map



35

Numbers indicate how many alerts and/or detections the collision avoidance system detected in the marked location.



MYRTLE AVE
No protection for cyclists in bike lane from street traffic

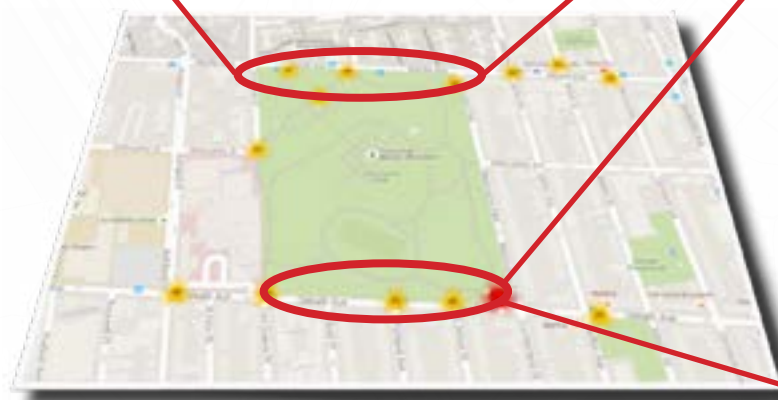
Myrtle Avenue in Brooklyn

Pinpointing potential "hot spots" allows us to focus on the location and what could be causing the high incident rate.

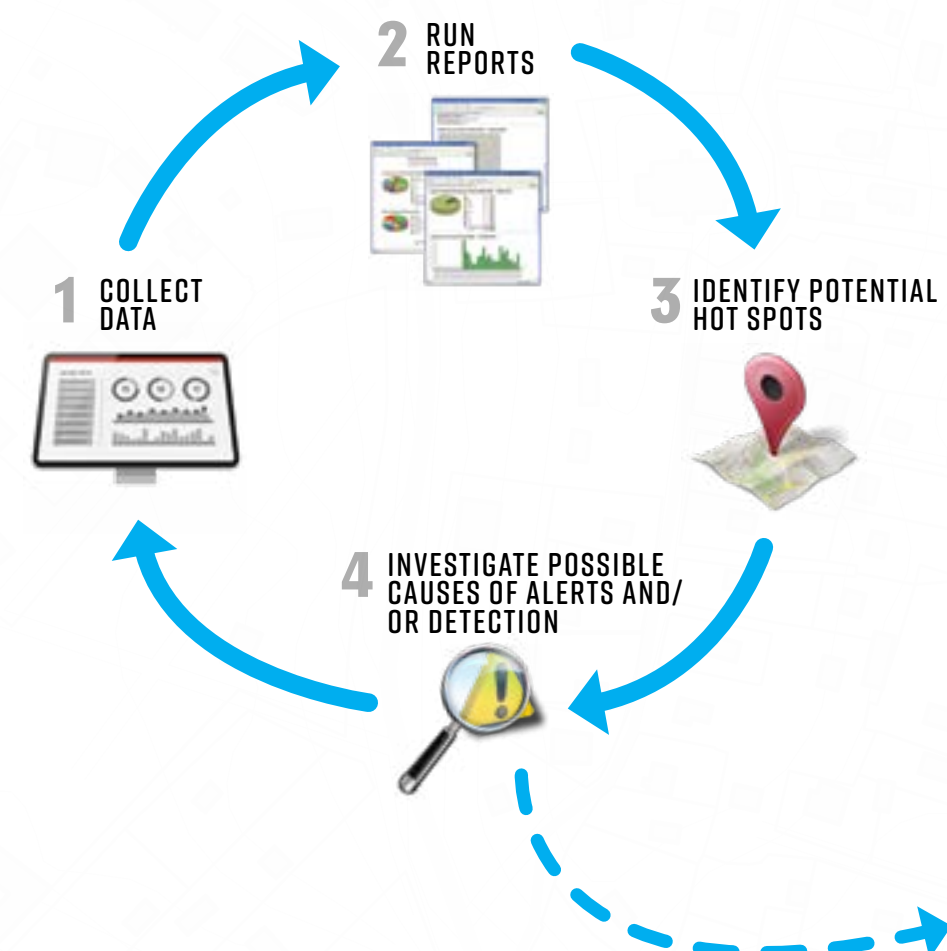


DEKALB AVE
No protection in bike lane, bike lane paint is worn off, a lot of potholes

Dekalb Avenue in Brooklyn



Identified "hotspot" on driving route



1 COLLECT

The Shield+ Telematics System can track vehicle routes and identify where there have been detections and alerts.

2 REPORT

Using the collected data, generate safety reports based on location, drivers, number of detections, etc.

3 IDENTIFY

The Shield+ GPS tracking and collision avoidance technologies can pinpoint "hot spots" on driving routes

4 INVESTIGATE

After identifying the potential danger zones, further investigate possible causes of the high number of alerts and detections. (ie: potholes, unmarked bike lanes, etc.)

INFRASTRUCTURE IMPROVEMENTS

- Fix potholes
- Secure bike lanes
- Add stop signs
- Reduce speed limits
- Add crosswalk



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Mobileye, an Intel Company, is a global leader in the development of computer vision and machine learning, data analysis, localization, and mapping technologies for Advanced Driver Assistance Systems and autonomous driving solutions. Its technology is integrated into hundreds of new car models from the world's major automakers including BMW, Ford, General Motors, Honda, Volvo, and more. In fact, over 24 million vehicles worldwide are equipped with Mobileye technology.



Rosco's integration of the Mobileye Shield+ Collision Avoidance System is an example of how the unique safety requirements of bus and truck operations can be addressed with proper application of evolving technology. Applications with specific trucks such as in Refuse Vehicles, Walk-In Vans, and over the road vehicles are possible as well.

Rosco is the largest supplier of automotive vision safety products to the bus and truck marketplace. For over a century, Rosco's goals have remained the same: Commitment to producing the highest quality automotive products and providing the superior service customers have grown to expect. Today, while Rosco products are on all school buses manufactured in North America, Rosco supplies mirrors, visors, and digital vision products to nearly every commercial bus, truck, military, and specialty vehicle manufacturer as well.



A CENTURY OF AUTOMOTIVE VISION SAFETY

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