

MOBILEYE® SHIELD+

COLLISION AVOIDANCE SYSTEM



An Intel
Company



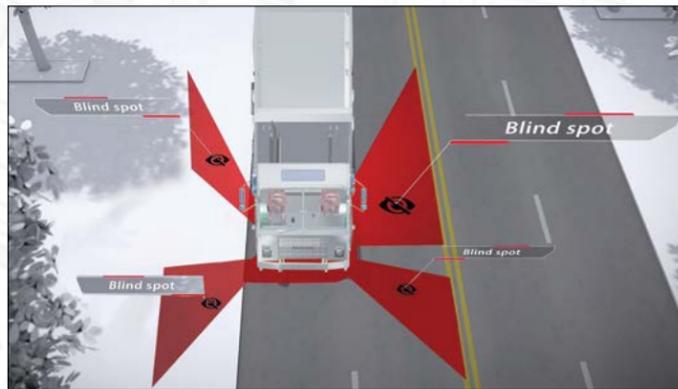
OFFICIAL MOBILEYE PARTNER

MOBILEYE® SHIELD+

OUR SOLUTION FOR PEDESTRIAN & CYCLIST SAFETY

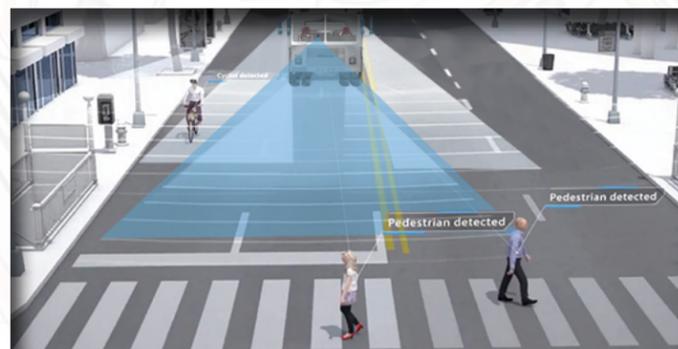
The Mobileye® Shield+ System is the latest technological advancement for preventing collisions between vehicles and Vulnerable Road Users (VRUs) including pedestrians and cyclists. VRUs often are not seen by the waste truck operator due to large blind spots around the vehicle, especially when making turns. Waste truck operating conditions demand the highest level of awareness by the vehicle operator. Shield+ increases awareness and safety for the driver and VRUs around the waste truck to prevent collisions.

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 constant update of near crashes with pedestrians and cyclists.
- Identify exact geo-location of incidents.
- Real-time big data on dangerous intersections.

REDUCE PEDESTRIAN COLLISIONS, SAVE LIVES

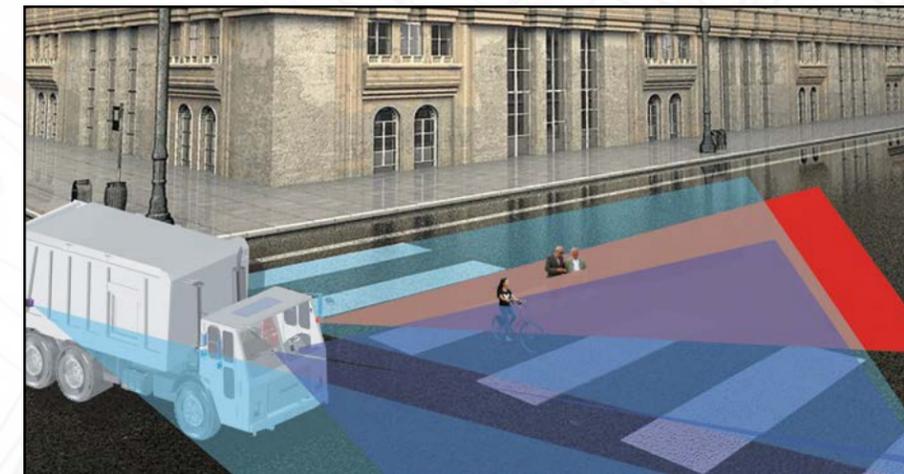


In addition to all the benefits of the original Mobileye® Collision Avoidance System, this unique, smart vision multi-sensor system provides drivers with alerts when pedestrians and cyclists are in the danger zones on the side of the waste truck as well as the front. Often times, pedestrians will dart 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 pedestrians and cyclists in the waste truck's path, before an incident occurs, giving the driver time to react and take corrective action. These alerts can help save lives and your organization's safety program.

Shield+ yields 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 filter out VRU proximity that is not at risk, while detecting and tracking VRU proximity and course. Utilizing an intelligent vision sensor that works

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

INTERSECTION COMPLEXITY ON "WARP SPEED"

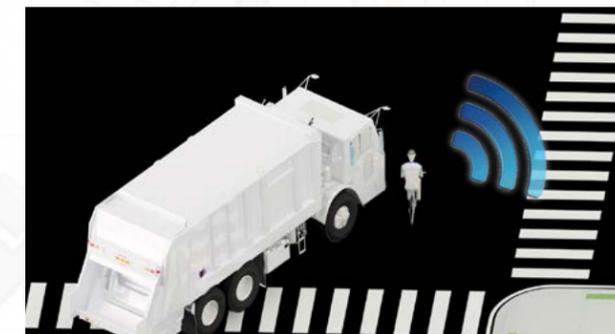


- Driver Blind Zone
- Front Cameras - Coverage Zones
- Side Cameras - Coverage Zones

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

Fleet managers have installed the Mobileye® Collision Avoidance System in some of the world's best-run fleets including cars, trucks, service vehicles and taxis, in both rural and urban environments. These global organizations have experienced significant reductions in incidents, collisions and associated costs. Your fleet can accomplish the same.

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 is within the vicinity and maneuvering around them. The alert will ONLY sound 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.

INTERIOR COMPONENTS



(3) Driver Alert Displays

- Green operational LED on center display
- Amber & red LED boards for caution & alarm status
- Integrated EyeWatch 3 interface in center display
- Piezo speaker system for audible alerts
- Universal mounting features



(2) 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

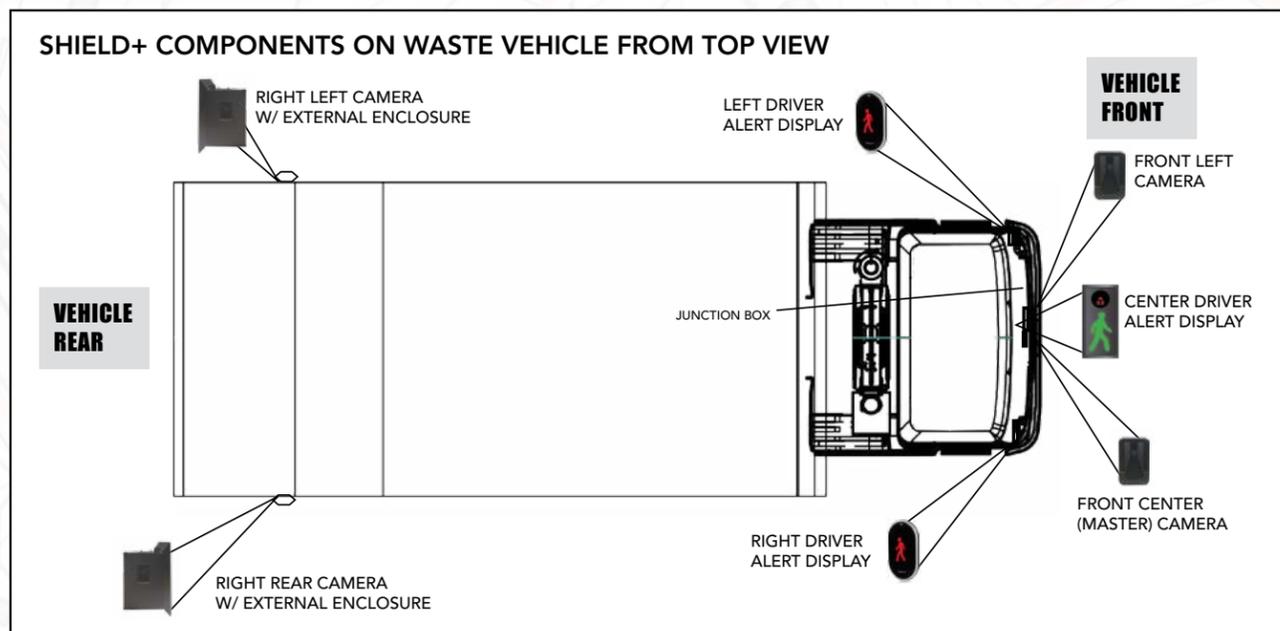
EXTERIOR COMPONENTS



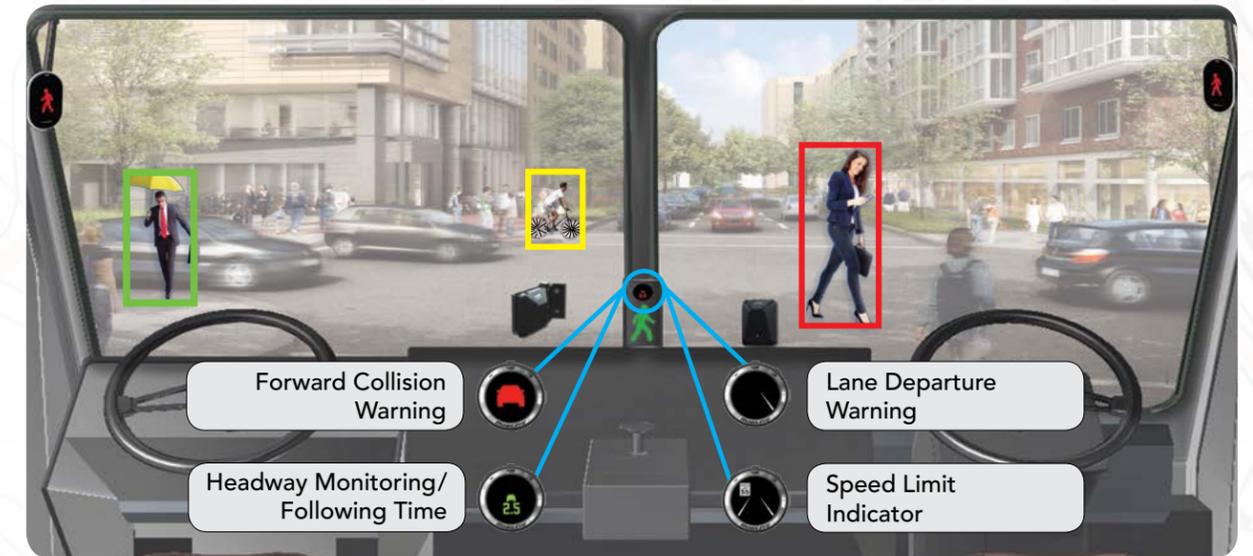
(2) Exterior Camera Housings With Smart Sensors

- Concealed wiring
- Heated interior chamber
- Hydrophobic glass
- IP67 Rated

Adjustable, extruded aluminum housings withstand the rigors of the waste truck and truck marketplace and hold up to waste truck washes and high pressure cleaning.



SMART SENSOR AND DRIVER DISPLAY LOCATIONS



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

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	Alerts when the vehicle exceeds the posted speed limit. Notes the amount exceeding the posted 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 up to 2.7 seconds before an imminent rear-end collision. Active at any speed. Same red vehicle icon warns of a possible low speed collision, under 19 MPH.
	Solid Green	Solid green display indicates all the functions of the Shield+ System are operational. If the green center display is off, the pedestrian and cyclist detection is not operational.
	Solid Amber	Solid 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 the truck with caution. Active under 31mph.
	Blinking Red Alert	Blinking 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 under 31mph.

IDENTIFYING POTENTIAL DANGER ZONES AND HOT SPOTS USING SHIELD+ TELEMATICS

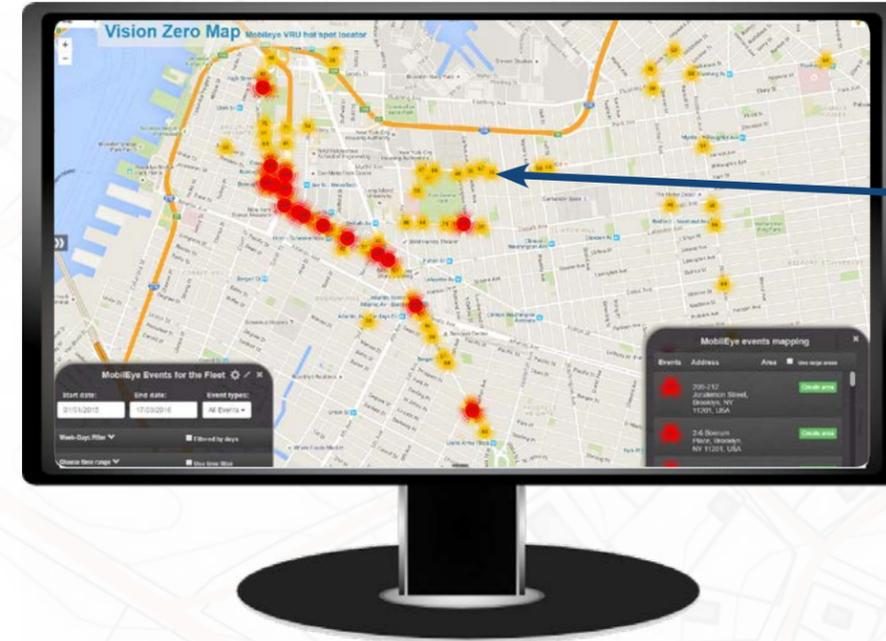
The **Shield+ Telematics System** can locate and pinpoint potential "hot spots" on driving routes. A vast majority of collisions involving pedestrians and cyclists proved to be preventable with the right technology.

Mobileye Shield+ Map



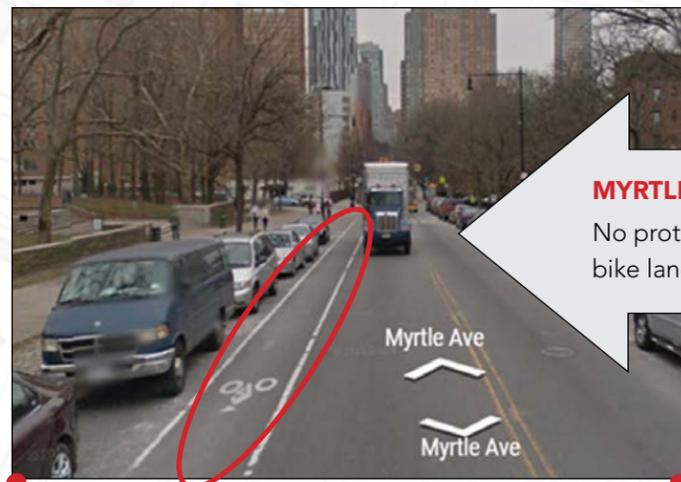
The hot spots identified by the **Shield+ Telematics System** correspond to the data of cyclist injuries found on the Vision Zero View map.

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.

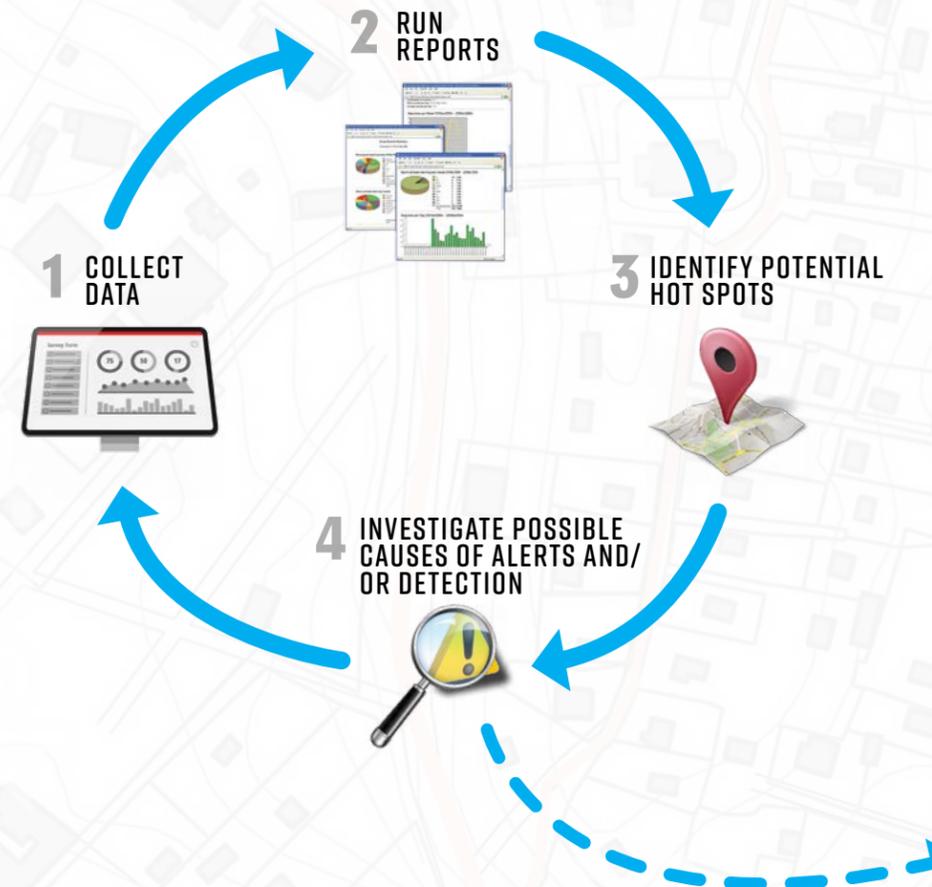
DEKALB AVE

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® is the technological leader in the area of advanced image sensing and processing technology for automotive applications. With over a decade invested in extensive R&D, Mobileye has gained an unprecedented understanding of the diverse challenges that face drivers on the road and how to keep them safe. This unequalled expertise has made Mobileye the recognized global pioneer in collision avoidance systems. As evidence, Mobileye is the OEM (Original Equipment Manufacturer) supplier of such systems to many of the world's leading automobile manufacturers.



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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