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An Intel Company

rosco
COLLISION
AVOIDANCE
Official Mobileye Partner

NIGHT VISION
APAS

Shield+
FOR WASTE

MOBILEYE®

SHIELD+

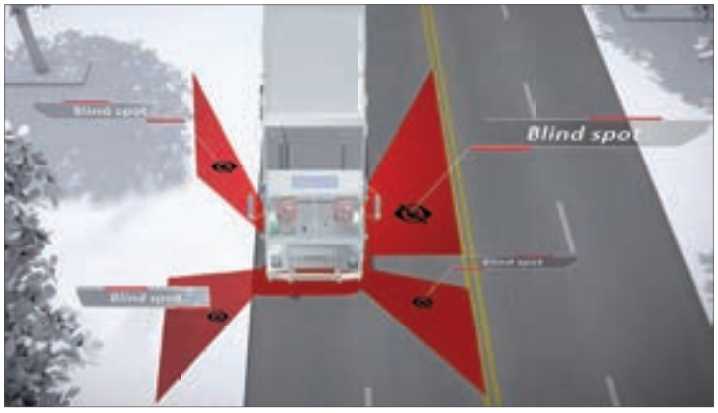
OUR SOLUTION FOR PEDESTRIAN & CYCLIST SAFETY

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.

"The Mobileye Shield+ system helps our operators mitigate blind spots and temporary obstructions, and double check their professional judgements. The system is incredibly helpful on vehicles which travel through the pedestrian dense urban areas of Old Town, Alexandria, VA."

Raymond Mui, Assistant General Manager, Alexandria Transit Company ("DASH")

Blind Zones Around Large Vehicle

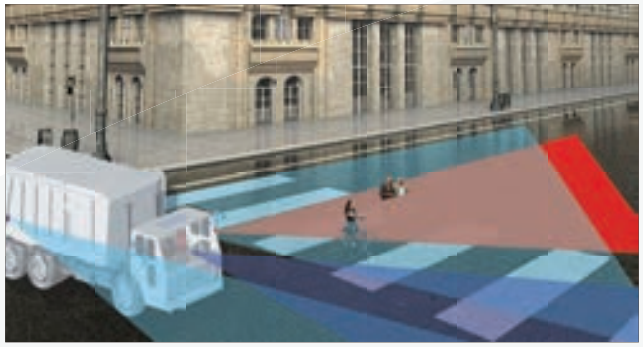


- Assists large vehicle operators to prevent collisions with vulnerable road users.
- Assists decision makers by providing invaluable real-time big data on dangerous intersections.
- Provides constant update of near crashes with pedestrians and cyclists.
- Identify exact geo-location of incidents.
- 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. "As part of your corporate driver safety program, these alerts can save lives.

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"

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.

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

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 Advanced Pedestrian Alert System (APAS)

The optional "intelligent", external alert system will send an audible alert to VRUs around the bus to ensure they are aware that the truck 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

(1) 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

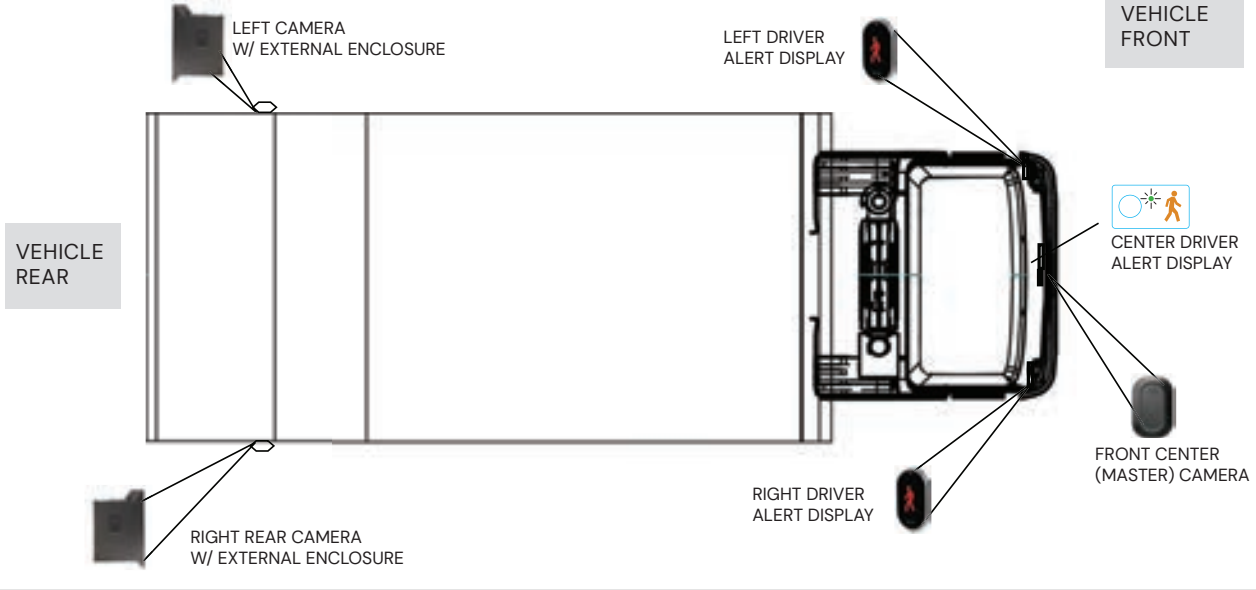
Exterior Components

(2) Exterior Camera Housings With Smart Sensors

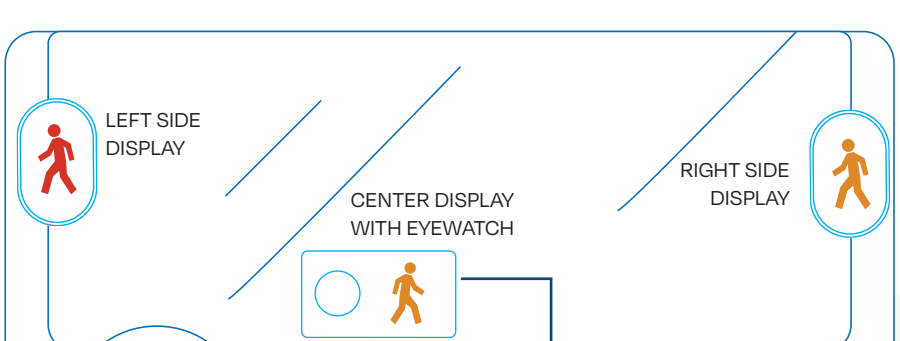
- Concealed wiring
- Heated interior chamber
- Hydrophylic glass
- IP67 Rated

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.

SHIELD+ COMPONENTS ON WASTE VEHICLE FROM TOP VIEW



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.

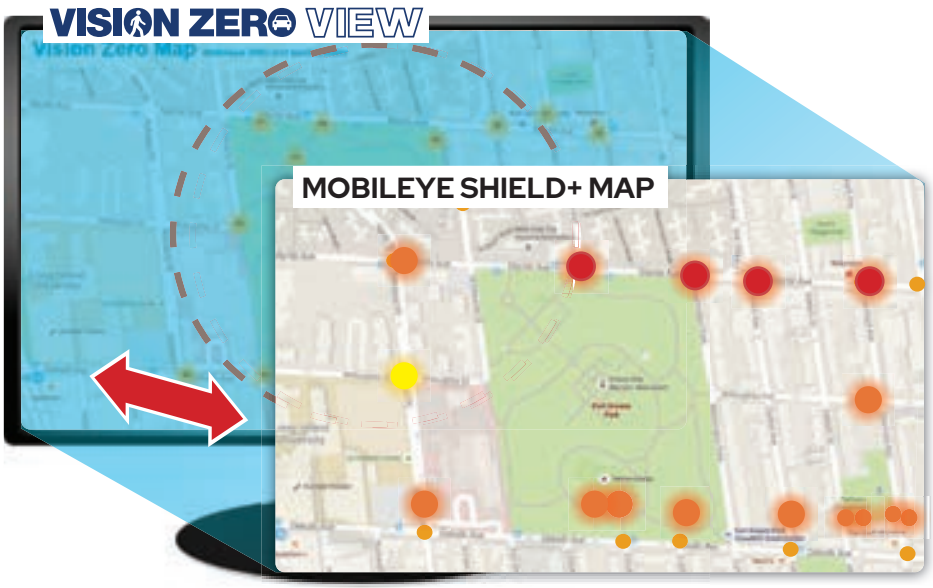
Driver Alert Display Readouts

Center Display Only

FEATURE		DESCRIPTION
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.
Green LED		Green LED indicates all the functions of the Shield+ System are 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.



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

Myrtle Avenue in Brooklyn
No protection for cyclists in bike lane from street traffic

Dekalb Avenue in Brooklyn
No protection in bike lane, bike lane paint is worn off, a lot of potholes

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

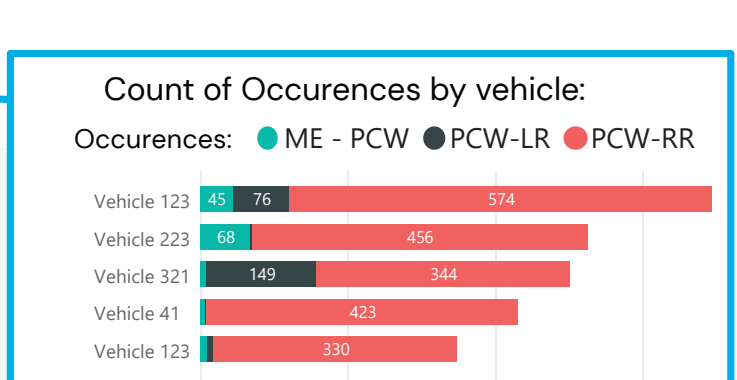
Pinpointing potential "hot spots" allows us to focus on the location and what could be causing the high incident rate.

Let Rosco help you bridge the gap between data and decision making

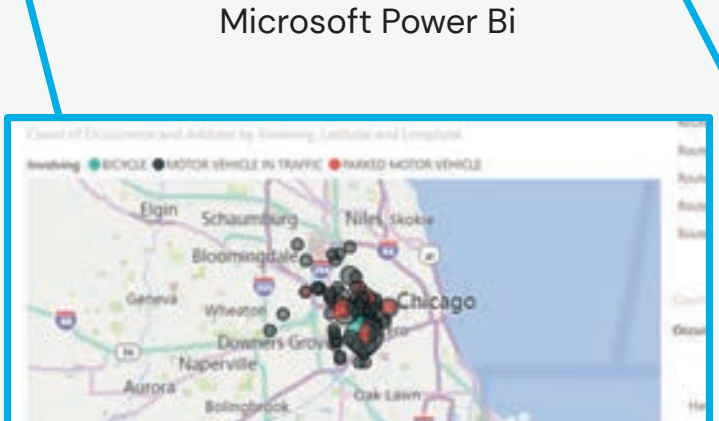
Utilizing Microsoft's latest business intelligence analytics tool, Power BI--
Rosco can you help your team paint a bigger picture*

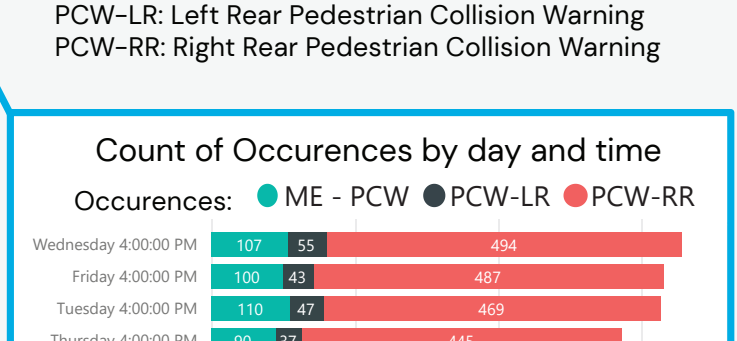
**Rosco's PowerBI business analytics program is available as an augmented service to clients - contact sales for more info*

Unified dashboard powered by Microsoft Power Bi



ME-PCW: Forward Pedestrian Collision Warning
PCW-LR: Left Rear Pedestrian Collision Warning
PCW-RR: Right Rear Pedestrian Collision Warning





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 unequaled 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.

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