Submission No 8

INQUIRY INTO HEAVY VEHICLE SAFETY AND USE OF TECHNOLOGY TO IMPROVE ROAD SAFETY

Organisation: Mobileye, An Intel Company

Name: Mr Jason Bloom

Position: Regional Director for Southern Africa & Australasia

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Mobileye, an Intel Company
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About Mobileye

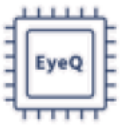
Mobileye, an Intel Company, is a global leader in the development of computer vision and machine learning, data analysis, localization, and mapping technologies for advanced driver assistance systems (ADAS) and autonomous driving solutions.

Our safety technology is integrated into hundreds of new car models from the world's major automakers: BMW, Audi, Volkswagen, Volvo, Nissan, Ford, Honda, General Motors and more.

Mobileye's world-class aftermarket collision-avoidance technology is brought to you by the same team developing some of the world's most sophisticated ADAS technology and can be retrofitted to almost any vehicle on the road.

The Mobileye collision avoidance system is available with a single, forward-facing vision sensor suitable for regular-sized vehicles, or in a multi-sensor solution designed specifically for large commercial vehicles with hazardous blind spots.

In Australia, Mobileye aftermarket technology is already being utilised by large public bus operators as well as supermarket chains using light duty vehicles for online deliveries.



25+ global automakers rely on Mobileye technology to make their vehicles safer

20M+ Vehicles worldwide are equipped with Mobileye technology

13 Automakers are already working with Mobileye to enable autonomous driving

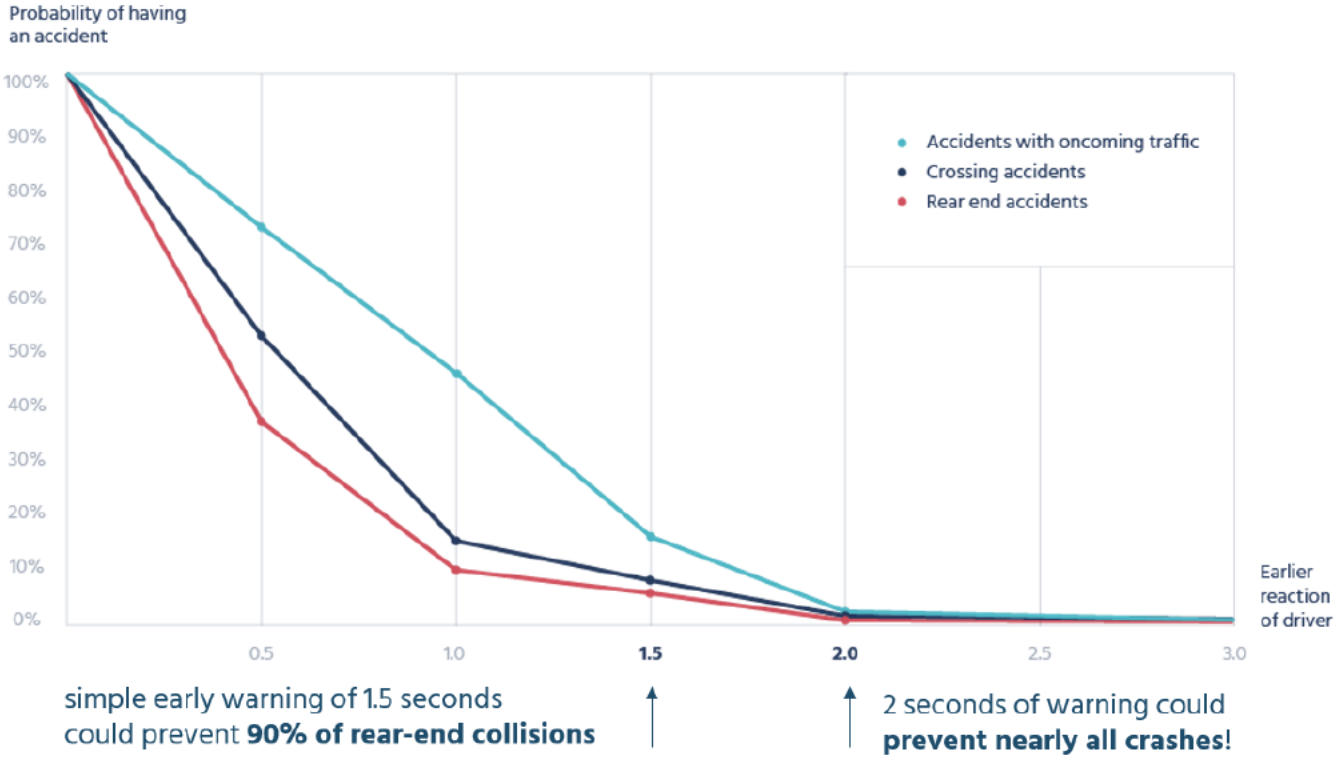
Road Safety is a Top Priority

What began as a mission to reduce vehicle injuries and fatalities has quickly become the most advanced collision avoidance system on the market, in more than 300 car models and over 20 Million vehicles around the globe. We foresee an accident-free future with our technology at the center of it.

Road accidents are now seen as a global epidemic, and Australia is sadly no exception to this. In 2017, there was an 86% increase in the number of fatalities caused by heavy duty vehicles in NSW alone. [1]
Both the human and financial tolls are immense.

Research carried out by NHTSA has shown that around 94% of collisions are caused by human error.[2] Typically, it is driver inattention in the crucial 2-3 seconds prior to an imminent collision, and the driver's consequent failure to take corrective action, that leads to accidents.[3] Further research has shown that a mere 1.5 seconds' early warning could prevent 90% of forward collisions, and that 2 seconds' warning could prevent nearly all forward collisions.[4]

Figure 1: Study conduct by AXA Switzerland showing the impact of an early warning



[1] http://www.smh.com.au/comment/truck-safety-is-every-road-users-problem-20180105-h0e7xu.html?lipi=urn%3Ali%3Apage%3Ad_flagship3_feed%3BsB5JEWAATSShPYpXQpkmdA%3D%3D
[2] https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115
[3] *Traffic Safety Facts (2015)*, US Department of Transportation
[4] Sinzig B, *Forward Collision Accidents: The (Swiss) Insurance Company Perspective*, Accident Research, Feb 2009.

Moreover, it seems that distracted driving is on the rise. Of course, nobody ever gets into a car with the intention of having an accident, but the causes of inattention – whether they be busier daily schedules, mobile phones or simply more traffic – are many, and more distracting than ever. For example, bus drivers in busy urban environments are expected to keep their eyes on the road, all while managing passengers' embarking and disembarking, taking payment and handing out change, and keeping to the route schedule – often in dangerous road conditions or in challenging weather. Equally so, long-haul truck drivers fight a constant battle to meet delivery schedules and navigate difficult roads, often while fatigued from long workdays.[5]

Complicating such an already dangerous situations further is the growing phenomenon of distracted *pedestrians* – those looking down at their mobile phones or unable to hear properly due to headphones, while walking in and around traffic.

Mobileye aftermarket offers two main products to the market: The Mobileye 6 Series and Mobileye Shield+™, assisting drivers to **mitigate or altogether avoid collisions**.

Mobileye Collision Avoidance Technology

Our technology is among the most advanced and cost effective collision avoidance solutions available. It can understand, through a single camera, the entire driver environment including lanes, vehicles, traffic lights and pedestrians. It is based on nearly 20 years of R&D and many thousands of hours spent stress-testing our algorithms against real life driving situations. Mobileye was one of the first to understand that a single-lensed camera could perform vehicle and pedestrian detection in a market then dominated by radar sensors. The Mobileye collision avoidance system is powered by Mobileye's system-on-chip (SoC) – the EyeQ® family – which provides the processing power to support a comprehensive suite of ADAS functions based on the single camera sensor.

How it Works:

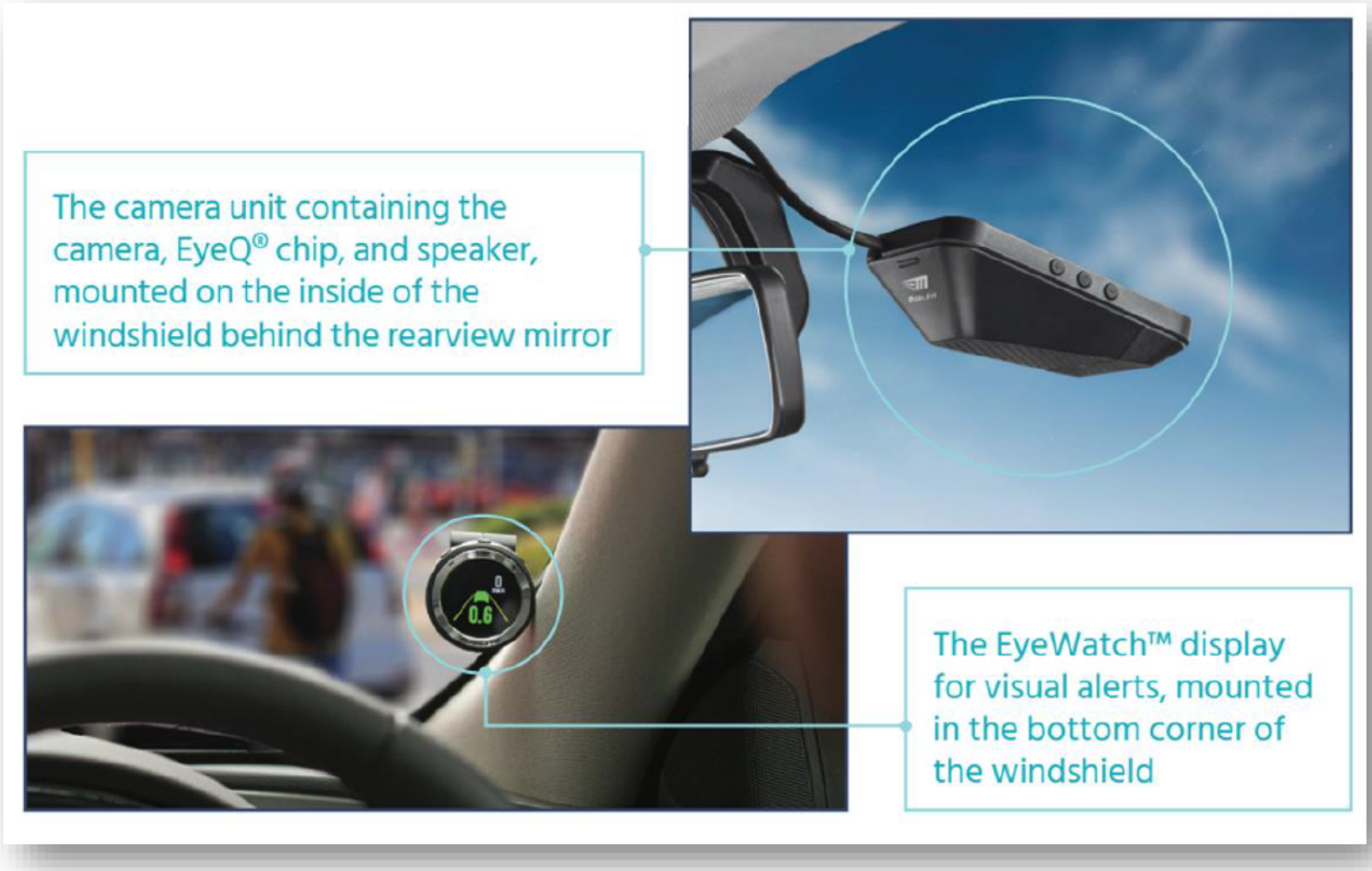
The Mobileye aftermarket system is made up of two parts:

- A windshield-mounted unit containing the camera, EyeQ chip, and speaker for audio alerts.
- The EyeWatch™ display for visual alerts, mounted on the dashboard or the windshield.

[5]From Ten Eyewitness news, 17 January 2018: https://www.facebook.com/tennews/videos/1794163290653970/?comment_id=1794377437299222&comment_tracking=%7B%22tn%22%3A%22R%22%7D

The camera scans the driving scene and **Mobileye's proprietary computer-vision algorithms** detect vehicles, lane markings, speed limit signs, and vulnerable road users such as pedestrians and cyclists. When the system detects a situation which presents danger of an imminent collision, it alerts the driver with a visual and audio warning. This allows the driver the critical second or two to brake or slow down to avoid or mitigate the impending collision.

Mobileye's Collision Avoidance technology can also be retrofitted into almost any existing heavy duty bus or trucks as well as passenger cars. Ensuring that all vehicles on Australian roads meet the same high level of safety.



Products

Mobileye 6 Series:

Mobileye 6 series is a forward collision avoidance system designed for any type of vehicle including passenger cars, trucks, light or heavy-duty vehicles.

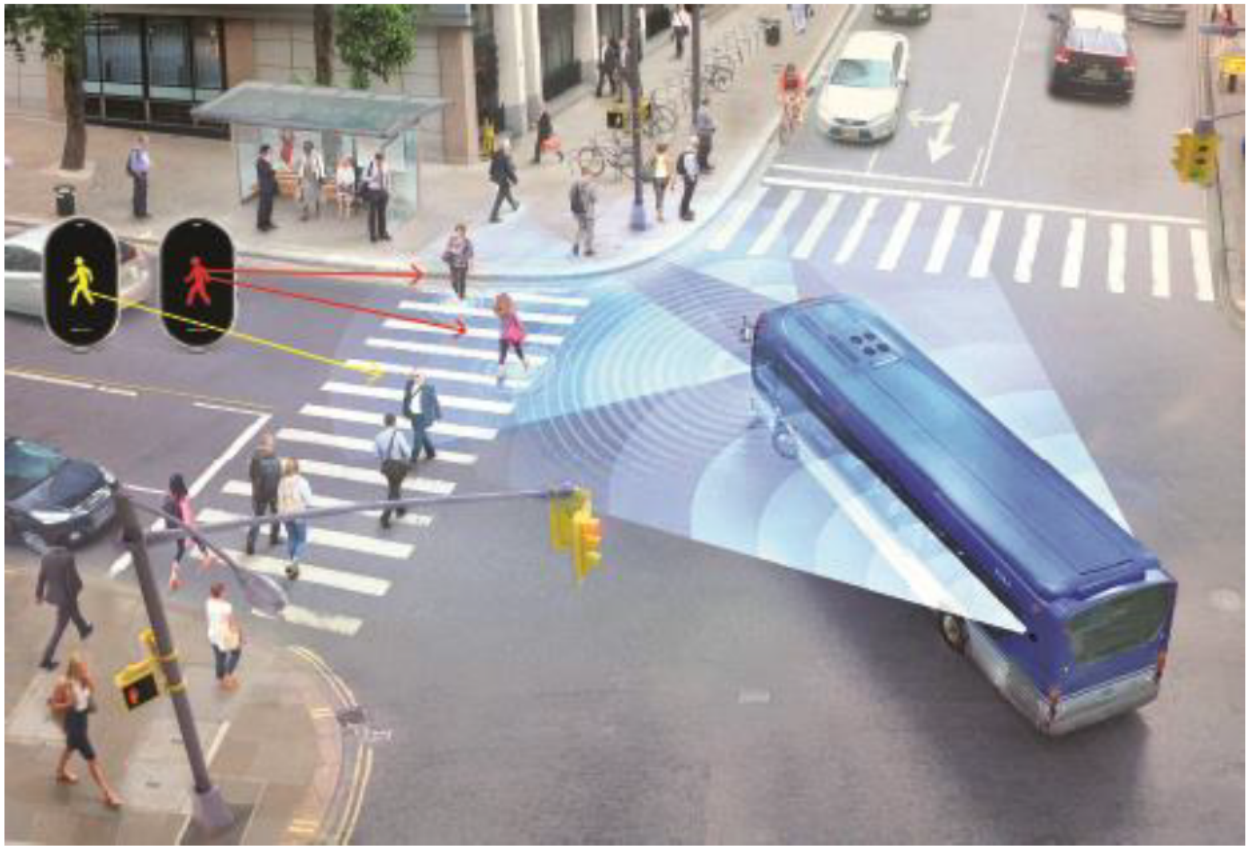
The Mobileye collision avoidance systems helps drivers by acting as a "third eye", constantly monitoring the road in front of the vehicle. It identifies potential dangerous situations and provides audio and visual alerts in real-time to assist the driver in preventing or mitigating a collision.

Key Features at a Glance:

	**Forward Collision Warning - FCW** FCW alerts you of an imminent collision with a vehicle or motorcycle ahead**, both on highways and in urban areas, up to 2.7 seconds before a collision**, allowing enough time to react.
	**Pedestrian & Cyclist Collision Warning - PCW** The PCW alerts you, during daylight, of an imminent collision with a pedestrian or cyclist, **up to 2 seconds before a collision** (under 50 kmh).
	**Lane Departure Warning -LDW** LDW alerts you with visual and audio warnings when there is an **unintentional deviation** from the driving lane.
	**Headway Monitoring Warning - HWM** HWM helps you keep a safe following driving distance from the vehicle ahead, and provides visual and audio alerts if the distance becomes unsafe.
	**Speed Limit Indicator & Traffic Sign Indicator – SLI/TSI** Mobileye recognizes certain traffic signs and speed limit signs (including electronic signs), and notifies you, both of the new speed limit and if you exceed it.

Mobileye Shield+™:

Mobileye Shield+™ is a collision avoidance system specifically designed to address the large blind spots, greater turning radii and other unique challenges that drivers of buses and heavy duty vehicles encounter daily on crowded city streets. Mobileye Shield+ consists of two to eight vision sensors that constantly monitor the road ahead of the bus as well as blind spots on both sides of the vehicle and by the A-pillar and left mirror.



Mobileye safety technology is powered by sophisticated machine learning and computer-vision algorithms that continuously analyze the driving environment to identify hazards including other vehicles, pedestrians, cyclists and motorcyclists. Upon detection of a hazard, Mobileye Shield+ tracks it, and when necessary, issues visual and audio alerts in real-time to assist the driver in avoiding, or at least mitigating, a collision.

A recent study of the Mobileye Shield+ technology in Washington State in the USA supports Mobileye's ability to reduce accidents and incidents versus a control group. "No Shield+ equipped bus were involved in any collisions with bicyclists or pedestrians."[6]

[6] https://orfe.princeton.edu/~alaink/SmartDrivingCars/PDFs/WSTIP_ActiveSafety-CollisionWarningPilot.pdf

Management of Heavy Vehicles

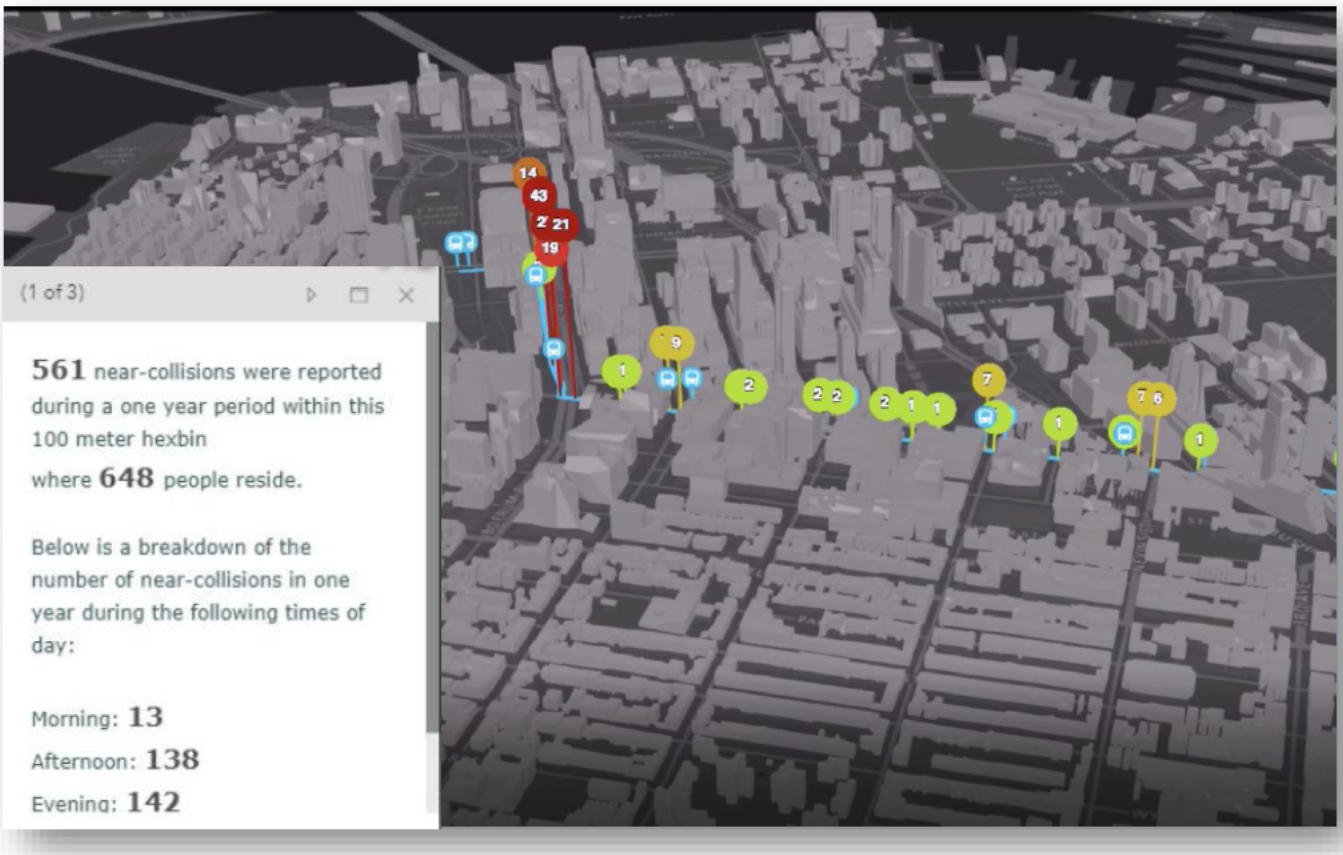
Managing a fleet is a demanding logistical challenge. Retrofitting your fleet with ADAS that integrates with FMS technology can help the operation run more smoothly while saving lives and costs.
Mobileye technology integrates with almost all telematics systems on the market. Furthermore, some FMS companies offer Mobileye as a value add to their FMS software.

Integrating Mobileye collision-avoidance technology with an FMS system allows for the following:

1. Driver warning monitoring;
2. Deeper understanding of driver behavior; and
3. 'Hot spot' mapping of high-warning zones providing valuable information for city infrastructure improvements.

Mapping capabilities for Smart Cities:

Mobileye Shield+ allows fleet managers and municipal decision-makers to access an online map displaying the hot spots (areas with a high number of warnings) on transit routes based on aggregated alert data. This valuable information can be leveraged for city infrastructure improvements.



Technology Minimizing Risks

Technology has always been at the forefront of safety and collision avoidance is no different.
When we get in our cars and buckle our seatbelts, or step onto a bus and hold the hand grip, we don't tend to think about the vast number of safety features protecting us. The development and enforcement of automotive safety features is often taken for granted. Some of us still remember when seatbelts or airbags weren't available, and even after their introduction were only optional.

The development and implementation of automotive safety features throughout the 20th century and to this day have without question helped to save countless lives.

As shown, human error is the leading cause of accidents. Early warning alerting the driver to an imminent collision can provide the time necessary for the driver to regain focus and react.

> *30% of crashes could be averted with Advanced Driver Assistance Systems, such as forward collision warning/mitigation, blind spot detection, and lane departure warning.*
>
> Boston Consulting Group, A Roadmap to Safer Driving Through Advanced Driver Assistance Systems, 2015.

> *Testing of approximately 300 buses with Mobileye collision avoidance systems by China's Ministry of Transport, Research Institute of Highway showed, that per 100 kilometers, drivers achieved reductions in forward collision warnings by 27%, lane departure warnings by 26% and headway monitoring warnings by 39%. Overall there was a 21-35% decrease in the average risk ratio of drivers.*
>
> Safe Car News, China: Mobileye and MoT release results of truck and bus ADAS tests

Regulation & Enforcement

The wide acceptance that collision avoidance technology is necessary in today's world is seen in the many regulations, mandates and subsidies provided by different countries and states. Here are some examples.

Location	Type	Type of vehicle	Description
China	Mandate	Long Distance Buses & Coaches	From April 2018, FCW and LDW will be mandatory for long distance buses and coaches.
Japan	Endorsement	Charted buses	Govt. has endorsed stickers to be used so the public knows that the bus they are boarding has LDW and AEB.
Singapore	Subsidy	Small & Medium enterprises	A subsidy of 70% was awarded to SMEs who purchase a complete safety system comprised of an FMS and Mobileye.
Taiwan	Subsidy & Mandate	Inner city buses and vehicles weighing more than 3.5T with more than 9 passengers	Govt. provides a 49% subsidy to any inner-city bus company that installs LDW and FCW. From January 2020, all new models of trucks weighing above 3.5T and/or buses carrying more than 9 passengers must be equipped with LDW and AEB.
Korea	Regulation & Mandate	Buses over 11m long and trucks over 20T	In July 2017, MOT announced LDW will be mandatory starting July 2017 for buses over 11 meters long and trucks over 20 tons. Vehicles without LDW will be fined after the end of 2019.
European Union	Regulation	Trucks & Buses	All new trucks and buses, from 2015, must have LDW & AEB
Belgium	Subsidy	All	Flemish MOT provides subsidy for collision–avoidance-technology equipped vehicles.
Israel	Tax Reduction Mandate	Passenger vehicles Heavy vehicles	Since 2013 vehicle importers have received an import tax reduction if vehicles include a collision avoidance system. Since 2016 all vehicles weighing 3.5 tons or more must install collision avoidance systems to pass their annual warranty checks. Since 2016 all vehicle advertisements must show a safety rating showing if the vehicle has higher end (collision avoidance) safety equipment.

Key Customers

ComfortDelGro, Australia:

- CDC Australia implemented Mobileye's collision avoidance system following successful adoption by sister company SBS Transit in Singapore who equipped Mobileye with 750 buses
- *"CDC is proud to be the largest bus company in Australia to adopt Mobileye."* –CDC Australia
- CDC official PR: click here

SAB Miller - ABInBev, Colombia & Peru:

- Completing a pilot of 180 units in Colombia, Sab Miller AB-InBev **reported a 70% reduction in collisions**. Following this they equipped their entire South American fleet with Mobileye technology.
- Transportes 77, one of SAB Miller's fleets operating in Peru installed Mobileye technology as part of their Responsible Driver Program, integrating Mobileye with an FMS system to collect data regarding driver behavior and potential collisions.
- *"Mobileye can be described as a cost reduction tool, as it prevents accidents that are costly and positively influences driver behavior, improves fuel consumption and keeps trucks on the road."* – Carlos Cucalon, Regional Manager for South America

Coca-Cola Hellenic Romania:

- After a successful 300-vehicle pilot where **no collisions** were recorded, Coca-Cola HBC installed Mobileye's CAS technology in more than 10,000 vehicles across Eastern Europe.
- In the 700 vehicles equipped in Romania alone a **65% reduction in traffic collisions per million kilometers driven** was reported.

Appendix:

Mobileye Series 6 brochure: https://drive.google.com/open?id=1GGoHtukpI6uwrmJQi1JUAqeIIfPMER3C

Mobileye Shield+ brochure: https://drive.google.com/open?id=16eZ4IIhG1qu2LbhyilsFtAr7Eqyybqwf

Mobileye Latest News: https://www.mobileye.com/en-uk/blog/

Contact Details

Jason Bloom

Regional Director for Southern Africa & Australasia

Mobileye, An Intel Company

Email: [redacted]

Tel: [redacted]