

# Mobileye

Driving technology towards a fully autonomous vehicle





*Mobileye are using Speedgoat products to help bring new technologies for Advanced Driver Assistance Systems, such as on-highway lane following, and collision warning, to mainstream production to improve safety and driver comfort.*

Mobileye are experts in computer vision. Since their founding in 1999, they have been developing leading edge Advanced Driver Assistance Systems (ADAS) technology with their EyeQ chip.

EyeQ was first introduced in 2004. It is now in its 3rd generation and is estimated to be integrated in approximately 5.2 million vehicles.

Since 2007 the company has offered a range of aftermarket vision-based ADAS systems. They currently offer lane departure warning, forward collision warning, headway monitoring and warning, low speed urban collision warning, intelligent headlamp control, speed limit indication (traffic sign recognition) and pedestrian collision warning.

In 2011 the company introduced the world's first OEM production vision-only Forward Collision Warning system.



*A MobileEye EyeQ2 chip used in a Hyundai Lane Guidance camera module*

## Technologies

Mobileye technologies provide accurate information about the location of other vehicles, pedestrians, lane markings, animals, traffic signs, traffic lights and more. From this information warnings, or even emergency braking commands, can be issued. Research has shown that if drivers brake just half a second earlier, 60% of forward collision accidents could be prevented.

As Mobileye use a single video camera, it is much cheaper to produce than other technologies, such as laser scanning, and therefore much more feasible for use in mass produced vehicles.

## On-highway driving

Although Mobileye predict that a fully autonomous vehicle is still 10 to 15 years away, they are now aiming to have on-highway automated driving systems in production vehicles by 2015.

In this scenario the system is able to automatically steer the vehicle and control its speed when the vehicle is on a highway. The driver would start driving as normal, and then whenever the vehicle is on a highway, engage the system to automatically control the vehicle. To switch lanes or exit the highway the driver would take back control for as long as is required, before re-engaging the automated system.

With this feature the driver can relax and enjoy autonomous driving for the majority of a typical highway journey.

## Development and Testing

To develop the new features required for autonomous driving, Mobileye are leveraging their existing EyeQ device to capture video information and send it over CAN to a Speedgoat Mobile real-time target machine.

The target machine is also connected via CAN to a gateway for receiving information from the vehicle, such as speed, steering feedback and yaw rate, and for sending commands to the vehicle.

The target machine runs a control module, designed in Simulink, to interpret the received data and issue steering and speed commands to the vehicle.

By connecting the target machine with a laptop running Simulink, control engineers can dynamically tune signal parameters during real-time runs, and rapidly improve the control design, to immediately experience how the vehicle reacts.

For longer tests the target machine is run in standalone mode and data is logged during test for analysis later in the office.

## Towards the fully autonomous vehicle

To reach their long term goal of a fully autonomous vehicle, Mobileye plan to expand their capabilities each year to provide more features and handle more situations such as complex junctions and more urban scenarios.

## Speedgoat's value contribution

"With the Speedgoat system, changing parameters and tuning the system is very easy and straightforward. It saves us a lot of time. There's no need to re-compile and burn each new version of the control algorithm." says Mr. Bagon.



*Eyal Bagon, Senior Director Production Software and Development Coordination, Mobileye*



*Mobileye 550*



## Mobileye

HQ: Jerusalem, Israel  
[www.mobileye.com](http://www.mobileye.com)

### Speedgoat products used

- Mobile real-time target machine with analog and digital I/O
- 2 x IO601 intelligent CAN modules with 2 isolated CAN ports each

### MathWorks software used

- MATLAB®
- Simulink®
- MATLAB Coder™
- Simulink Coder™
- Simulink Real-Time™

Learn more  
[www.speedgoat.ch/userstories](http://www.speedgoat.ch/userstories)

