



CEVA TECHNOLOGY
SYMPOSIUM SERIES

The Eyes of A Smart Car

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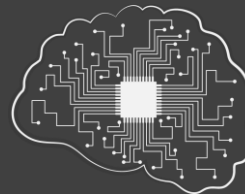


Global Leader in Vision Intelligence

10 billion devices shipped with ArcSoft Tech



20+ years dedication in vision intelligence



Global company, with distributed branches
in US, EU, CN, KR, JP



200+ world top-level vision experts



Products



Smart Phone

Single Camera Solutions
Dual Camera Solutions
Depth Camera Solutions
AR/VR Solutions



Smart Car

DSM
SVM
ADAS



Other Smart Products

Smart Refrigerator
Smart Retail
Smart Robot
Smart Sweeper
Smart Door
Smart AD
Smart Car Insurance
Live Broadcast



DSM

- Driver Identification
- Drowsy & Distraction Detection
- Dangerous Actions Detection
- Gesture Recognition

SVM

- 360° Stitching & View
- Park Assist
- Blind Spot Assist

ADAS

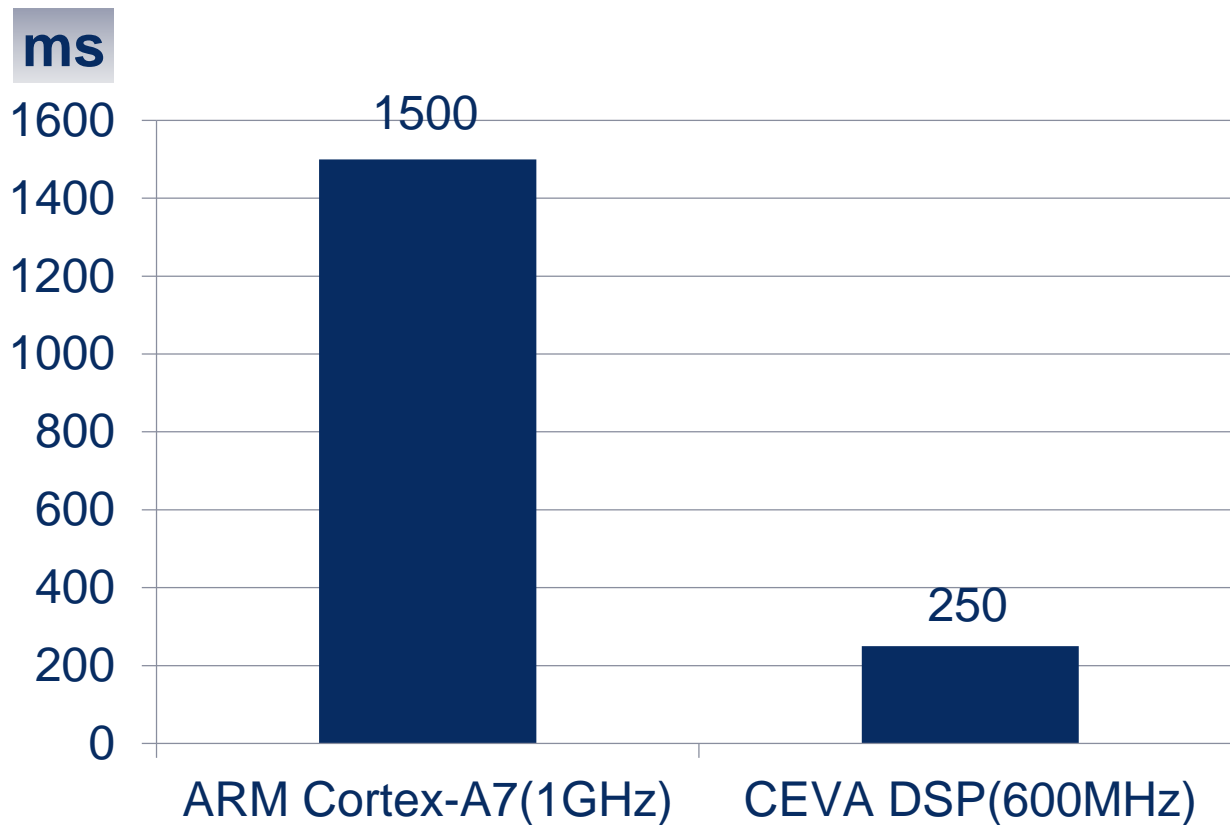
- LDW
- FCW
- PCW

The Eyes Looking At Driver

Driver Identification

- Verify the owner, and open the door
- Identify the driver for customized settings:
seat/mirror position, temperature, and infotainment preferences
- Checking attendance for transportation and car-renting company
- Analyze the driver's the driving behavior





6X

VGA

Gesture Interaction

- Control the music, volume, window, temperature, ..., by natural gestures
- Reduce the potential dangers of eyes off the road



Gesture Interaction

- Natural gesture to interact with car



Play/Pause



Volume Up



Volume Down



Next Song



Previous Song



Zoom In



Zoom Out

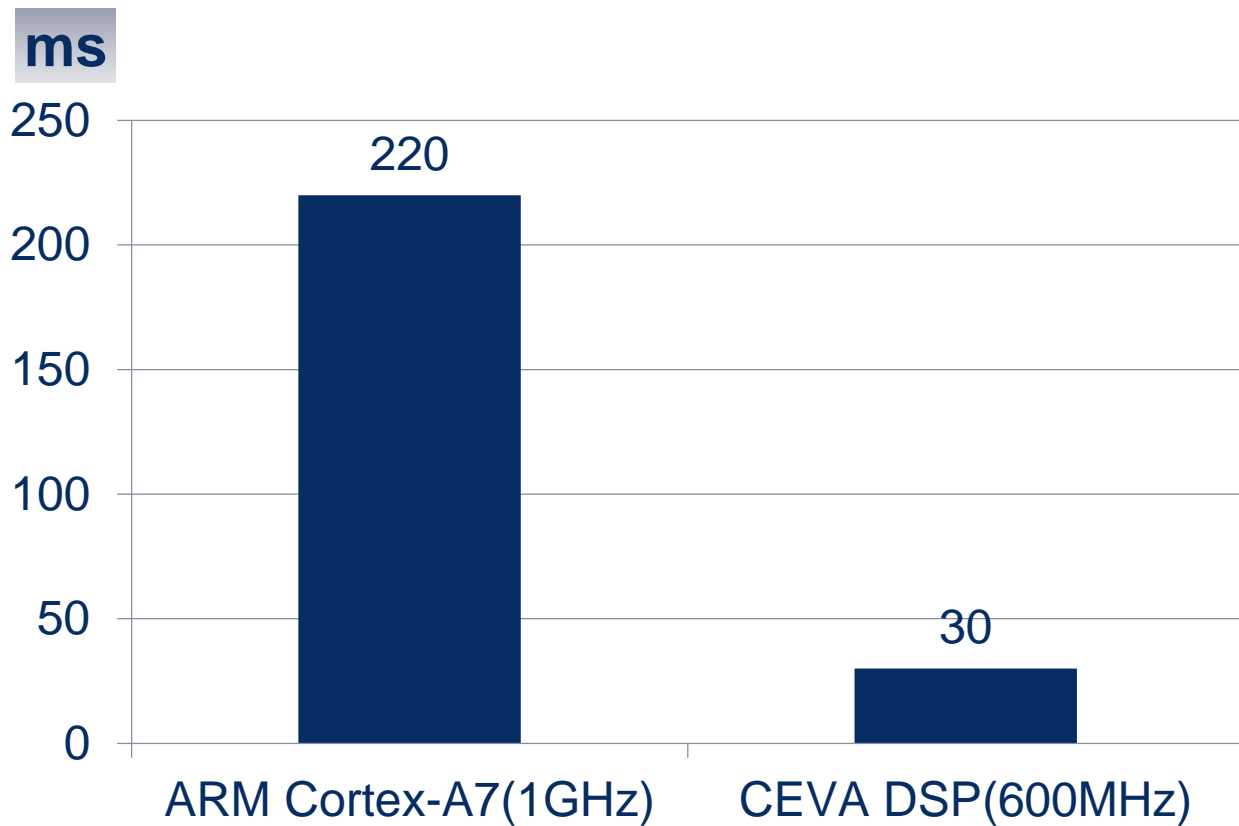


User Definition

Accept Call

Decline Call

Gesture Performance – DSP vs. CPU



VGA

Fatigue Detection

- Real-time fatigue detection
- Alert the driver while doze or yawn detected



Doze



Yawn

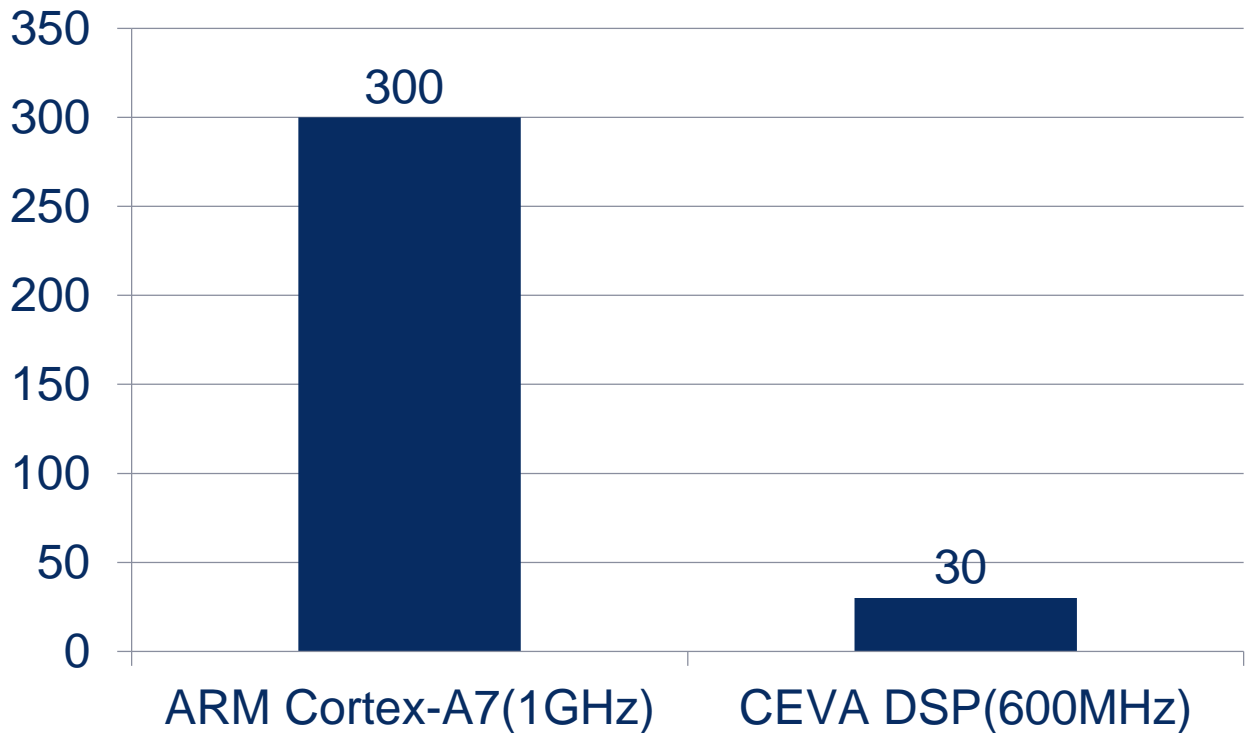
Distraction Detection

- Alert the driver while eyes off road, or other distraction behaviors such as:
looking for things in the drawer, playing phone, making up, ...
- High-accuracy and instant response



Fatigue&Distraction Performance – DSP vs. CPU

ms



10X

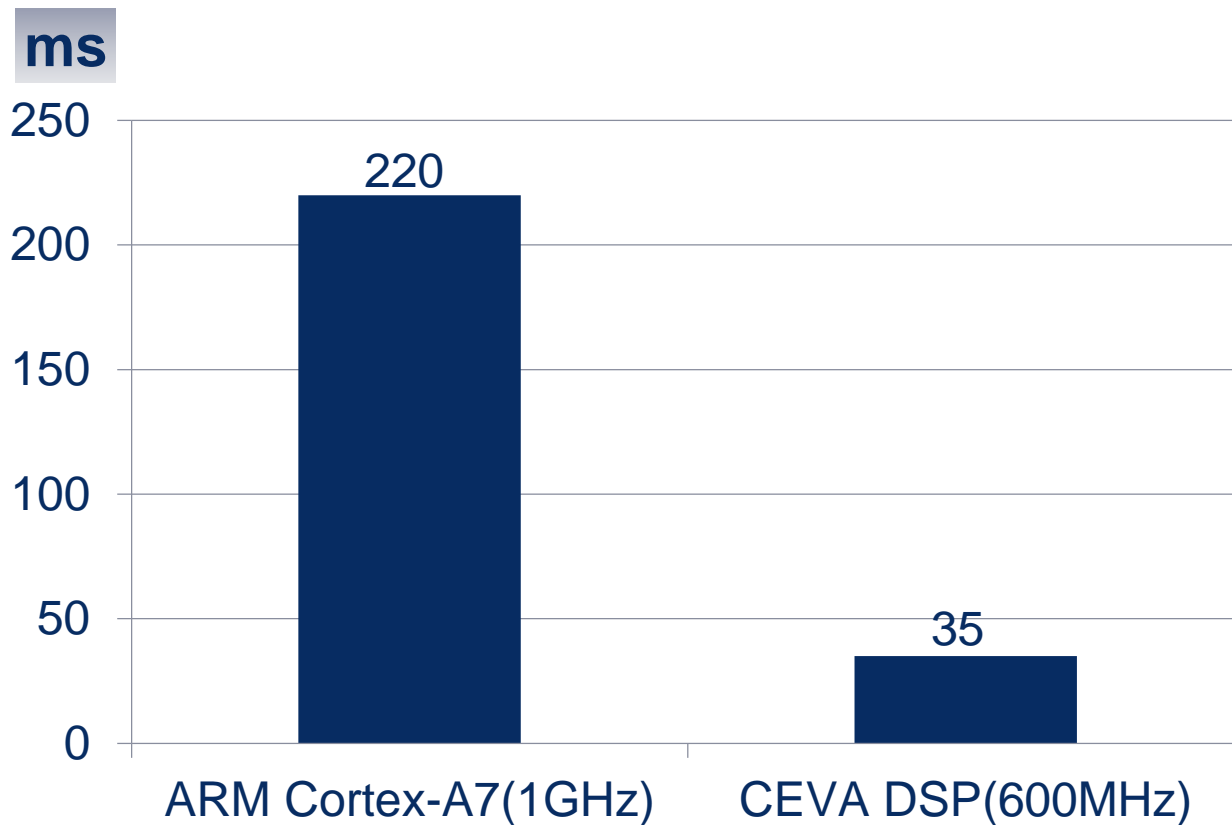
VGA

Dangerous Actions Detection

- Alert the driver while dangerous behaviors detected, such as: phone calls, smoking, drinking
- High-accuracy and instant response



Dangerous Actions Performance – DSP vs. CPU



VGA

The Eyes Looking Around

Distortion Correction & Seamless Stitching



Raw images



Image after
undistortion processing



Image after
fusion processing

HDR and Low-light Video Enhancements

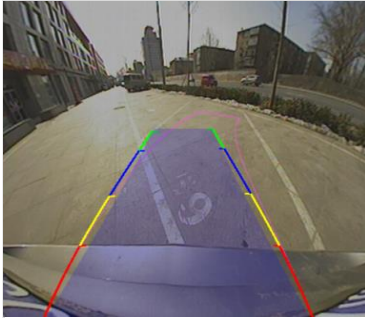


Original Image

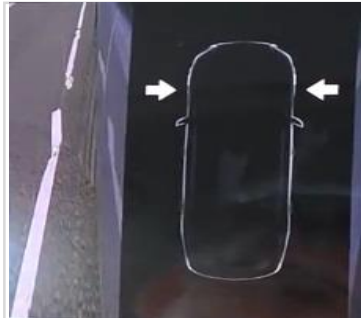


Enhanced Image

Multiple View Angles



Single View



Sides View



Corner View

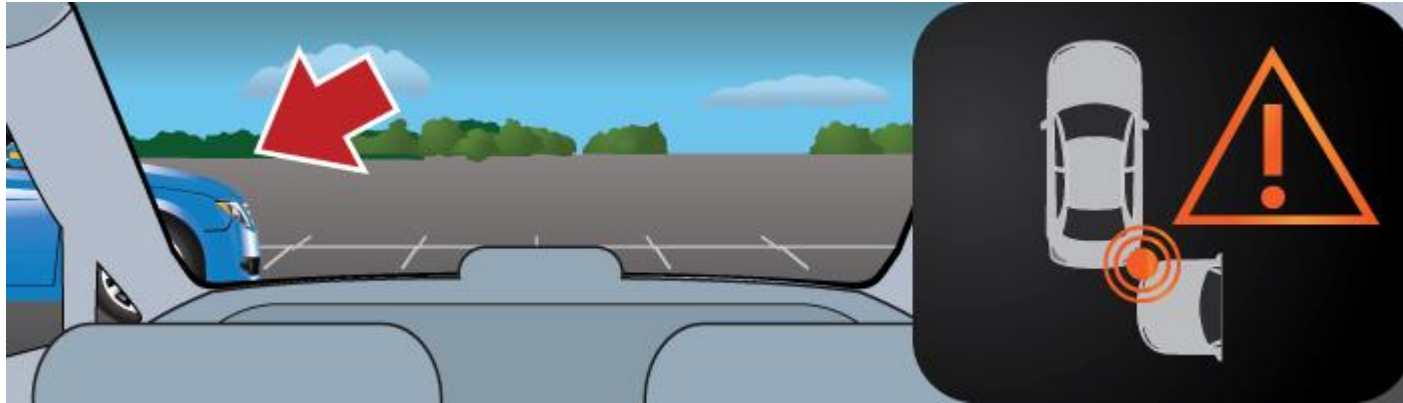


Top View



3D View

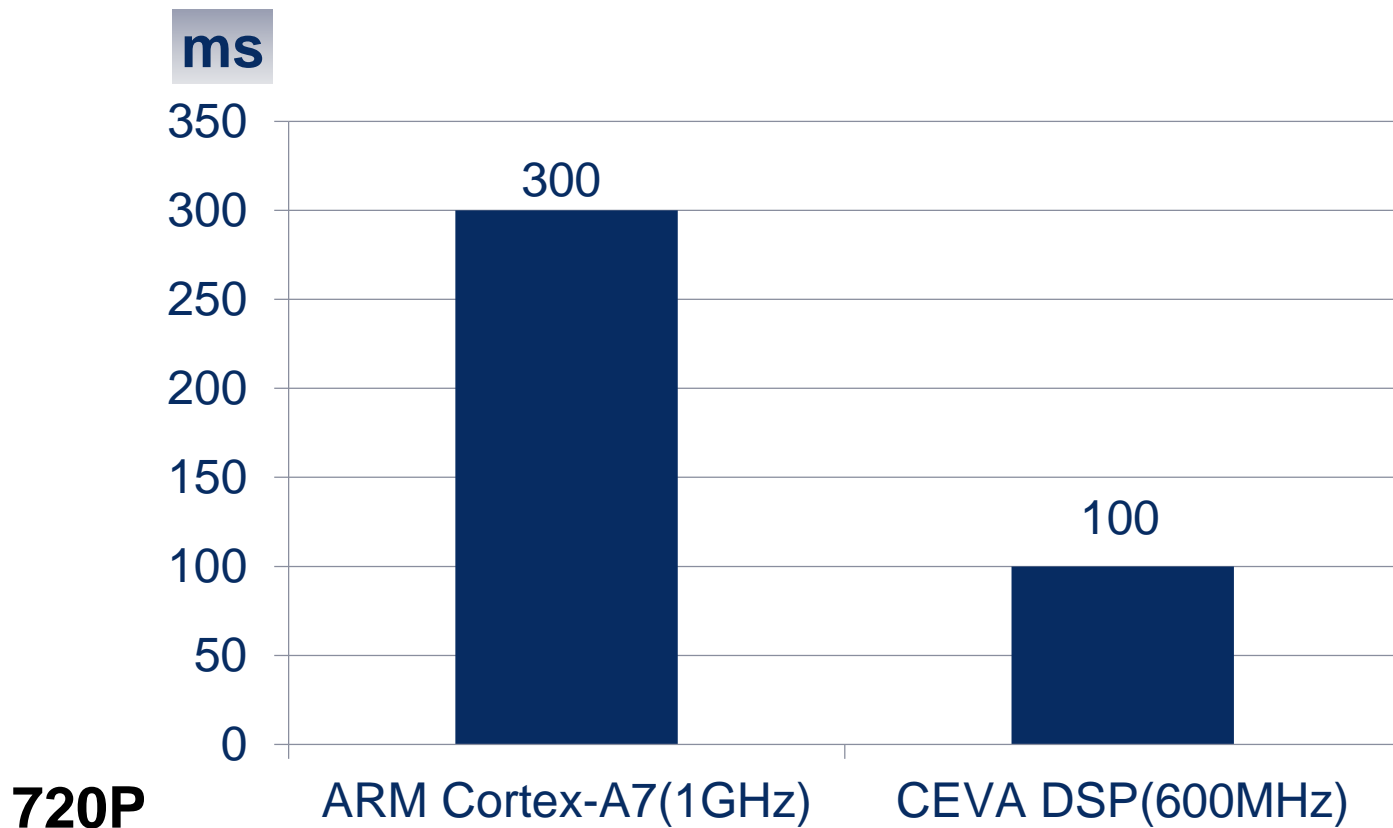
Cross Vehicle Detection



Surrounding Pedestrian Detection



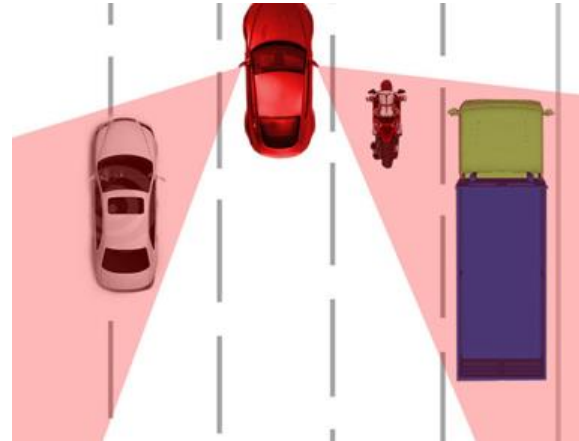
Pedestrian Detection Performance – DSP vs. CPU



3X

720P

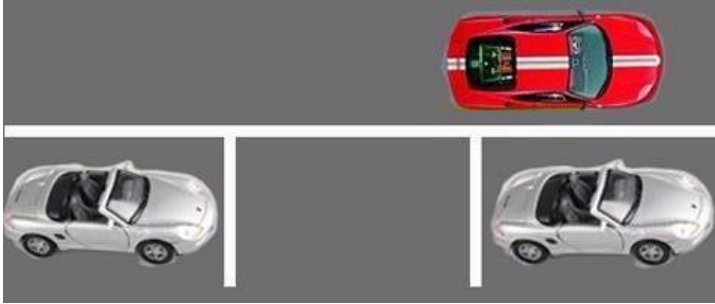
Moving Object Detection



Obstacle & Pit Detection



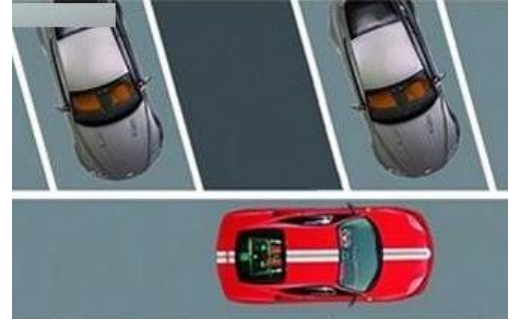
Parking Space Detection



Horizontal



Vertical



Diagonal

The Eyes Looking Forward

Front Vehicle Distance Detection



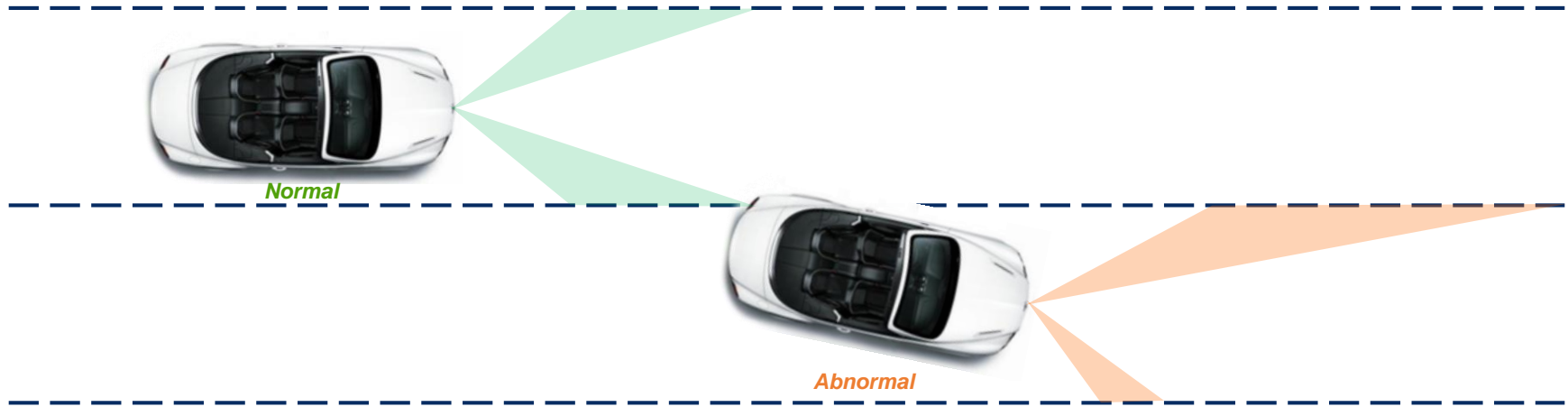
Front-collision Warning



Preceding Vehicle Starting Alert



Lane Departure Warning



Side Vehicle Entering Warning



Pedestrian Collision Warning



Traffic Sign Recognition



Customers



Thank You

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