Next Generation Eyesight® and Future Strategy

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Subaru EyeSight® - Introduction
Agenda

1. Subaru’s Safety Philosophy
2. Overview of EyeSight®
3. Pre-Collision Braking
4. Next Generation EyeSight ®
5. Current Status
6. Future Strategy
1. Subaru’s Safety Philosophy

“Zero Accidents by Automobiles”

Primary safety
- Field of vision designed for security
- Comfortable driving position
- User-friendly interface

Active safety
- Symmetrical AWD
- Low center of gravity
- Reassuring chassis

Progress in every aspect of Subaru All-Around Safety
Protecting the lives of all passengers and pedestrians

Pre-crash safety
- EyeSight (Significant enhancement toward automated driving)

Passive safety
- Protect passengers
- Protect pedestrians

2014 NHTSA TOP SAFETY PICK+
www.nhtsa.gov
EyeSight uses stereo camera to recognize pedestrians and bicycles, and provides object sensing and vehicle control.
1999-2001 Active Driving Assist
Stereo Camera System
Application of ADAS for the first time

2003-2005 ADA
Stereo Camera and Millimeter Wave Radar
Application of Sensor Fusion Technology to assist safe driving under all weather conditions

2008- EyeSight, 2010- EyeSight Ver.2
Eight Driver Assistance Functions with Stereo Camera System alone
AEB collision avoidance under 30 km/h
ACC up to 140km/h

2014 - EyeSight ® Ver.3
AEB collision avoidance under 50 km/h
ACC up to 180km/h
2. Overview of EyeSight®: Functions

- Improved object recognition accuracy
- Added steering assist control (Japan market)

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<th>Objective</th>
<th>Ver.2</th>
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<td>Collision avoidance damage mitigation</td>
<td>Pre-Collision Braking Control</td>
<td>Performance updated by Brake lamp recognition and (New) Rear-Collision Throttle Management - Japan market ONLY</td>
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<td>Driver workload reduction</td>
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<td>Preventive warning</td>
<td>Vehicle Distance Warning</td>
<td>(New) Hazard Avoidance Assist - Japan market ONLY</td>
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<td>Lane Departure Warning</td>
<td>(New) Active Lane keeping</td>
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<td>Lane Sway Warning</td>
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3. Pre-Collision Braking: Car to Car
3. Pre-collision Braking: Car to Pedestrian
3. Pre-collision Braking: **Car to Bicycle**
Survey of US Customers re Most common reasons for EyeSight® (v2) turning “OFF” (auto-deactivation):

- Low Sun Angle: 80%
- Heavy Precipitation: 44%
- Fog: 17%
• CMOS sensor reduced low sun angle issue
• Improve image processing for heavy precipitation
Brake lamp detection using distance image and color classification
Expanding Visible Range – Approximately 40% increase in visible distance and field of view
5. Status: Achievements

Highest Possible Rating from IIHS Forward Collision Prevention Test Program and meets NHTSA NCAP criteria

source: iihs.org

source: safercar.gov
6. Future Strategy: Roadmap

Focused on stereo camera technology development for autonomous driving

Human control

System control

Driver assist
Expanded assist range
Limited autonomous driving (on expressway)
Expanded autonomous driving (on expressway)

Advanced level

EyeSight

EyeSight Ver.2

EyeSight Ver.3

Future EyeSight 202X

ADA

Forward Vehicle Collision Warning
Lane Departure Warning
Adaptive Cruise Control

Collision Avoidance Brake
Lane Departure Warning
Full Speed Range ACC

Steering Assist Control
Collision Avoidance Brake
Full Speed Range ACC

Autonomous Driving on Expressways
All-Around Collision Avoidance Assist

2010
202X

Limited autonomous driving (on expressway)
6. Future Strategy: Approach

1. Improving the performance of Collision Avoidance
   • Target: Night, Intersections, Vulnerable Road Users
   • Lateral control for collision avoidance

2. Autonomous Driving
   • Focus on advanced driver assistance on highway
6. Future Strategy: **360-degree safety**

Subaru aims to expand the sensing range to 360 degrees.
Potential areas for consideration to improve safety

- Provide supplemental information, e.g. non-DSRC equipped vehicles, pedestrians at intersections.
- Provide real-time and accurate information of traffic lights, e.g. Red Light Traffic Violation Warning application.
- Accurate location information, e.g. RSE sends location information about traffic signals, intersections, and stop line, in addition to information about lane restrictions.
- Maintain clear lane markings, pot holes, etc.


Thank You