Identifying State-specific Distracted Driving Target Group

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Agenda

- Distracted Driving Projects:
  1. **Hands on Wheel, Eyes on Road Campaign**
  2. **Investigating the Impact of Distracted Driving among Different Socio-Demographic Groups**
  3. **A Machine Learning Model for Driving Distraction Detection**
  4. **Identifying State-specific Distracted Driving Target Group**
  5. **Educating the Public about Distracted Driving and Evaluating Distraction-Preventing Technologies**

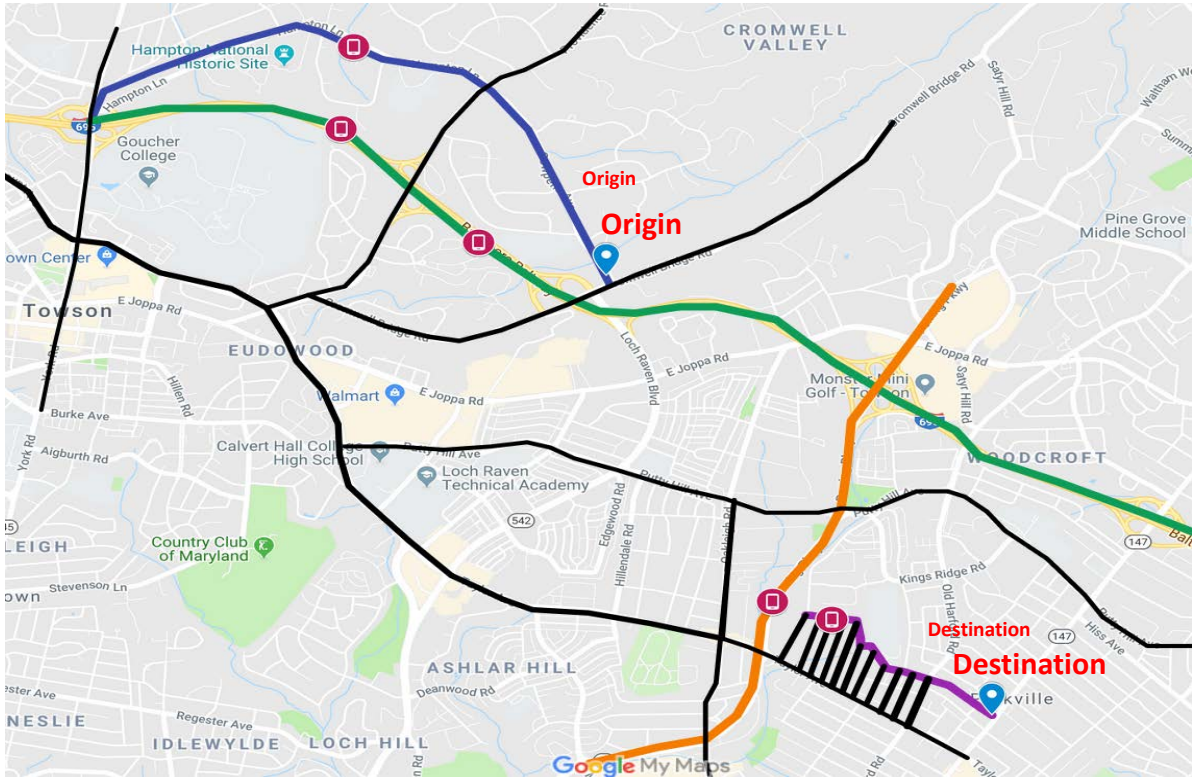
MORGAN STATE UNIVERSITY
THE NATIONAL TRANSPORTATION CENTER

SABA

Distracted Driving

- 94 participants
- Pre-survey, post- survey, simulator, eye-tracker

Study Area



Machine Learning

Scenarios	Calibration Results			Validation Accuracy	Classifier
	Correctly classified instances	Incorrectly classified instances	Percent Correct		
No Distraction vs Hands-free call	69	13	84%	81%	Lazy IBk
No Distraction vs Hand-held call	66	20	77%	70%	Voted Perceptron
No Distraction vs Voice to text	81	7	92%	71%	Random Forrest
No Distraction vs Texting	58	20	74%	70%	J48 (decision tree)
No Distraction vs Taking on/off clothes	56	7	89%	88%	Vote
No Distraction vs Eating/Drinking	48	14	77%	88%	Lazy Kstar

Identifying State-Specific Distracted Driving Target Group (DD4)

What we have done

❖ Introduction

❖ Problem Statement

1. We do not know who gets distracted.
2. We do not know what is the most distracted driving technologies.

❖ Goals: Investigating distracted drivers in Maryland.

1. Find the socio-demographic and target group of distracted drivers in each distraction type in Maryland.
2. Understand what kind of devices, technologies, and behaviors distract drivers the most in Maryland.

Data and Methodology

- For this study, **158** people were recruited from Maryland.

- This questionnaire is a stated preference survey. The survey was implemented using the online platform, Qualtrics.

- The questionnaire consists of four sections:

1- Basic information about the drivers (including gender, age, income, education level, family size, driving frequency, and employment).

2- Respondents' driving behavior and the types of devices and technologies they use while driving.

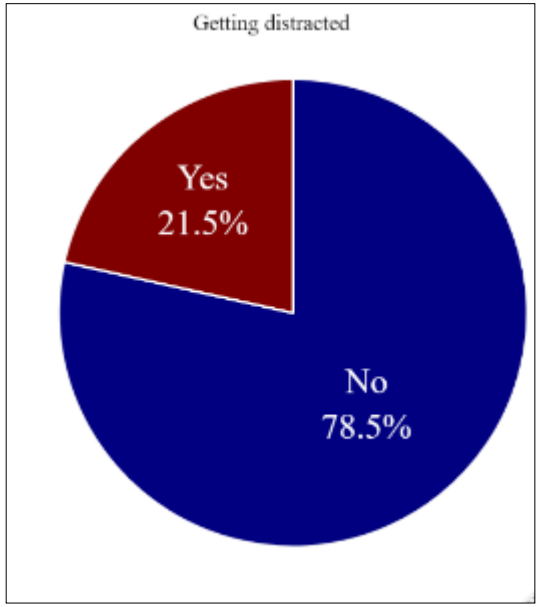
3- Drivers who had experienced a crash due to distraction in the last two years to investigate the cause of their distraction.

4. Before and During the covid Experience. Because the data collected during the pandemic are not comparable to the data of previous years, all the questions were asked of the respondents before (from 3/1/2019 to 3/1/2020) and after (3/1/2020 to 3/1/2021) the pandemic to compare the changes in drivers' behavior before and after the pandemic.

Data and Methodology

Socio-Demographic Information of Distracted Drivers

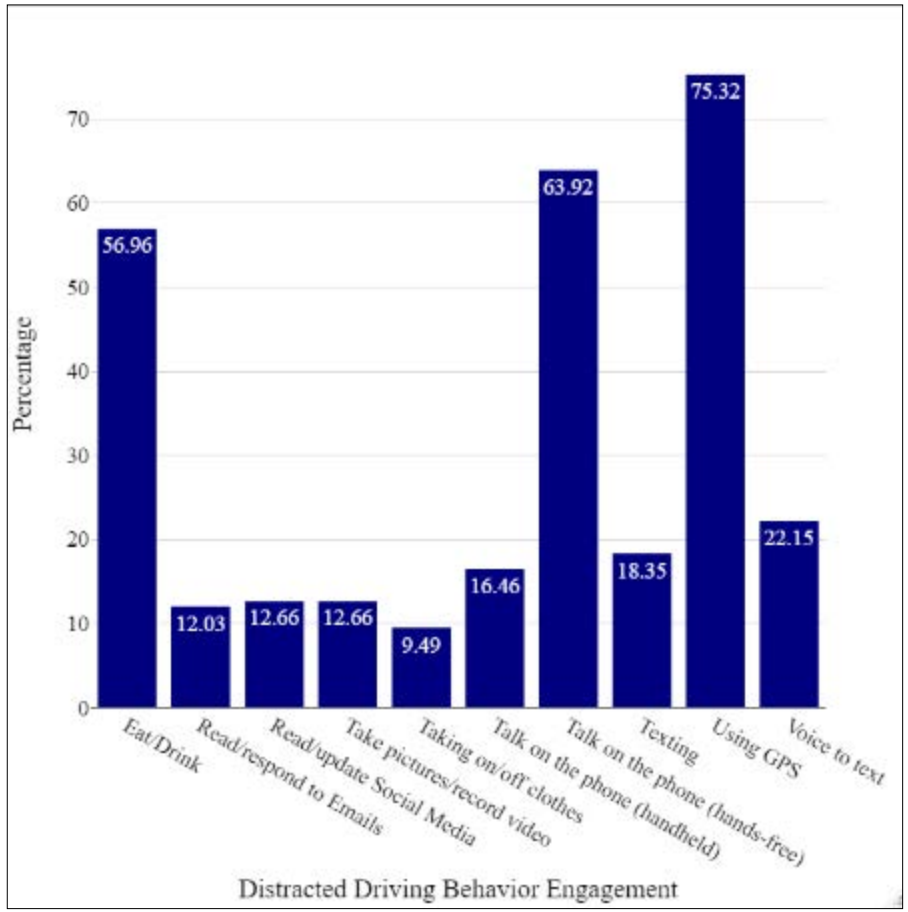
- The respondents were asked whether they usually get distracted while driving, and **21.5%** of them answered affirmatively.
- Self-reported distractions among **females** are higher than among males.
- Those between **16 to 19** and **20 to 34** were more distracted.
- Those with incomes between **$120,000 to $159,999** and **more than $160,000** had the highest distraction while driving.
- Participants who had **more children** in the household were more distracted.



Analyses and Results

Responses and Behaviors of Drivers

The most common behaviors among all drivers were using GPS and talking on the phone (hands-free)



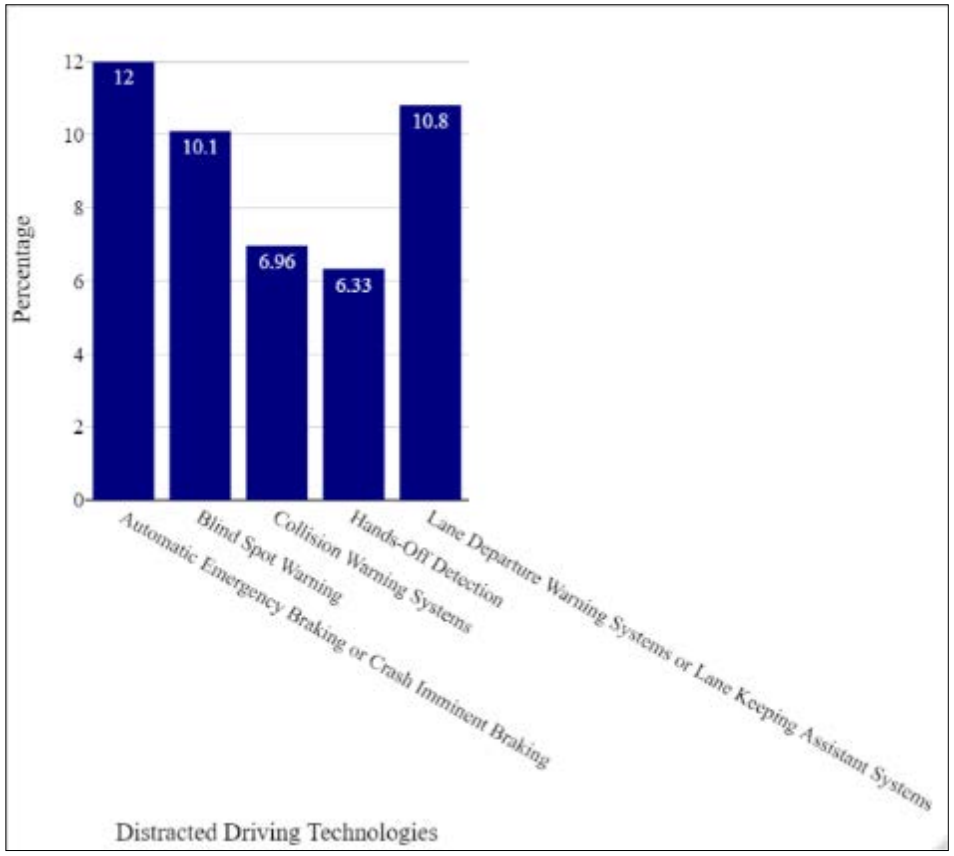
- Only 6% set their phone to automatic messaging while driving,

- The most popular restricted driving apps used by participants are Do Not Disturb While Driving on the phone's setting, T-Mobile Drive Smart, and AT&T ICW.

Analyses and Results

Responses and Behaviors of Drivers

Hands-off detection has the least amount of distraction, and automatic emergency braking or crash imminent braking has the greatest amount of distraction among all five car technologies.



Most of the participants (almost 50% for each category) answered “my car does not have this technology.”

Analyses and Results

Responses and Behaviors of Drivers

- 11.39% of respondents said they had been involved in at least one crash due to distraction, or at least one near-crash experience (12.03%) due to using a cell phone while driving.

- The most frequent types of crashes due to distraction were **left turns** and **rear end** collisions.

- Among all the aggressive behaviors while driving, **driving well over speed limit** and **swearing under one's breath** were repeated more than other behaviors.

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Analyses and Results

Gender and Age as a Factor in Distraction

- **Females** engage more in using hands-free cell phone, texting, voice to text, taking pictures/recording video, using GPS, eating, or drinking while driving than males.
- **Males** engage more in reading or updating social media, reading, or responding to emails, and taking on or off clothes.
- The most common distracted driving behaviors among older drivers (more than 65) are **talk on the phone (hands-free)**, **using GPS** and **eating and drinking.**
- The risk of having a near-crash experience due to using a cell phone while driving was higher in **males** than females, and those between **16 to 19** among distracted drivers.
- When it comes to all types of car technology, **males** and those between **20 to 34** were distracted more than other groups

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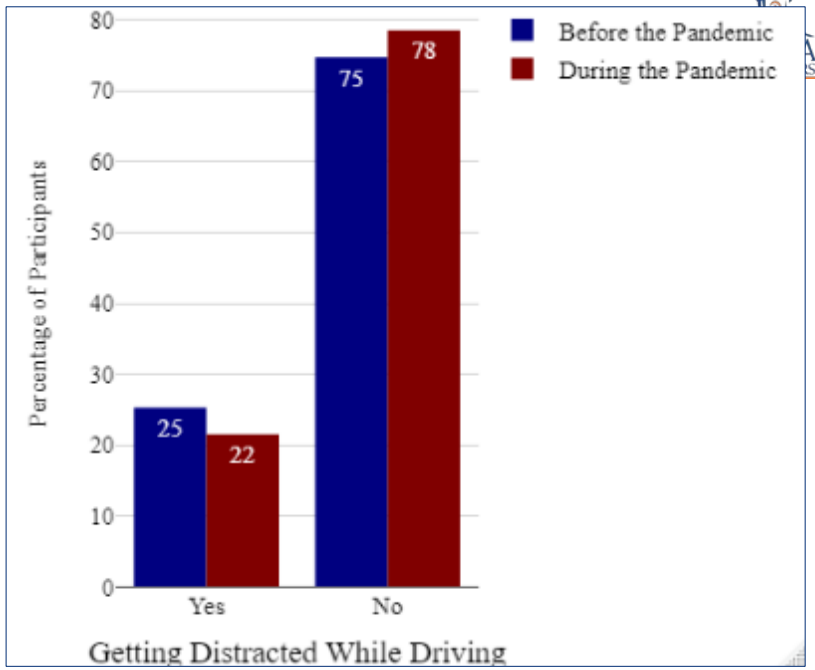
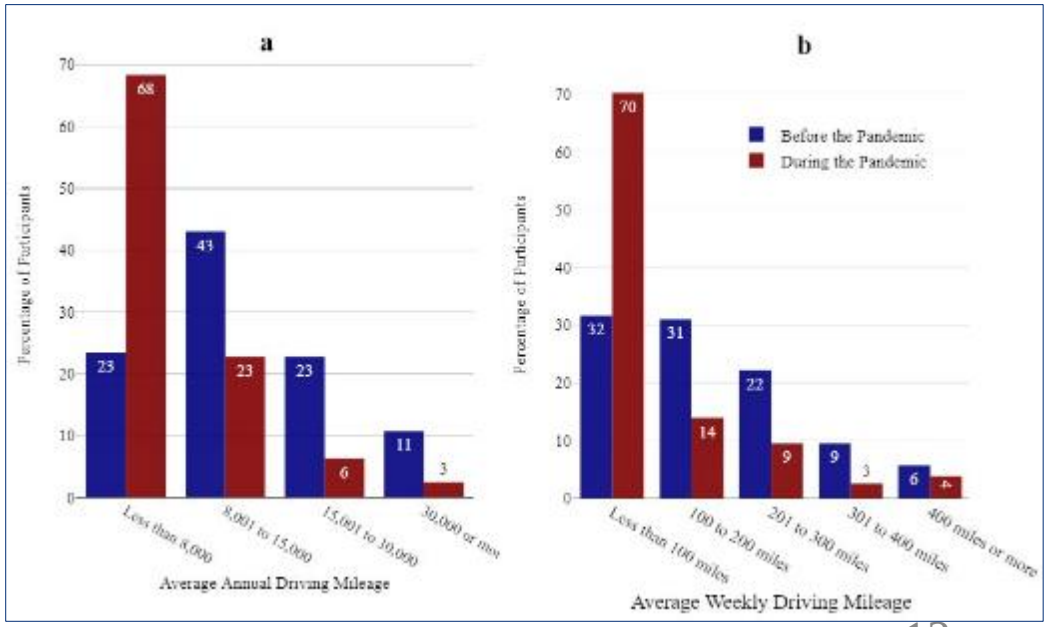
Analyses and Results

Changes Before and During the COVID-19 Pandemic

- Because the data collected during the pandemic are not comparable to the data of previous years, all the questions were asked of the respondents **before (from 3/1/2019 to 3/1/2020) and during (3/1/2020 to 3/1/2021) the pandemic** to compare the changes in drivers' behavior before and during the pandemic.



- The distracted driving rate decreased more than 3% during the pandemic, from 25.3% to 21.5%.
- Before the pandemic, 55% of participants drove every day; however, after the pandemic that dropped sharply to 11%.
- Hands-free cell phone use while driving dropped by 5%.
- Having at least one crash due to distraction dropped significantly (23%) from before pandemic to during the pandemic.



Analyses and Results

Distracted Driving Models Results

Teenagers engage more times in distracted driving behaviors (such as texting, using handheld cell phone, reading, or updating social media, etc.) than other age groups. The most common distracted driving behaviors among older drivers (more than 65) are talking on the phone (hands-free), using GPS and eating and drinking. Handheld cell phone can cause the most distraction. Using a handheld cell phone while driving increases the probability of near-crashes by 7.6 times and distraction by 13 times. Also, using voice to text while driving increases the probability of distraction by 6.49 times.

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Fact Sheets

Research Fact Sheet

Research project:

Identifying State-Specific Distracted Driving Target Group

What's the issue?

Distracted driving is one of several significant factors contributing to crashes and causes of death. In 2019, some 3,142 people were killed by distracted driving in the United States. Moreover, an average of 181 people were killed each year in Maryland due to distracted driving from 2015 to 2019. To have effective countermeasures, the characteristics of distracted drivers and the technologies that distract drivers must be identified.

What did the research discover?

Researchers developed a survey in the state of Maryland to find out who gets distracted the most and what is the most distracted driving behavior. They found that teenagers (16 to 19 years old) get distracted the most among all age groups. Teenagers engage more times in distracted driving behaviors (such as texting, using handheld cell phone, reading, or updating social media, etc.) than other age groups. The most common distracted driving behaviors among older drivers (more than 65) are talking on the phone (hands-free), using GPS and eating and drinking. Handheld cell phone can cause the most distraction. Using a handheld cell phone while driving increases the probability of near-crashes by 7.6 and distraction by 13 times. Also, using voice to text while driving increases the probability of distraction by 6.49 times.

How can I implement this?

Set your phone to automatic messaging while driving. Use feature on their phone that restricts using it while driving (such as Do Not Disturb While Driving on the phone's setting, T-Mobile Drive Smart, AT&T ICW, etc.).

Learn more:

The full report is available on our website:
https://www2.morgan.edu/school_of_engineering/research_centers/urban_mobility_and_equity_center/research/completed_research.html

Research Fact Sheet

Research project:

Investigating Distracted Driving Behavior During the COVID-19 Pandemic

What's the issue?

The global outbreak of COVID-19 has brought many modes of transportation to a halt, with major implications for all forms of transportation. Our transportation networks and systems started to look very different as we went through this crisis: very few cars on the road, empty lines at airports, clean air, very little noise, and so on. The COVID-19 pandemic caused a significant shift in people's travel behaviors and distraction while driving. The statewide statistics indicates that during the pandemic (2020), total crashes and injuries due to distraction decreased, however, fatality due to distracted driving increased. Knowing what else has been affected during the COVID-19 and the effect of the pandemic on driving behavior is critical.

What did the research discover?

The statewide statistics indicates that during the COVID-19 pandemic (2020), the total number of injured and total crashes due to distraction decreased which is the same as the result of this study, however, the fatalities due to distraction increased. Researchers developed a survey in the state of Maryland to find out who gets distracted the most and what is the most distracted driving behavior before and during the COVID-19 pandemic. They found that the results are aligned with the statewide statistics which indicate that distracted driving crashes dropped in 2020 during the pandemic. the distracted driving rate decreased more than 3% during the pandemic. The respondents' daily trips have significantly decreased, about 44% below pre-pandemic rates. The findings show that hands-free cell phone use while driving dropped by 5% (from 68% to 63% of users) during the COVID-19 pandemic. Also, the results show that aggressive behavior – including swearing under one's breath, driving over the speed limit, using the horn when annoyed, failing to signal, tailgating, weaving in or out traffic, failing to stop at stop sign, and speeding up to get through light– decreased during the pandemic.

Learn more:

The full report is available on our website:
https://www2.morgan.edu/school_of_engineering/research_centers/urban_mobility_and_equity_center/research/completed_research.html

Educating the Public about Distracted Driving and Evaluating Distraction-Prevention Technologies

❖ Introduction

❖ Problem Statement

1. Most drivers are not aware of different aspects of distracted driving's consequences.
2. Despite advancing different technologies to prevent drivers from getting distracted, the efficiency of these new technologies has never been evaluated.

❖ **Goals:** Reduce the number of crashes due to distracted driving by educating Maryland drivers and evaluating different available technologies.

1. First Objective: Educate drivers through different methods (including fact sheet and webinar)
2. Second Objective: Evaluate different technologies that can prevent drivers from distraction

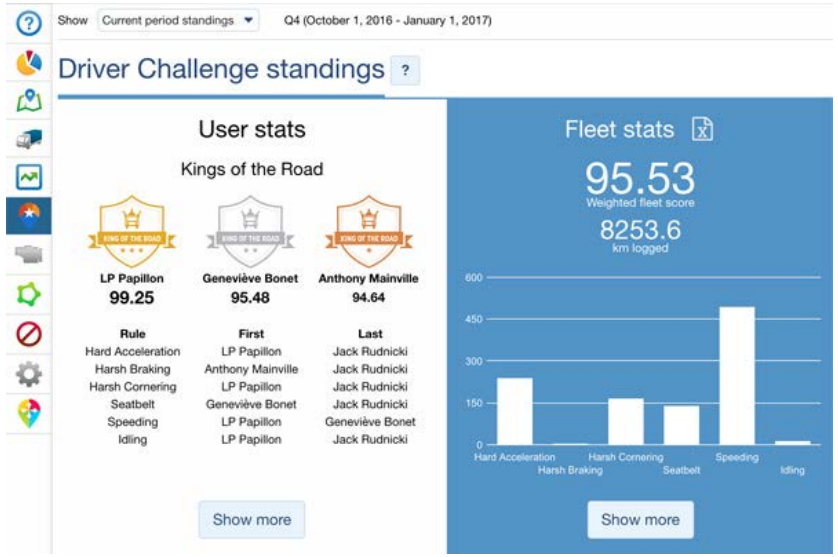
1. Distracted Driving Prevention Technology

1.1. Cell Phone Blocking Apps

1.2. Plug-in Devices

1.3. Distraction Detection Cameras

1.4. Driver Coaching



2. Safety Technologies for Distracted Drivers

2.1. Head Up Display

2.2. Lane-Departure Warning Systems

2.3. Lane-Keeping Assist

2.4. Forward-Collision Warning

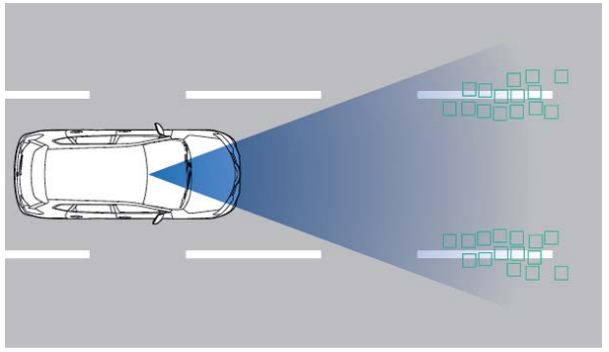
2.5. Automatic Braking Systems

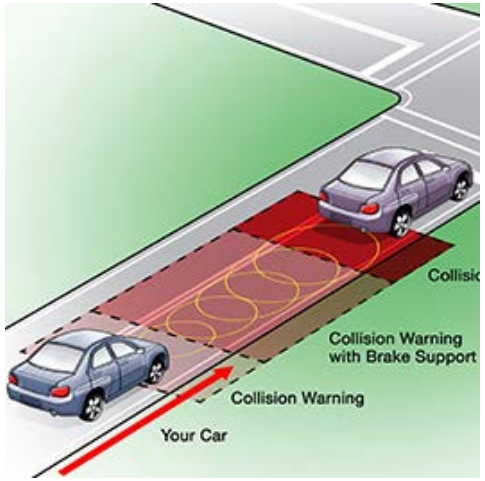
2.6. Adaptive Cruise Control

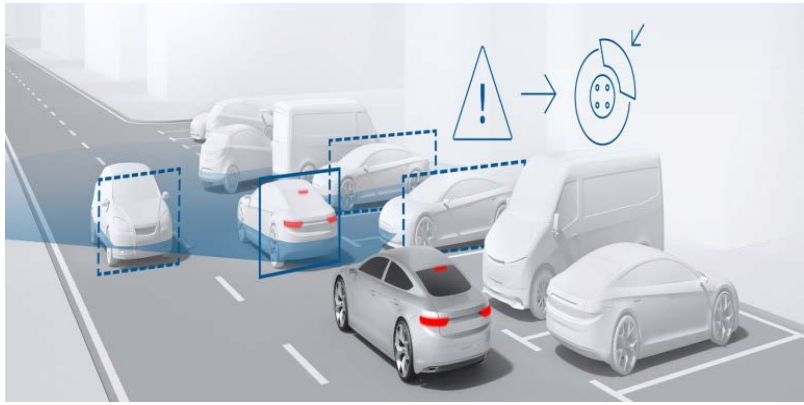
2.7. Rear Cross-Traffic Alert

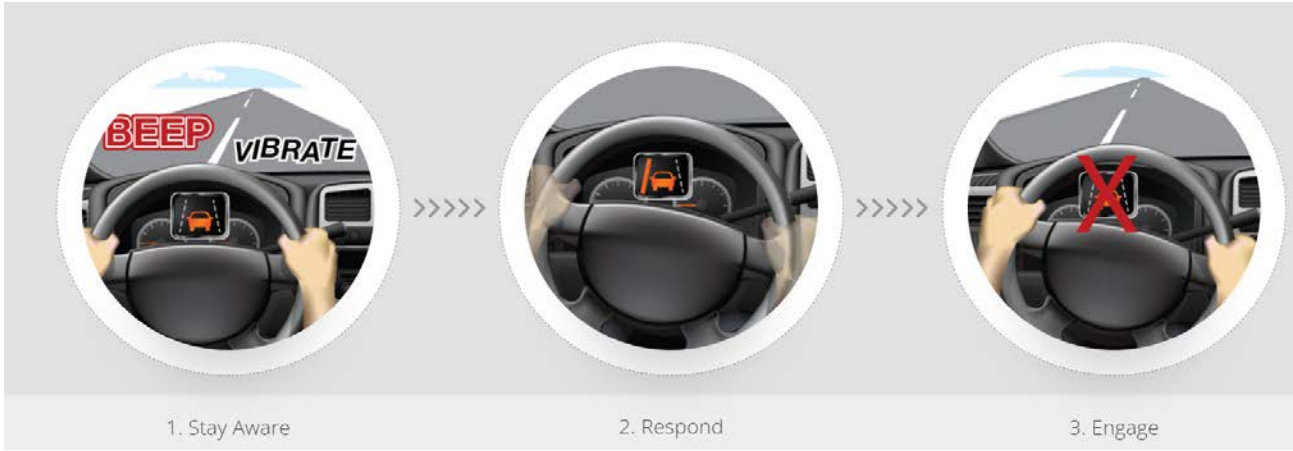
2.8. Driver Monitoring Systems

2.9. Blind Spot Warning









Thank you for your attention!