

In the Driver's Seat

A guide to vehicle safety technology.



Technology may make driving safer

New technologies are responsible for many of the advances, comforts and conveniences of modern life, from the smartphone to wearable items such as wristwatches and eyeglasses. And new technology is even helping us to drive our cars more safely.

Today's vehicle safety features are far more technologically sophisticated than last century's seatbelts and airbags. Let's take a closer look at – and get a deeper understanding of vehicle safety technology and how it can benefit you as a driver.

Before we do, here's a quick glance into the past. In 1948, the Tucker Model 48 automobile featured a third, center-mounted headlight – what might now be called an “adaptive headlight” – that turned with the front wheels to help drivers see better at night.* Unfortunately, the company went out of business in 1949. The idea, however, lived on to become part of 21st century vehicle technology. Back to the future, indeed!

Today's newest cars have features such as back-up cameras, smart headlights and collision avoidance features, among others, which work to keep drivers and passengers safe on the road. This guide is designed to help you learn more about these features and to provide information for discussion with your dealer if you're buying or leasing a new car. Plus, you can use this information when you might need to borrow or rent a car. This guide will help you understand and use vehicle safety technology while you are in the driver's seat.

Drawing on more than a decade of research focused on promoting safe driving for a lifetime, The Hartford's gerontology team and the MIT AgeLab have been exploring the role of vehicle safety technologies in keeping mature drivers safe on the road. In a series of studies, we have gathered valuable insights from experts and consumers alike to help drivers as they age stay confident and safe behind the wheel.

“I like the back-up camera because of my grandchildren ... when I'm pulling out of the garage, even with the doors open, they sometimes manage to come behind the car...”

– Research participant

* Source: Smithsonian, 2004
http://www.si.edu/encyclopedia_si/nmah/tucker.htm

Safe driving for a lifetime

For most people in the U.S., including most mature adults, driving is their primary mode of transportation¹. As we age our bodies experience changes – and some of these may affect the driving experience. Examples of normal age-related changes that can impact drivers include:

- Declining night and peripheral vision
- Greater susceptibility to glare
- Reduced strength and reflexes
- Changes in flexibility and coordination

In particular, flexibility and range of motion are necessary for critical driving maneuvers such as yielding, merging, changing lanes and making turns². Most of us adjust to these changes gradually and compensate in how we drive in order to stay safe on the road. However, the types of crashes that mature drivers typically experience are often related to these types of maneuvers.

In our research³ with the MIT AgeLab, drivers age 50+ told us that normal age-related changes were among their concerns around driving. Mature drivers indicated that the physical aspects that were most challenging for them were:

- Turning their head and body to look behind when backing up (41%)
- Getting in and out of the car (22%)
- Turning their head to see blind spots when changing lanes (19%)

Many of the vehicle technologies available today can help to compensate for some of these physical changes and thus enhance driving safety.



“As I age, I find it harder to turn my head when backing up – and I can’t hear normal sounds as clear as before. I would need many of these technologies to remain a safe driver.”

– Research participant

¹ Passenger Travel Facts and Figures 2015, Bureau of Transportation Statistics, USDOT, https://www.bts.gov/sites/bts.dot.gov/files/2025-03/TSAR-2024_dot_79039_DSI.pdf

² Lundahl, K., Frisk, E., Nielsen, L., (2017), Implications of path tolerance and path characteristics on critical vehicle manoeuvres, Vehicle System Dynamics, 55(12), 1909-1945. <https://doi.org/10.1080/00423114.2017.1339891>

³ Top Technologies for Mature Drivers: Consumer Insights 2013

Top technology – What do the experts say?

During earlier research⁴ with the MIT AgeLab, we worked with an international panel of experts in driving, aging and technology to identify the top technologies that enhance safety for mature drivers. This research was conducted to learn more about which vehicle technologies could most benefit mature drivers. This is important, because while many of today's technology features can enhance the driving experience – especially as people age – each technology may not have the same impact on safety. The following ranking is based on an extensive review of vehicle technologies by our expert panel.

- 1 **Smart headlights (also known as adaptive headlights)** adjust the range and intensity of light based on traffic distance to reduce glare, improve night vision and may pivot as the vehicle turns corners.
- 2 **Emergency response systems** offer quick assistance to drivers in case of a medical emergency or collision, often allowing emergency personnel to get to the scene more quickly.
- 3 **Back-up cameras (also known as reverse monitoring systems)** warn of objects to the rear of a vehicle, helping drivers judge distances and back up safely. In addition, the systems help drivers with reduced flexibility.
- 4 **Blind-spot warning systems** warn drivers of objects in blind spots, especially when changing lanes and parking. These systems also help people with a limited range of motion.
- 5 **Lane departure warning systems** monitor vehicle position and warn the driver if a vehicle travels outside its lane. This technology helps drivers to stay safely in their own lane.
- 6 **Vehicle stability control** helps to automatically bring a vehicle back into the driver's intended line of travel, particularly in situations where the driver underestimates the angle of a curve or experiences weather effects. In general, this technology reduces the likelihood of a crash.
- 7 **Assistive parking systems** enable vehicles to park on their own or indicate distance to objects, reducing driver stress, making parking easier and increasing the number of places where a driver can park.
- 8 **Voice-activated systems** allow drivers to access car features by voice command, so they can stay focused on the road ahead.
- 9 **Crash mitigation systems (also known as collision avoidance)** detect when a vehicle may be in danger of a collision and can help minimize injuries to vehicle occupants.
- 10 **Drowsy driver alerts** monitor the degree to which drivers may be inattentive while on the road. This technology helps drivers regain their focus on driving tasks.

⁴ Top Technologies for Mature Drivers: Expert Rankings 2012



Supportive technology for older adults

Experts judged these technologies to be particularly beneficial for older drivers. Smart headlights help with age-related vision changes. Emergency response systems, vehicle stability control and crash mitigation systems can reduce or minimize crashes and any resulting injuries. Back-up cameras, blind-spot warning systems, lane departure systems, voice-activated systems, and assistive parking systems can help with driving behaviors that depend on flexibility and range of motion. Drowsy driver alerts can help with the potential side-effects of some medications.

Vehicle technology adoption

In our 2015 research⁵ with the MIT AgeLab, mature drivers were presented with seven technologies (blind-spot warning systems, back-up cameras, smart headlights, collision avoidance systems, lane departure warnings, parking assistance and adaptive cruise control) and explored their willingness to adopt them. The seven technologies included six from the prior studies and one emerging technology. The research presented an opportunity to delve more deeply into what consumers thought about these technologies and which ones they thought they would want – and use – themselves. Overall, we found that 96% of mature drivers in the study reported that they would be willing to buy a car with at least one of these seven auto technologies; nearly 10% indicated that they would be willing to buy all seven. As these technologies become more widely available, it's important that all drivers learn how they work, how to use them effectively and what the benefits of using them are. This is especially true for mature drivers, as many technologies can enhance the driving experience as we age.

⁵ Vehicle Technology Adoption Among Mature Drivers 2015

3 reasons why learning more about vehicle safety is important

1 Vehicles are changing

While cars today may not look all that different from previous model years, the equipment under the hood and the features available to drivers and passengers offer a very different experience. Not only are multiple technologies available as options, but many cars come with new safety features as standard items and some features are required by the federal government. For example, in 2018 backup cameras became mandatory for all vehicles manufactured on or after May 1, 2018; including buses and trucks weighing less than 10,000 pounds. Back-up cameras display objects behind the car and can help drivers to judge distances and back-up safely. When vehicles change, drivers may have to adapt as well. The more you know about the kind of safety technologies that are available and how they work, the better you will be able to use these technologies as you drive.

2 Technology may make you safer

Vehicles today have many more features than they did 10, 20 or 50 years ago. But which ones are really worth considering in order to enhance your safety? A study from the Insurance Institute for Highway Safety* reported that one in five injury crashes could be prevented or reduced if all passenger vehicles were equipped with forward collision warning, lane departure warning systems, blind-spot warning systems and adaptive headlights.

Here are two examples of how vehicle technologies may make you safer:

- A vehicle with technology that can help prevent frontal crashes will keep you, and drivers around you, safer because of it. Research from the Highway Loss Data Institute** shows that front crash prevention is reducing crashes. And even if these systems don't prevent accidents completely, they can still reduce impact speeds, which may lessen the severity of a crash and risk of injury.
- Adaptive (smart) headlights, which can swivel as you turn corners and adjust the light to traffic conditions, help with night vision. While this is good for all drivers, it's particularly important for mature drivers. That's because many of us experience changes in our vision as we age. These changes generally begin when we are in our 20s and 30s and become more noticeable as the years go on. Even a 35-year-old may notice increased difficulty when driving on a rainy night, as he or she may already be experiencing changes in contrast sensitivity and reduced ability to tolerate glare.

Continued...

* Source: Insurance Institute for Highway Safety, 2015

** <https://www.iihs.org/news/detail/automakers-make-big-strides-in-front-crash-prevention>; dated 2025

“Very interested in smart headlight and blind spot technology. I do think these would help prevent accidents and make it safer for people of all ages to drive.”

– Research participant

3 Technology may also boost your comfort and convenience

Many of today's cars have safety features that can reduce collisions, while keeping drivers and passengers safe. But these features may also help drivers feel more confident behind the wheel. In particular, back-up cameras can help drivers with reduced flexibility to see behind the vehicle and blind-spot warning systems may help drivers with limited range of motion be more comfortable in the driving experience. These two features in particular are favored vehicle technologies by mature drivers in our research⁶ with the MIT AgeLab.

In the end, the car that's right for you depends on many variables. Technology is an increasingly important component of staying safe on the road.

To learn more about vehicle safety technology

Start conversations

Use the checklist on the next page to talk with people who are in the know about or have used such vehicle technologies. You could talk with a trusted car dealer about your current car or one you are looking to buy or lease, or talk to a friend or knowledgeable person if you are borrowing or renting a car. This checklist will help you start conversations so that you will be informed about which technologies are in the car and how they work – before you drive away.

Stay up-to-date

Technologies are constantly emerging. Even since we started our studies on vehicle technologies, new features have been developed, like adaptive cruise control. Be sure to stay current with the latest additions to new cars. Our resource list at the end of this guide, contains many organizations that can help you both learn more about today's technologies and keep you up-to-date about features coming in tomorrow's car.

Adaptive cruise control is a technology that enables the car to adjust its speed depending on traffic conditions with minimal driver involvement. In the most recent study, we included this feature as an additional technology for drivers to consider. One research participant said, “[I liked] adaptive cruise control. I get tired of starting and stopping, so I don't have to turn it off and turn it back on.”

Being in the driver's seat

Vehicle technologies, such as those named in this guide, may help you be safer when you drive. Learning more about how these features work is a smart step to keeping you and your loved ones safe on the road. Whether it's for the car you already have, one you are considering buying or leasing, or if you borrow or rent another car for a short period time, staying current on the latest vehicle technologies – and using them appropriately – can help you to be safe in the driver's seat.

⁶ Vehicle Technology Adoption Among Mature Drivers 2015

What to ask about vehicle technologies

Of course, the most important choices are the ones you make for yourself and your family. With that in mind, here's a vehicle technology checklist to bring with you when you're shopping for a new car or driving one that you have borrowed or rented. Whenever borrowing or renting a car, it's wise to spend a few minutes to familiarize yourself with the car's basic features because they may be different from the car you drive every day. For instance, where is the windshield wiper control? How do you turn on the defroster? The same is true of the latest safety technologies. There are often differences between automotive manufacturers on how these features are designed and presented in their vehicles.

Here are some questions to ask – before you drive away. These questions are simply conversation starters. Once you've gotten the answers, you'll be in a better position to know how these features work.

Which of these features does the car have?

☐ **Smart headlights (also known as adaptive headlights)**

- Do the lights come on automatically? If so when?
- Will the lights automatically shift between low and high beams depending on weather and environment?
- Do the lights pivot as the car is turning?

☐ **Emergency response systems**

- How do I activate the system – verbally or with the push of a button?
- Will this system automatically activate in the event of a crash?

☐ **Back-up cameras (also known as reverse monitoring systems)**

- How will the system let me know if something is behind me?
- Will there be audible cues or visual indicators?

☐ **Blind-spot warning systems**

- Does the system come on automatically? If so when?
- How will the system tell me if there is something in my blind spot – a visual display or a sound?

☐ **Lane departure warning systems**

- Does the system come on automatically? If so when?
- How will the system tell me that I need to adjust my driving – a visual display or a sound?
- Does the system move the vehicle back to the center of the lane automatically or does it depend on the driver?

☐ **Vehicle stability control (VSC)**

- How does VSC work?

☐ **Assistive parking systems**

- How does the system I am using work? Does the car take over?
- What do I need to do?
- Are there sounds or visual cues to help me park the car?

☐ **Voice-activated systems**

- What features in the vehicle can I adjust through voice commands?
- Can I adjust the volume?
- How do I turn this system on or off?

☐ **Crash mitigation systems (also known as collision avoidance)**

- Does the system come on automatically? If so when?
- How will the system in the vehicle I am driving indicate that a crash is imminent?
- Will the system stop the car or provide a signal (visual or audible) to the driver to stop the car?

☐ **Drowsy driver alert**

- What signals will this system provide me – an audible warning or alarm?
- Will the car take over at any point?

☐ **Adaptive cruise control**

- How do I turn it on and off?
- Does it adjust the car's speed automatically?
- What does it do when it detects a car too close in front of it?

Additional resources

The following resources can help you learn more about vehicle safety technologies.

Your Local Dealership

As cars become more technologically complex, your local car dealer can show you these features on a new or used vehicle. Some dealerships may offer educational opportunities, such as technology classes or assign knowledgeable representatives to work with new-vehicle buyers.

Your Vehicle Manual

Vehicle safety systems that are designed to protect you in a crash have come a long way. To get the most from these safety features, you need to use them properly and in combination with one another. The vehicle manual that you received with your car can tell you which technologies are included and address specific questions about how they work in your car's specific brand and model.

AARP Driver Safety

AARP Driver Safety offers in-person, virtual, and self-paced workshops covering topics related to new vehicle technologies, owning an EV/hybrid vehicle, and driving at night. Check out the top technologies and available Driver Safety workshops at www.aarp.org/cartech.

Insurance Institute for Highway Safety (IIHS)/ Highway Loss Data Institute (HLDI)

IIHS is an independent, nonprofit scientific and educational organization dedicated to reducing the losses – deaths, injuries and property damage – from crashes on the nation's roads. HLDI shares and supports this mission through scientific studies of insurance data representing the human and economic losses resulting from the ownership and operation of different types of vehicles and by publishing insurance loss results. Visit both organizations at www.iihs.org.

National Highway Traffic Safety Administration (NHTSA)

NHTSA is dedicated to achieving the highest standards of excellence in motor vehicle and highway safety. It works to help prevent crashes and their related costs. Learn more about vehicle safety technologies by visiting www.nhtsa.gov/vehicle-safety

National Safety Council and the University of Iowa

The National Safety Council and the University of Iowa have partnered together to provide education on safer driving with technology. To learn more about how best to interact with vehicle safety features, go to their website at www.mycardoeswhat.org.

The Hartford's Gerontology Team

To help mature drivers learn more about vehicle technologies, The Hartford's team of gerontologists and the MIT AgeLab conducted three joint research projects on vehicle technology and driving safety. For more tips on safe driving for a lifetime, go to www.thehartford.com/resources.

The Hartford's Gerontology Team

The Hartford's team of gerontologists create innovative business solutions for the mature market. They are uniquely positioned to apply knowledge of aging to develop one-of-a-kind products and services for The Hartford's customers, and specialized training for The Hartford's employees. They conduct original research in partnership with academic institutions and produce public education programs on safety, mobility and independence. The Hartford has had this in-house expertise since 1984, guiding The Hartford to unparalleled success in understanding and serving the mature market.

The Hartford/MIT AgeLab Relationship

The Hartford became a founding sponsor of the MIT AgeLab in 1999. The Hartford's team of gerontologists and the MIT AgeLab were committed to producing original research that can influence the quality of life of older adults and their families. Through publications, professional meetings and public education, The Hartford/MIT AgeLab partnership successfully reached millions of people in the United States and around the globe with high quality, meaningful information to guide important decisions about safety, mobility and independence.

The MIT AgeLab

The MIT AgeLab is a multidisciplinary research program that works with business, government, and NGOs to improve the quality of life of older people and those who care for them. The AgeLab applies consumer-centered systems thinking to understand the challenges and opportunities of longevity and emerging generational lifestyles to catalyze innovation. For more information, go to <https://agelab.mit.edu>.

This information is intended to help individuals who seek information about vehicle technology and safety. It is not intended to be an exhaustive source or to relate to a particular vehicle, driver or driving situation. Readers are advised to consult the appropriate professionals to assist them in analyzing their situation.