

COMMENTS

FUN, FUN, FUN, 'TIL SONNY (OR THE GOVERNMENT) TAKES THE T-BIRD AWAY: ELDER AMERICANS AND THE PRIVILEGE TO BE INDEPENDENT

Many of the freedoms enjoyed in American society are intimately related to the ability to drive an automobile.¹ “[N]early all the benefits of modern society depends on our ability to transport ourselves from one location to another.”² Indeed, the personal mobility provided by the automobile allows us to practice many of our constitutional guarantees, especially our freedom of choice.³

¹ See Cletus R. Mercier & Scott R. Falb, *Policy Issues: License Renewal for Older Drivers—Analysis of the Iowa Experience in Reexamination of High-Risk Drivers*, 25 POL’Y STUD. J. 157, 157 (1997), available at 1997 WL 19422349; see also Jeffrey Krasner, *Miss Daisy’s Helping to Test Tech Limits for Older Drivers*, BOSTON GLOBE, May 14, 2001, at C2, available at 2001 WL 3933140 (quoting Joseph Coughlin, the founder of the transportation and aging program AgeLab, at the Massachusetts Institute of Technology, “Driving is the glue that holds all those little activities we call life together, . . . [i]f you can’t drive, you can’t go window shopping for the fun of it, and you can’t go to the park to see your grandchildren play. That’s life.”).

² Jon E. Burkhardt et al., *Mobility and Independence: Changes and Challenges for Older Drivers*, ADMIN. ON AGING 1, 2 (July 1998), available at <http://www.aoa.dhhs.gov/research/drivers.html> (last visited Mar. 25, 2002); see also THE HIGHWAY SAFETY DESK BOOK, U. S. DEP’T OF TRANSP., at 2 (1998), (providing that there are more than one hundred and seventy million drivers in America), available at <http://ntl.bts.gov/DOCS/deskbk.html> (last visited Mar. 25, 2002). Every year these people drive at least two trillion miles on the streets and highways in this country. *Id.*

³ See Burkhardt, *supra* note 2, at 2 (reporting that voting, fulfilling religious obligations, employment and educational opportunities, choice of health care, participating in commerce, and social interaction, are nearly all dependent on driving); see also *Improving Transportation for a Maturing Society*, U.S. DEP’T OF TRANSP., at 45 (Jan. 1997), (declaring that the Department of Transportation (DOT) has a goal of allowing people to drive as long as possible because driving enables a person to achieve the pinnacle of personal mobility), available at <http://ostpxweb.ost.dot.gov/policy/aging/final-b2.pdf> (last visited Mar. 25, 2002) [hereinafter *Improving Transportation for a Maturing Society*].

Driving also serves as an equalizer between the powerful and the weak in American society by making transportation cost effective. "Driving is part of the spirit of being an American, . . . [u]nlike other countries, where there is more [of] an ethos of interdependency, the driving force of this country is independence. Everywhere you go, your passport is your driver's license. The bank. The airport. The driver's license proclaims your identity."⁴ In spite of the importance American society places on driving, the privilege to drive has not been elevated to a fundamental right.⁵ The law regards driving as a privilege that may be revoked.⁶ People often lose their privilege to drive when they violate the rules of the road,⁷ or when they are temporarily or permanently suspended from driving because of a medical problem. However, many believe that one's privilege to drive should be restricted or revoked when a person reaches a certain age.⁸ Part I of this note will examine the most common medical conditions associated with

⁴ Catherine Collins, *For Older Drivers, a Choice Between Freedom and Safety*, N.Y. TIMES, Oct. 21, 1998, at G16 (quoting Professor Cohen, chairwoman of the department of aging and mental health at the University of South Florida in Tampa).

⁵ See *Miller v. Reed*, 176 F.3d 1202, 1206 (9th Cir. 1999) (noting that a person has a fundamental right to interstate travel, however, the right to operate a motor vehicle is not a fundamental right as a result of its relation to interstate travel). The person is "not being prevented from traveling interstate by public transportation, by common carrier, or in a motor vehicle driven by someone with a license to drive it." *Id.*

⁶ See *id.*

⁷ See MADD, *Nationwide Insurance, Police Chiefs Launch Sobriety Checkpoint Blitz to Curb DUI Over Dangerous Labor Day Weekend*, U.S. NEWSWIRE, Aug. 29, 2001, available at LEXIS, News Library, Usnwr File (stating that 1.4 million people were arrested in 1998 for DUI related offenses); see also *They aren't Dangerous*, 36 STATUS REP., INS. INST. FOR HIGHWAY SAFETY 8, at 6 (Sept. 8, 2001) (specifying that elder drivers have the lowest incidence of alcohol related offenses), available at <http://www.hwysafety.org/srpdfs/sr3608.pdf> (last visited Mar. 25, 2002) [hereinafter *They aren't Dangerous*].

⁸ See Collins, *supra* note 4, at G16. The article reported that:

As part of a study of older drivers, Mr. Coughlin, of M.I.T., and Roger Cobb, a professor of political science at Brown University, asked state licensing officials how they would characterize the issue of licensing older drivers. One in three responded that older drivers were a 'serious problem' warranting more attention, and 37 percent said that older drivers were 'a very serious problem deserving more attention and additional regulation.'

Id.; see also Simon Hinde & Randeep Ramesh, *Ford Taps into Lucrative 'Grey Market'*, TIMES (London), Sept. 17, 1995, available at 1995 WL 7698867 (illustrating the social division between old and young drivers, an elderly driver is quoted saying that "[p]eople can be horrible, . . . I am told regularly that I am too old to drive and that I have forgotten how to drive. Younger drivers are too impatient.").

problematic elder drivers.⁹ Part II will address the problems that arise when elder Americans lose their driver's license.¹⁰ Part III will explore the state and federal legislation designed to remedy these problems,¹¹ and Part IV will suggest that technological developments in automobile and road design will allow elder Americans to safely exercise and safely extend their privilege to drive.¹² Therefore, technological innovations that improve seniors' ability to drive may prevent legislatures from passing laws that discriminate on the basis of age, and may avoid the costly process of defending such litigation against claims that they are unconstitutional.

I. COMMON MEDICAL PROBLEMS OF ELDER DRIVERS

America is an aging society; the U.S. Census Bureau reports that one out of every eight Americans was age sixty-five or older in 1994, in 2050, one out of every five Americans will be sixty-five or older.¹³ A person's age alone cannot predict their ability to drive an automobile.¹⁴ However, as people age, they frequently develop medical problems that can negatively affect their ability to safely operate an automobile.¹⁵ Perhaps one of the most troubling issues associated with elder drivers is that researchers have failed to clearly identify the most common factors that lead to poor driving ability.¹⁶ Contradictory statistics regarding elder drivers

⁹ See *infra* notes 13-66 and accompanying text.

¹⁰ See *infra* notes 67-88 and accompanying text.

¹¹ See *infra* notes 89-115 and accompanying text.

¹² See *infra* notes 116-254 and accompanying text.

¹³ *Senior Drivers*, GOVERNOR'S TRAFFIC SAFETY COMMITTEE, NYS DEP'T OF MOTOR VEHICLES, at 1 (2002), available at <http://www.nysgtsc.state.ny.us/senr-ndx.htm> (last visited Apr. 1, 2002) [hereinafter *Senior Drivers*]; see also Burkhardt, *supra* note 2, at 4 (figuring that, by the year 2030, there will be five times the number of drivers eighty-five years old or older than there is today).

¹⁴ See Collins, *supra* note 4, at G16. This article also stated that:

The topography of the aging process is unpredictable, beginning at various times and affecting everyone differently. The most common impairments occur in sensory functions, like vision and hearing; cognitive functioning, like attention and memory, and psychomotor abilities, like reaction time. In addition, physical strength and flexibility are affected by age. Drugs prescribed for illnesses common among older people, like hypertension, may also cause driving skills to deteriorate.

Id.; see also *Senior Drivers*, *supra* note 13, at 2.

¹⁵ See Vasiliki L. Tripodis, Note, *Licensing Policies for Older Drivers: Balancing Public Safety with Individual Mobility*, 38 B.C. L. REV. 1051, 1056 (1997).

¹⁶ See Gerald McGwin, Jr. et al., *Relations Among Chronic Medical Conditions, Medications, and Automobile Crashes in the Elderly: A Population-*

are common.¹⁷ The twisting and molding of statistics is done by those in favor of restricting senior drivers and by senior advocacy groups.¹⁸ While this may be a useful tool in rallying public support, it shadows the real issues, and it prevents opportunity for positive change.¹⁹ Like most controversial issues, the secret to this cure does not live on one side of a divided line, but instead it is home somewhere between the two, and will only be discovered through study and compromise.²⁰ However, most studies suggest that drivers who suffer from the common effects of aging such as visual impairments,²¹ stroke, arthritis,²² frailty, or dementia present serious problems while driving.²³ When studying these illnesses related to driving performance, "it is important to focus not on the specific conditions but on the functional impairments that may result from these conditions."²⁴

based Case-Control Study, 152 AM. J. EPIDEMIOLOGY 424, 424 (2000); cf. *They aren't Dangerous*, *supra* note 7, at 4.

¹⁷ See Robert A. Cronkleton, *Two States Seek to Make Roads Safer for Senior Drivers*, KAN. CITY STAR, Aug. 8, 2001, available at LEXIS, Cmpcom Library, Kcstar File (noting that "[b]etween 1989 and 1999, the number of older drivers involved in fatal crashes increased 33 percent nationwide _ at a time when overall fatalities declined 9 percent."); see *contra They aren't Dangerous*, *supra* note 7, at 1, 6 (stating that "[s]eniors have very low crash rates per capita, especially compared with teenagers.").

¹⁸ See *They aren't Dangerous*, *supra* note 7, at 6.

¹⁹ See generally AARP 55 Alive, *Driver Safety Program*, AARP WEBPLACE, at 1, available at (indicating that an eight hour class provided by AARP, that teaches elder drivers useful tips for safe driving, is a helpful tool to improve a driver's current skills along with developing safe, defensive driving techniques), at <http://www.aarp.org/55alive/about.html> (last visited Mar. 25, 2002). Since many elder Americans self-regulate their driving, this program is conducive to their approach. However, this class may lead to a false sense of security. It is not a lack of knowledge that creates a problem for older drivers, they are usually experienced and cautious drivers. The problems that elder drivers have are caused by physical and mental deteriorations, problems that no class could solve.

²⁰ See discussion *infra* Part IV.

²¹ See Tripodis, *supra* note 15, at 1056.

²² See McGwin, *supra* note 16, at 424, 430 (reporting the results of a study conducted at the Center for Aging of the University of Alabama at Birmingham). The subjects of the study consisted of 901 drivers sixty-five or older; 244 of which were involved in at fault accidents, 182 of which were in accidents that were not their fault, and 475 drivers that had no accident. *Id.*

²³ See *Older Drivers*, NAT'L INST. ON AGING, at 2 (1999), at <http://www.aoa.gov/aoa/PAGES/AGEPAGES/drivers.html> (last visited Mar. 25, 2002) [hereinafter *Older Drivers*].

²⁴ Burkhardt, *supra* note 2, at 4.

Vision

Vision is the most important sense used while driving.²⁵ Studies indicate that a person's vision is responsible for ninety-five percent of the tasks performed while driving.²⁶ As people age, their sense of sight diminishes.²⁷ This is especially problematic since eye examinations do not always detect the impairments associated with driving.²⁸ Furthermore, when a person reaches the age of sixty, he or she needs eight times more light than a twenty year old needs in order to see properly.²⁹ This may explain why many seniors struggle while driving at night.³⁰ Many elder drivers must also cope with the loss of peripheral vision since the scope of their vision narrows.³¹ This condition is especially dangerous since driving requires one to frequently scan the road in order to anticipate traffic patterns and in order to read signs. Researchers suggest that people who suffer from narrowed vision increase their crash rate by about thirty percent.³² Common causes of these impairments in senior drivers are cataracts, macular degeneration, or glaucoma.³³

Stroke

As people age, they have an increased chance of having a stroke. A stroke is a brain injury caused by an improper flow of blood to the brain.³⁴ This "cerebral vascular accident" deprives the brain

²⁵ See Tripodis, *supra* note 15, at 1056; see also *Driving Safely: Does Age Matter?* NAT'L CENTER ON WOMEN & AGING, June 1998, at 3, available at <http://www.heller.brandeis.edu/national/drive.htm> (last visited Mar. 26, 2002).

²⁶ Tripodis, *supra* note 15, at 1056.

²⁷ See *Making Roads Safer for Elder Drivers*, FLA. DEP'T OF TRANSP., at 1, (2001) (stating that the eye begins to deteriorate around the age of 20), available at <http://www11.myflorida.com/trafficoperations/elderroad.htm> (last visited Mar. 26, 2002) [hereinafter *Making Roads Safer for Elder Drivers*].

²⁸ See *Keeping an Eye on Vision: Primary Care of Age-Related Ocular Diseases*, 52 GERIATRICS 30, 35 (1997).

²⁹ *Making Roads Safer for Elder Drivers*, *supra* note 27, at 1.

³⁰ See *id.*

³¹ *Older Drivers*, *supra* note 23, at 2.

³² Rebecca Voelker, *Crash Risk Among Older Drivers Studied*, 282 JAMA 1610, 1610 (1999) (citing results from a study conducted by Wilmer Eye Institute of Johns Hopkins University in Salisbury, Maryland).

³³ *Older Drivers*, *supra* note 23, at 2 (noting that cataracts cause the eye to become cloudy, macular degeneration is the breakdown of material inside the eye leading to the loss of the central viewing area, and glaucoma limits sight on the edge of the viewing area).

³⁴ *What is a Stroke?*, HEALTH MED. SOLUTION, 1, 1 (information provided by Dr. Rappa), at <http://www.healthmedsolution.com/stroke.htm> (last visited Feb.

of its nutrient flow of blood.³⁵ Strokes are usually caused by a condition known as hardening of the arteries.³⁶ Older drivers who have had a stroke are more likely to be involved in an automobile accident and are at an increased risk for being responsible for the accident.³⁷

This increase in the crash rate is because a stroke causes the person's psychomotor skills to diminish.³⁸ A stroke affects a driver's, "[v]isiospacial abilities, identification and response to driving cues, attention, and complex reasoning skills . . ."³⁹ Elder people who have had a stroke will frequently continue to drive.⁴⁰ This is particularly dangerous because "[b]oth [stroke] patients and their spouses tended to overestimate driving ability."⁴¹ These patients do this because they are not being properly advised.⁴² "Forty-eight percent of the [stroke patients studied] stated that they had not received any advice concerning driving after the stroke, and 87 percent did not receive any evaluation of their ability to drive after the stroke."⁴³ This lack of counseling is especially disturbing when one reads studies reporting that sixty percent of stroke patients are unfit to drive,⁴⁴ and that stroke patients are twice as likely to be involved in an automobile accident.⁴⁵

25, 2002) (printout on file with the Albany Law Journal of Science & Technology).

³⁵ *Id.* (describing two types of strokes or blood flow injuries, an ischemic infarct and a hemorrhagic stroke). An ischemic infarct occurs when "[t]he arteries that penetrate through the skull, and feed the surface and underlying portions of the brain, . . . close up . . ." *Id.* A hemorrhagic stroke "occurs when the arteries in the brain form a balloon, or aneurysm, that can explode." *Id.*

³⁶ *Id.* at 2.

³⁷ See McGwin, *supra* note 16, at 427 (stating that this increased rate was independent of the medications that these people were taking).

³⁸ See Charlotte LoBuono, *How Stroke Impacts Driving Ability*, PATIENT CARE, Feb. 15, 2000, at 228, available at 2000 WL 100711705.

³⁹ McGwin, *supra* note 16, at 428.

⁴⁰ See *id.*; GD Fisk et al., *Driving After Stroke: Driving Exposure, Advice, and Evaluations*, ARCH. PHYS. MED. REHABIL. 1338, 1338 (1997) (indicating a study that thirty percent of stroke survivors resumed driving after the stroke).

⁴¹ LoBuono, *supra* note 38, at 228.

⁴² See Karl E. Miller, *Evaluation of Patients Who Resume Driving After a Stroke*, 57 AM. FAM. PHYSICIAN 1679, 1679 (1998), available at LEXIS, GenMed Library, Afp File.

⁴³ *Id.* (noting that the most common post-stroke driving assessment performed was a vision test, with only five percent of patients reporting that they received an on-road driving test).

⁴⁴ See LoBuono, *supra* note 38, at 228.

⁴⁵ See McGwin, *supra* note 16, at 428.

Arthritis

Arthritis is a widespread problem among the elderly population. Osteoarthritis is a condition that affects the joints of the body by degeneration, and as the suffix, "itis" implies, the joints become red, swollen and painful.⁴⁶ Arthritis is very unpredictable; different joints are affected at different times with varying severity of pain.⁴⁷ The pain and loss of strength associated with arthritis can cause the driver to become tired and distracted when driving.⁴⁸ Arthritis decreases the range of motion that is needed to survey the road and retards the motor performances, thus impeding the afflicted driver's ability to react quickly.⁴⁹

Frailty

As people age, they generally frail, and are more likely to be injured in a car accident.⁵⁰ Osteoporosis, bone loss, and an overall loss of strength make seniors more susceptible to being injured in automobile accidents.⁵¹ Although elder drivers are involved in fewer automobile accidents than younger drivers,⁵² they have the highest death rate because they are so frail.⁵³ When a driver reaches the age of sixty years old, they are at a greater risk of being injured in a minor collision, and their chances of dying in an automobile accident double.⁵⁴ Automobile accidents send more elder people to emergency rooms than any other catastrophe or illness, including the common fall.⁵⁵ The problem associated with

⁴⁶ *Osteoarthritis*, MEDINFO (2001), at <http://www.medinfo.co.uk/conditions/osteoarthritis.html> (last visited Mar. 26, 2002).

⁴⁷ See Ellie Kahn, *Driving Ambition; Arthritis and Driving a Car*, AIMPLUS, May 1989, at 34, available at LEXIS, News Library, AsapII File.

⁴⁸ McGwin, *supra* note 16, at 428-29.

⁴⁹ See Kahn, *supra* note 47, at 34 (acknowledging that even simple driving tasks such as turning the head or applying the brakes may be difficult for arthritis sufferers).

⁵⁰ See *Carmakers Catering to Older Drivers*, NEWSDAY, Jan. 1, 1995, at 33, available at 1995 WL 5091634 [hereinafter *Carmakers Catering to Older Drivers*].

⁵¹ See *Improving Transportation for a Maturing Society*, *supra* note 3, at 52.

⁵² See Collins, *supra* note 4, at G16 (noting that older drivers have a lower accident rate because they drive less than other drivers). However, older drivers have the most accidents per mile driven. *Id.*

⁵³ *Id.*

⁵⁴ Ricardo Alonso-Zaldivar, *Auto Makers Retool to Fit an Aging U.S.: Safety: Study Puts Focus on Protecting the Growing Population of Older Drivers. Industry Reexamines Testing*, L.A. TIMES, July 31, 2001, at A1, available at 2000 WL 2265114.

⁵⁵ *Id.* (noting that "analysts project that deaths among drivers 65 and older will double, from an estimated 5,232 this year to an estimated 10,363 in 2020").

the frailty of elder drivers has captured the attention of automobile safety experts, and the automobile industry now realizes that seniors' frailty poses "the greatest challenge of the next 20 years for the [automobile] industry."⁵⁶

Dementia

Drivers with dementia present a serious challenge for legislators, automobile designers, doctors, and families.⁵⁷ Dementia is a medical condition that affects a person's brain and his or her ability to think, remember, and speak.⁵⁸ The risk of developing dementia or Alzheimer's disease increases after a person reaches the age of sixty.⁵⁹ The symptoms include; impaired logic, memory, and language skills, and are caused by diminished nerve cells in parts of the brain that are responsible for memory and other thought functions.⁶⁰ About fifteen percent of the population over sixty-five are inflicted with some form of dementia.⁶¹ Even people that have a slight case of dementia are subject to an increased rate of automobile accidents.⁶² Cognitive impairments such as dementia, increases the crash rate by fifty to sixty percent.⁶³ The American Psychiatric Association has suggested a standard prescription of "[d]o not drive" when a patient has been diagnosed with dementia.⁶⁴ However, counseling a patient to stop driving puts a doctor in an uncomfortable and unfamiliar position.⁶⁵ According to one study, nearly thirty percent of doctors did not

⁵⁶ *Id.* (quoting Dr. Stewart Wang, surgeon at the University of Michigan Trauma Burn Center, where he stated that "[w]e are asking people to sit up and take notice that this is going to be a growing problem.").

⁵⁷ Elizabeth K. Tulloch, *What Shall We Do About Miss Daisy's Driving: Background for the Elder Law Attorney*, COLO. LAW., Oct. 1998, at 81, 82.

⁵⁸ See *Alzheimer's Disease Fact Sheet*, ALZHEIMERS DISEASE EDUCATION & REFERRAL CENTER (2001), at <http://www.alzheimers.org/pubs/adfact.html> (last visited Mar. 26, 2002).

⁵⁹ *Id.* (noting that "Alzheimer's disease (AD) is the most common form of dementia among older people."). Although AD is less common for younger people, it is estimated that four million Americans suffer from AD. *Id.*

⁶⁰ *Id.*

⁶¹ John C. Bodnar, Note, *Are Older Americans Dangerously Driving into the Sunset?*, 72 WASH. U. L.Q. 1709, 1715 (1994); see also *Alzheimer's Disease Fact Sheet*, *supra* note 58, at 1 (emphasizing that Alzheimer's disease is not a normal part of aging).

⁶² See Marilyn Larkin, *New Alzheimer's Disease Treatment Guideline Says "Do Not Drive,"* 349 LANCET 1372, 1372 (1997), available at LEXIS, News Library, Lancet File.

⁶³ See Voelker, *supra* note 32, at 1610.

⁶⁴ Larkin, *supra* note 62, at 1372.

⁶⁵ See *id.*

know how to report one of their patients who should no longer drive due to symptoms of dementia.⁶⁶

II. LOSING THE DRIVING PRIVILEGE

"In a nation in love with the automobile, driving is more than a simple matter of mobility; it's a sign of competence and independence . . ."⁶⁷ Elder drivers who cannot or do not drive frequently become isolated and depressed.⁶⁸ This is because losing the ability to drive an automobile after being dependent on it creates a dramatic change in a person's life.⁶⁹ When an elder American stops driving, they lose more than just the independence of mobility, they also lose a sense of their identity and their perceived status in our society.⁷⁰ "So much of the misery of getting old is about status. Losing your license is about status."⁷¹ Society must realize that elder Americans who lose their licenses to drive are accustomed to being independent and are used to coming and going as they please.⁷²

⁶⁶ See Greg Cable et al., *Knowledge, Attitudes, and Practices of Geriatricians Regarding Patients with Dementia Who are Potentially Dangerous Automobile Drivers: A National Survey*, 48 J. AM. GERIATRICS SOC'Y 14, 15 (2000).

⁶⁷ Joseph P. Shapiro, *Off the Road*, U.S. NEWS & WORLD REP., Oct. 25, 1999, at 60, available at LEXIS, Market Library, Usnews File; see also Ricardo Martinez, *Older Drivers and Physicians*, 274 JAMA 1060, 1060 (1995) (noting that eighty-eight percent of the elderly rely on the private automobile for transportation).

⁶⁸ See Shapiro, *supra* note 67, at 60 (quoting an examiner of elderly drivers who explains that when she tells drivers that they can no longer drive, "[i]t's like telling them they have a terminal illness."); see also *Role of Age*, CONDITIONS AND PERFORMANCE REPORT, U.S. DEP'T OF TRANSP. (1999) (asserting that "isolation is [a] most severe, debilitating, and progressive [condition] for senior citizens"), at http://www.fhwa.dot.gov/policy/1999cpr_01/cpm01_4.htm.

⁶⁹ See Mercier & Falb, *supra* note 1, at 157; see also Collins, *supra* note 4, at G16 (quoting Joseph Coughlin, the director of the transportation and aging program at the Massachusetts Institute of Technology, who stated "[w]hen an older person stops driving, the overall impact is essentially sentencing him to house arrest, . . . [i]n most regions of this country, suburban and rural, the elderly are now doing what we call aging in place. There are few alternatives to the personal automobile, so if you don't drive, you don't go out."); see also *Improving Transportation for a Maturing Society*, *supra* note 3, at 50 (suggesting that an older individual's ability to transport themselves, and experience social interactions may have a relationship to their mental and physical health, and their health care cost).

⁷⁰ See Tulloch, *supra* note 57, at 81; see also Mercier & Falb, *supra* note 1, at 157.

⁷¹ Burkhardt, *supra* note 2, at 5 (quoting Ethel Villeneuve, founder and director of the Driving Decisions for Seniors Program in Oregon).

⁷² See *id.*

When a senior stops driving, his or her family and friends are also affected.⁷³ Seniors who can no longer drive may feel like a burden to their family⁷⁴ and friends since they must depend on them for transportation.⁷⁵ Furthermore, seniors depending on other forms of transportation must adjust their lives to someone else's schedule.⁷⁶

Our society places great importance on the ability to drive, and the significance that driving has in the lives of older Americans, present challenges to those who may be responsible for restricting their driving.⁷⁷ Because "[l]osing a license is like a death sentence to most people, . . . the adult children of elderly drivers will usually not intervene—even when Mom or Dad is a road menace."⁷⁸ This is troubling since it is usually the family, friends, and the family doctor, that best know the driver's ability. Studies have found that only one third of families facing this issue were willing

⁷³ See Mercier & Falb, *supra* note 1, at 157; see also *Improving Transportation for a Maturing Society*, *supra* note 3, at 43 (recommending that retirement planning includes a person's transportation needs, and their intentions concerning giving up their driving privilege).

⁷⁴ See *Improving Transportation for a Maturing Society*, *supra* note 3, at 42 (hypothesizing that in the near future, elderly individuals may not be able to depend on family members for transportation because of the changes in American society.) Traditionally, it has been a spouse, or a daughter that has cared for an elder person, however, changes in the American family size and the greater number of working women may limit the availability of family members able to transport their elders in need. *Id.*

⁷⁵ See Shapiro, *supra* note 67, at 60; see also *They aren't Dangerous*, *supra* note 7, at 5 (stating that only three percent of the elderly rely on public transportation); see also Cronkleton, *supra* note 17, at 2 (observing that public transportation in the suburbs is not fit to meet the needs of elderly individuals; it is focused in work-week commute, not taking people to shopping malls or the grocery store).

⁷⁶ See Roger W. Cobb & Joseph F. Coughlin, *Are Elderly Drivers a Road Hazard?: Problem Definition and Political Impact*, 12 J. AGING STUD. 411, 420 (1998) (on file with the Albany Law Journal of Science & Technology).

⁷⁷ See generally, Joseph P. Shapiro, *How to get the Keys away from Mom and Dad*, U.S. NEWS & WORLD REP., Oct. 25, 1999, at 60 (exposing the problems one son had in getting his elder father to stop driving), available at LEXIS, Market Library, Usnews File; see also *Improving Transportation for a Maturing Society*, *supra* note 3, at 45 (stressing the importance of developing a "more economical, reliable, and uniform screening techniques that can be applied to as many people as possible"). Currently, dangerous drivers are identified "somewhat haphazardly and belatedly" usually after they are involved in an accident, or after they receive a traffic citation. *Id.* The referral to DMV is also inconsistent, coming from different sources such as a doctor, a police officer, a family member, or the individual's license renewal form. *Id.*

⁷⁸ Tammerlin Drummond, *On the Road too Long: More Seniors are Getting into Accidents, Prompting States like California to Consider Tougher Licensing*, TIME, Aug. 23, 1999, at 46, available at 1999 WL 20779650.

to talk about it.⁷⁹ Physicians and other health care providers are also hesitant to address this issue.⁸⁰

A recent interview illustrates some of the problems described above. Mrs. Jerista, a resident of Pennsylvania, is an eighty-four year old widow who suffered a heart attack, and a broken hip in 2000.⁸¹ After recovering from open heart and hip surgery, Mrs. Jerista continued to drive, until she chose to remove her deceased husband's name from her automobile insurance policy.⁸² Upon doing this, her insurance company began to scrutinize her policy and required her to take a driving skills test given by a private adult rehabilitation center.⁸³

After giving me a physical, my doctor told me that I needed to take a driving examination [at the rehabilitation center]. When I took the test, I was not able to drive my own car [a small four-door sedan], instead I had to take the test in a large van. I did not like that at all, the van was for a handicapped driver, I am not handicapped. I was not familiar with all the controls of the van, nor was I used to driving a car that large. There were also two people in the car, who were talking to me, this made me nervous; I am used to driving alone.⁸⁴

Mrs. Jerista failed the driving test, though she passed the oral part of the test, and was then required to retake her Pennsylvania driving exam. Mrs. Jerista never took the state's road test because she failed the question portion of the test that is given on a computer.⁸⁵ "I don't know how to use a computer, I think I knew the answers, but I did not know how to enter in the correct answer. The computer made me very nervous."⁸⁶ After, Mrs. Jerista had failed the question test given on the computer twice, she decided not to take it again.⁸⁷ "It was a hard decision to make, I

⁷⁹ See Mercier & Falb, *supra* note 1, at 157.

⁸⁰ See *id.*; see also *AMA Gives Physicians Green Light to Report Patients to DMV*, GERIATRICS, Feb. 2000, at 25 (theorizing that some doctors believe that if they reported elder drivers to the DMV, seniors would stop going to the doctor out of fear of losing their license).

⁸¹ See also Interview with Emily Jerista, in Wilkes-Barre, Pa. (Oct. 24, 2001) (providing an example of the "haphazard" identification process that some states must rely on, and an example of the general problems presented when elder drivers must give up their driving privilege).

⁸² *Id.*

⁸³ *Id.*

⁸⁴ *Id.*

⁸⁵ *Id.*

⁸⁶ *Id.*

⁸⁷ Interview with Emily Jerista, in Wilkes-Barre, Pa. (Oct. 24, 2001).

believe I'm a good driver, besides, I only drive to the grocery store when no one is around to take me, but I did not want to take that computer test again, so I let my license expire. I just don't think it was right that I had to retake the [state] test because the rehabilitation center said I failed their exam."⁸⁸

III. STATE RESPONSE TO ELDERLY DRIVERS

States have responded differently to the problems presented by elder drivers.⁸⁹ However, there are a couple of common approaches that states use in hoping to remedy these problems.⁹⁰ One response is to target elder drivers through testing which aims to get the dangerous seniors off the road.⁹¹ Another common approach is to make roads safer for older drivers by responding to their particular needs.⁹²

The state of Illinois is an example of a state that uses this testing method.⁹³ Illinois approaches the problem of elderly drivers in a strict and unique way since all Illinois drivers must renew their license every four years.⁹⁴ When renewing a driver's license, every Illinois resident must apply "in person and pass an eye

⁸⁸ *Id.* Mrs. Jerista admits, "I still drive to the grocery store from time to time, when my daughter is not here to take me." *Id.*

⁸⁹ *Cf.* Bodnar, *supra* note 61, at 1722; *see also* Collins, *supra* note 4, at G16 (stating that "[o]nly 11 states (New York not included) have age-based renewal requirements. Four states require road testing upon license renewal for older drivers. Ten states have not adopted any form of vision testing, regardless of age. Only 11 states require doctors to report their patients' relevant medical problems to motor-vehicle departments.").

⁹⁰ *See* Bodnar, *supra* note 61, at 1721 (stating that the AARP program focuses on individual evaluations for senior drivers); *see also* Collins, *supra* note 4, at G16.

⁹¹ *See* Collins, *supra* note 4, at G16.

⁹² *See Senior Drivers*, *supra* note 13, at 3.

⁹³ *See* Tripodis, *supra* note 15, at 1061; *see also* Mercier & Falb, *supra* note 1, at 157 (reporting that testing can yield inconsistent results).

Even driving tests begun al [sic] the same suburban mall and run over the exact same streets will yield different traffic patterns-and thus different skill needs and different scoring opportunities-when run at 9:15 Tuesday morning rather than at noon on Saturday. Testing a driver afflicted with dementia may produce erroneous results, depending on the stage of development of the dementia and whether the driver may have a 'good day' when symptoms are less obvious.

Id.; *see also* Cobb, *supra* note 76, at 420 (arguing that testing all drivers over the age of sixty-five would be too burdensome on a state's budget). Moreover, states are over burdened with the current testing strategy. *Id.*; *see also* Bodnar, *supra* note 61, at 1739 (explaining that strict testing requirements directed at seniors would be challenged by the AARP and other senior organizations).

⁹⁴ Tripodis, *supra* note 15, at 1061.

examination" in order to maintain their license.⁹⁵ When a driver reaches the age of sixty-nine, he or she must "demonstrate an ability to read and understand traffic signals as well as knowledge of the state traffic laws."⁹⁶ Illinois also makes their seventy-five year old drivers take a road test to measure their ability and control.⁹⁷ When an Illinois driver reaches the age of eighty-one, the driver must take all of the exams every two years, and at age eighty-seven, the driver must take all of the tests every year.⁹⁸

In contrast, Florida is a lenient state in regards to testing seniors, while attempting to meet the specific needs of elderly drivers to make driving easier for them, and also to make the roads safer for all drivers.⁹⁹ "Florida leads the nation with 18% of its population 65 and older [T]he [Florida] Department of Transportation began Florida's Elder Roadway User Program in 1992 to help seniors maintain their mobility and provide a safer system" ¹⁰⁰ This program concentrates on the "natural effects of aging that apply to driving," which includes vision problems as well as problems with making decisions.¹⁰¹ To rectify these aging problems, Florida provides its elder drivers with better guidance by implementing more legible road signs and by allotting drivers with more advanced warnings of roadway conditions.¹⁰²

⁹⁵ Bodnar, *supra* note 61, at 1722.

⁹⁶ *Id.*

⁹⁷ *See id.*

⁹⁸ *See id.* at 1722-23.

⁹⁹ *See Collins, supra* note 4, at G16 (stating that "[s]ome people take advantage of Florida's leniency. After failing her driver's test in Illinois, one of the most restrictive states, an elderly woman, who declined to be identified, received a license renewal without an examination in Florida, where she spends winters.").

¹⁰⁰ *Making Roads Safer for Elder Drivers, supra* note 27, at 1.

¹⁰¹ *Id.*

¹⁰² *Id.*; *see also Senior Drivers, supra* note 13, at 2-5 (stating that New York does not feel it is appropriate to test drivers based on their age because, a person's age is not an accurate indicator of their ability to safely drive an automobile). New York does not allow age based testing since they contend that it is age-based discrimination. *Id.* It would also be very costly to test each driver over the age of sixty-five. *See id.* Instead, New York suggests that car companies design safer cars, that roads are made safer by making signage easier to read, lanes easier to follow, and the timing of the traffic devices more efficient. *Id.* Since there is a perceived connection between aging and one's fitness to drive, some suggest that increased testing should be done. *See id.* However, even if this testing began at a young age, and even if it avoided political protests from senior groups, this type of testing would still be very costly and would still discriminate on the basis of age. *See id.* Moreover, testing is passive; it would not improve a driver's skills, nor would it make roads safer for a driver to navigate. *See supra* note 72 and accompanying text.

Although each state is trying to remedy the problems that seniors have while driving, there is a need for a more educated, and a more focused approach. Of course this will be a difficult task, but this is an important task, and one that must be accomplished, especially since the number of elder drivers is rapidly increasing.¹⁰³ The foundation to rectifying the problems with elder drivers would be a federal study that examines the most dangerous medical conditions, and the most problematic driving tasks that present the greatest dangers for elderly drivers.¹⁰⁴ This information would provide the focus needed to achieve this worthy goal. To implement a national safety standard, Congress should use its spending power¹⁰⁵ to offer states the incentive to adopt the policy of states such as Florida and New York, that focus on making driving easier for the elderly, by making roads and signs that minimize the elder drivers' problems.¹⁰⁶ This approach should be taken because age-based testing does not seem to be a viable solution due to the political obstacles associated with it.¹⁰⁷

¹⁰³ See *Senior Drivers*, *supra* note 13, at 1; see also *Improving Transportation for a Maturing Society*, *supra* note 3, at 56 (admitting that there are limits when trying to develop guidelines for assessing older drivers). Additionally, the U.S. Department of Transportation (DOT) is encouraging government studies to determine the relationship between medical conditions and crash involvement. *Id.*

¹⁰⁴ See *Improving Transportation for a Maturing Society*, *supra* note 3, at 56 (admitting that they are limited when trying to develop guidelines for assessing older drivers, the DOT is encouraging the government to sponsor studies to determine the relationship between medical conditions and crash involvement). While the DOT initially made this demand in their 1997 report, there has yet to be a study that reveals this needed information. *Id.*

¹⁰⁵ See JEROME A. BARRON & C. THOMAS DIENES, *CONSTITUTIONAL LAW* 100 (4th ed. 1995) (explaining that our Constitution gives Congress the power to spend for the general welfare). By using the spending power, Congress can attach conditions when granting money to a state. *Id.*; see also *South Dakota v. Dole*, 483 U.S. 203, 207 (1987) (holding that the spending power is appropriate if the spending is for the general welfare, the condition on the states is clear and unambiguous, and the condition is clear and related to a legitimate federal interest). By doing this, Congress can set and achieve a national standard for safer roads. *Id.* at 208.

¹⁰⁶ See *Senior Drivers*, *supra* note 13, at 3; see also *Making Roads Safer for Elder Drivers*, *supra* note 27, at 1-2.

¹⁰⁷ See *Bodnar*, *supra* note 61, at 1738-39; see also *Collins*, *supra* note 4, at G16 (stating that the AARP opposes age restrictions on the privilege to drive as age discrimination). In the alternative, the AARP recommends its educational program that emphasizes the importance of recognizing and understanding driving hazards. See *id.* This program focuses on evaluating elder drivers, and then providing them with information and instruction. *Id.* Therefore, the AARP encourages elder drivers "to reduce their driving gradually, perhaps giving up

Furthermore, testing does nothing to help a person drive safely.¹⁰⁸ However, some case by case testing could be helpful. This could be done if doctors were properly trained to recognize drivers who are a danger to themselves and to others. The doctors could then make referrals to the DMV who would then test these drivers.¹⁰⁹

When seniors can no longer drive, they need public transportation that will cater to their wants and their needs.¹¹⁰ Much of today's public transit caters to commuters, not the elderly.¹¹¹ The means of public transportation must also fit the particular needs of the elderly who may be physically restricted from getting to a bus stop, waiting for a bus or getting into a bus.¹¹² Taxis and other "Dial-A-Ride" programs can be expensive.¹¹³ One solution to this problem is evidenced by the Portland, Maine based "Independent Transportation Network."¹¹⁴ This program provides a round-the-clock service, as well as reduced fare opportunities for those seniors who share a ride or trade in their car for credit.¹¹⁵ This system costs half as much as a taxi service, and transports the elderly to social functions as well as to medical appointments.

IV. TECHNOLOGICAL DEVELOPMENTS AND ELDERLY DRIVERS

"As baby boomers get older, . . . the number of elderly highway fatalities will surpass that of deaths from drunk driving."¹¹⁶ Developments in automobile and road technologies may present the greatest opportunities for elder Americans to safely maintain their driving privilege, and to avoid this sobering prediction from

night driving, driving during rush hour or driving on busy highways." *Id.*; see also Mercier & Falb, *supra* note 1, at 4.

¹⁰⁸ See *They aren't Dangerous*, *supra* note 7, at 6.

¹⁰⁹ See Craig D. Young, *Health, Safety, and the Older Driver*, PATIENT CARE, Jan. 15, 2001, at 22, available at 2001 WL 26231286.

¹¹⁰ See *Improving Transportation for a Maturing Society*, *supra* note 3, at 41 (complaining that in spite of the fact that only three percent of seniors travel by public transportation, thirty-two million elderly Americans depend on this form of transportation). Those seniors who depend on public transportation usually have no other means of mobility. See *id.* The lack of alternative transportation is especially problematic for older people living in rural areas where there is an insufficient or no mass transportation option. See *id.*

¹¹¹ *They aren't Dangerous*, *supra* note 7, at 5; see also *supra* note 75.

¹¹² See *id.*

¹¹³ *Id.*

¹¹⁴ *Id.*

¹¹⁵ *Id.*

¹¹⁶ Alan Leo, *In Tomorrow's Car, Who's Driving?*, MIT TECH. REV., May 23, 2001, at http://www.technologyreview.com/articles/wo_leo052301.asp (last visited Mar. 27, 2002).

coming true.¹¹⁷ New technologies have the ability to make America's roads safer, and to bridge the gap between the abilities of younger and older drivers, by supplementing the diminished physical and mental capacities of the elder driver.¹¹⁸ In fact, a technology aimed at making driving safer for a senior will improve the safety of all motorists.¹¹⁹ In accomplishing this, technology may also avoid the passing of laws that unfairly target and discriminate against older drivers; this would save the high monetary and damaging social costs of states having to defend the constitutionality of these laws. Therefore, the development of technologies will do more than save lives; they also have the potential to keep the diverse age groups of our society united.

However, for a technology to properly supplement the deficiencies of older drivers and meet its perceived potential as a social equalizer, it must be developed for the particular needs of older drivers.¹²⁰ Furthermore, because some technologies have the potential of confusing elder drivers, they should only be used after a proper study is conducted to show that the technology will improve a targeted and specific need of elder drivers.¹²¹ Of course, the automobile industry, and governments should strive to develop and utilize technologies in automobiles and also in road engineering that can remedy the most obvious, and most severe

¹¹⁷ See *Improving Transportation for a Maturing Society*, *supra* note 3, at 53; see also A. James McKnight, *Too Old to Drive?*, ISSUES IN SCI. & TECH., Winter 2000-01, at 63; see also Collins, *supra* note 4, at G16 (quoting Joseph Coughlin, the director of the transportation and aging program at the Massachusetts Institute of Technology, who stated that along with educating drivers of the affects of aging, "[w]e need to develop a next-generation vehicle for older drivers, . . . [o]nce it was cruise control, maybe in the future it will be night vision. The whole consumer marketplace is based on customization, and it's silly to think that as the market matures people won't want to customize the automobile.").

¹¹⁸ See *Carmakers Catering to Older Drivers*, *supra* note 50, at 33.

¹¹⁹ Cf. *Improving Transportation for a Maturing Society*, *supra* note 3, at 54; see also David Sedgwick, *Detroit Solving Age-Old Problems*, CHI. TRIB., Feb. 15, 1996, at 13E (analogizing that "[a]n older driver is like the miner's canary, . . . [i]f you solve a problem for an older driver, you have solved it for tired drivers, distracted drivers and anyone who is operating at less than an optimal level."), available at LEXIS, News Library, Chtrib File.

¹²⁰ See *Improving Transportation for a Maturing Society*, *supra* note 3, at 54 (revealing that a technology developed for the general population may impair an older drivers abilities).

¹²¹ See *id.*; see also Tim Moran, *Designers Worry Technology Pushes Drivers to the Limit*, AUTO. NEWS, June 21, 1999, at 24J, available at LEXIS, News Library, Autonw File.

problems that interfere with elder individuals' ability to safely operate an automobile.¹²²

Developing Useful Technologies for the Elder Driver

Few automobile engineers have lived long enough to experience the challenges of old age.¹²³ The discrepancies between automobile designs intended for younger individuals, and the design needs for elder drivers have forced many seniors to retire from driving prematurely.¹²⁴ While some younger drivers might be relieved when they learn this fact,¹²⁵ the automobile industry is not.¹²⁶ Older drivers represent the largest, the most significant, and the fastest growing market in the country.¹²⁷ Because of this,

¹²² See *Carmakers Catering to Older Drivers*, *supra* note 50, at 34.

¹²³ See Michelle Krebs, *Shifting Gears*, AM. DEMOGRAPHICS, Jan. 2000, at 52, available at LEXIS, News Library, Amdem File; see also Anthony Lewis, *The Third Age Suit: Driving in the Slow Lane*, AUTO. NEWS INT'L, June 1, 2000, at 24, available at LEXIS, News Library, Autonw File.

¹²⁴ See Hinde & Ramesh, *supra* note 8, at 1 (buttressing this point, Dean Southwell states that the automobile industry has neglected older drivers by failing to meet their needs). "Many elderly people simply give up driving because they find it too difficult, or feel they are no longer safe behind the wheel . . ." *Id.*

¹²⁵ See generally Collins, *supra* note 4, at G16 (adding that many licensing officials think that seniors are unsafe drivers).

¹²⁶ See Hinde & Ramesh, *supra* note 8, at 2; see also *supra* Part II and accompanying text (revealing the problems that arise when elderly Americans stop driving).

¹²⁷ See Patricia Anstett, *Looking Ahead; Auto Industry, Eye Experts Join for Study of Vision Problems, Driving*, CHI. TRIB., Sept. 3, 2001, at 1 (estimating that by the year 2020, older drivers will spend \$475 billion on automobiles); see also Krebs, *supra* note 123, at 52 (according to Nate Young, group vice president of market planning, new product development and industrial design for Plymouth, Michigan-based Johnson Controls Inc., one of the world's largest suppliers of automotive interior components, "[t]hrough their retirement years, [seniors] will grow stronger as a buying entity and will remain so until their time is gone"). The article further noted that:

[t]he size of the population segment, its affluence, and longer life expectancy - - which suggests baby boomers will drive longer than did their parents - - has captured the attention of the auto industry, which is trying to get inside the heads of [older] people . . . to figure out if and how their car-buying patterns will change as they grow older.

At the moment, over-50 car buyers generally purchase more expensive vehicles than the rest of the population, ranging from pricier mid-size cars to top-of-the-line luxury automobiles and premium sport utility vehicles, according to an exclusive analysis for *American Demographics* of the 1999 APEAL study done by J. D. Power & Associates, a market research firm in Agoura Hills, California. The APEAL study is based on responses from nearly 88,000 new-vehicle owners, and examines what people like about their new cars and trucks and what kinds of features they require in their vehicles.

Ford Motor Co. has developed the "Third Age Suit" that allows a younger engineer to personally experience many of the challenges that people living in the third age of life face.¹²⁸ "[T]he Third Age Suit, [is] an outfit its designers don to simulate movements of an aging person. The coveralls have devices like athletic braces at all the joints, including the ankles, knees, and neck, that restrict movement. Rubber gloves simulate the way an older person loses touch and fine motor skills. Heavily-tinted, fogged glasses replicate the yellowing of the eyes."¹²⁹ This full body suit fulfills its intended goal in that it makes automobile designers and engineers more aware of the needs of older drivers.¹³⁰

Balancing Form and Function

Even when automobile designers are able to accommodate the needs of an older driver, the design that is required to accomplish the increased comfort and the increased safety may not be aesthetically conducive to the modern mode of automobile style.¹³¹ "You have to be careful about designing an older person's car. I still get letters from older buyers about bringing back the long horizontal speedometer."¹³² Elder drivers like controls and

The study shows that the over-50 crowd is slightly more likely to purchase domestic brands than imported ones, favoring domestic name plates in 12 out of 19 vehicle segments, versus 11 of 19 for the under-50 group.

The major difference between the over-50 and under-50 buyers is psychographic—why they buy what they buy. The older buyers lean toward more sensible vehicles, while the largest group of younger buyers consider themselves 'practical enthusiasts,' they want utility, but with a little more fun and emotion. As expected, the plus-50 buyers rate quality, reliability, and durability higher than do under-50 buyers, who rank emotional appeal higher.

Id. Jacques daCosta, J. D. Power's senior manager of product research further noted that "[t]he younger buyers want more sex appeal and flash. That's what excites them." *Id.* The list of must-have features chosen by older buyers revolve around comfort and convenience, and include "leather seats, lumbar support, and sturdy cup holders; younger buyers, meanwhile, list premium audio systems with CD changers and sunroofs as higher priorities. Both groups rank safety and security features—such as antitheft alarms and side airbags—high on their wish lists." *Id.*

¹²⁸ See Lewis, *supra* note 123, at 24.

¹²⁹ Krebs, *supra* note 123, at 52.

¹³⁰ See *id.*

¹³¹ See *id.* (stating that the design needs of senior drivers will frequently clash with the styles demanded by younger drivers).

¹³² Jack Keebler, *Friendlier Vehicle Interiors; Automakers Move to put Comfort First as Women and Older Drivers Demand a More Ergonomically Designed Vehicle*, ORLANDO SENTINEL, Aug. 4, 1994, at F1, available at LEXIS, News Library, Orsent File.

gauges that are large and easy to use.¹³³ They also prefer color changes among controls and gauges that operate different functions, and that convey different information so they can easily distinguish one control or gauge from another.¹³⁴

However, these seemingly simple demands complicate the job of interior designers who must include many features in the complex dashboards of today's automobile.¹³⁵ They also clash with the desires of younger drivers who like complex sound systems that have many controls for fine-tuning the sound, and the sporty look offered by a number of gauges.¹³⁶ Furthermore, designers are concerned that large gauges and controls will make the automobile's interior appear childish, with a "Fisher-Price look."¹³⁷

The balancing of form and function is no doubt a difficult task that automobile designers must learn to master. This is especially true when complex new technologies are introduced with the hope of making the task of driving safer. Any additional feature added to an interior must be easy to master and serve a purpose beyond displaying the newest gadget that science can offer. "The 1980s were a celebration of technology; interiors were like fireworks displays, . . . we're [now] rediscovering that the top priority is the human user. We're getting back to reality. [Many] of the earlier interiors were not only absurd but [also] unsafe."¹³⁸

*Technologies Assisting Vision*¹³⁹

Vision, the most important sense used while driving, is also the sense most in need of assistance, and improvement.¹⁴⁰ "[D]river vision aids and safety systems can save resources and lives . . ."¹⁴¹ Realizing this, scientists have developed a plethora

¹³³ See *id.*

¹³⁴ See *id.* (stating that it is preferred by older drivers to have radio and heater gauges in white with a dark background).

¹³⁵ See *id.* (providing that the addition of air bags and cup holders has limited the amount of available interior space).

¹³⁶ See *id.*

¹³⁷ See *id.* (quoting a statement made by Lyman Forbes, the manager of human factors of Ford Motor Company).

¹³⁸ See Keebler, *supra* note 132, at F1.

¹³⁹ Technologies that assist an elderly driver's vision will also improve other impairments that frequently affect a senior's ability to safely operate an automobile. To avoid repetition, the visual technologies that are multi-beneficial will only be discussed when the non-visual benefits are especially significant.

¹⁴⁰ See *supra* notes 25-33 and accompanying text.

¹⁴¹ Kami Buchholz, *Enhanced Driving/Night Vision Conference Stresses Safety*, AUTO. ENG'G, Dec. 1, 1997, at 53 (quoting Dr. A. Fenner Milton, Deputy Assistant Secretary for Research and Technology/Chief Scientist, Headquarters,

of highly technological devices to supplement vision.¹⁴² Ironically, the technologies with the greatest potential of making driving safer and saving lives, such as night vision, reverse aids, and lane changing aids, depend heavily upon technologies that were originally created by the U.S. military as tools of war.¹⁴³ Night vision uses infrared technology that offers a picture similar to a television, and it uses silicon processing, and electronic technologies.¹⁴⁴ When working at maximum capacity, this technology allows the driver to operate the automobile at night with daylight like vision.¹⁴⁵ This may provide a very useful tool for elder drivers since their eyes need much more light to see properly, which frequently cause them to struggle with nighttime driving.¹⁴⁶ "Night Vision" works by detecting the heat of objects on the road and then projects it onto the automobile's dashboard.¹⁴⁷ The night vision system includes installing an infrared camera near the automobile's headlights that conveys the illuminated visual of the road to the driver.¹⁴⁸

This technology is a useful tool for drivers who struggle with driving at night and for all drivers who are forced to navigate in conditions that create poor visibility due to poorly lit roads, rain, or fog.¹⁴⁹ "[T]he technology allows drivers to see objects like moving animals three times farther than with high-beam lights alone."¹⁵⁰ Perhaps the most significant effect that night vision has on drivers is its ability to reduce the stress that vision

Department of the Army who "oversees the Army's research and technology program, involving 10,000 scientists/engineers with an annual budget of \$1.4 billion"), available at 1997 WL 12695029.

¹⁴² See *Road Safety Research Report No. 25, Older Drivers: A Literature Review, Impact of New Technology on Older Drivers*, LOCAL GOV'T AND THE REGIONS, DEP'T FOR TRANSP., (2001), at 1, available at <http://www.roads.dtlr.gov.uk/roadsafety/research25/09.htm> (last visited Mar. 28, 2002) [hereinafter *Road Safety Research Report No. 25*].

¹⁴³ See Anstett, *supra* note 127, at 1 (commenting how present day accomplishments in technology had begun as developments in aerospace and the military).

¹⁴⁴ See Buchholz, *supra* note 141, at 53 (noting that automobile night vision uses uncooled infrared technology that is much more cost efficient than cooled IR which can cost in excess of \$30,000 per unit). The major difference between cooled and uncooled IR is that uncooled IR provides evidence of whether it will work without having to completely test the individual unit. *Id.*

¹⁴⁵ *Id.*

¹⁴⁶ See *supra* notes 29-30 and accompanying text.

¹⁴⁷ See Anstett, *supra* note 127, at 1.

¹⁴⁸ See *Road Safety Research Report No. 25, supra* note 142, at 5.

¹⁴⁹ See *id.*

¹⁵⁰ Anstett, *supra* note 127, at 1.

problems create.¹⁵¹ Night vision can "consequently reduce the inappropriate behaviour [sic] and decisions often seen in drivers under this kind of stress."¹⁵² While night vision has the potential of eliminating some of the dangers of people driving with poor vision, its availability is limited, and its cost is high.¹⁵³

Less expensive devices that also require a less dramatic change in the way people drive will be available to provide elder drivers with better nighttime eyesight. "The auto headlamp, long regarded as a commonplace fixture, is fast emerging from the Dark Ages."¹⁵⁴ These new headlights use cutting-edge technologies that produce more light, and that enable drivers to have a superior control over the direction of the light than that of the standard headlight.¹⁵⁵

An example of these super headlights is the high intensity discharge (HID) headlight. This illumination system works by generating an arc that is charged with electricity between a pair of electrodes that are encased in a bulb containing xenon gas.¹⁵⁶ This creates a brighter light with a longer reach, which allows the driver to have improved vision while driving at night.¹⁵⁷ A HID system with a high beam function is also being created.¹⁵⁸ This will electro-mechanically change the position of the bulb to change the way the light hits the reflector.¹⁵⁹ Another use of HID is to combine it with fiber optics.¹⁶⁰ The power of HID can provide the

¹⁵¹ See *Road Safety Research Report No. 25*, *supra* note 142, at 5.

¹⁵² *Id.* (noting that younger drivers use the security of night vision to drive at high speeds).

¹⁵³ See Anstett, *supra* note 127, at 1 (stating that night vision was first made available in 2000 for the Cadillac DeVille, at a cost of \$2,250). Production was on a limited basis, initially 3,500 cars had the technology, it was then included in 6,000 more cars and they quickly sold out. *Id.* Cadillac is now using night vision as a marketing device.

¹⁵⁴ Ralph Kisiel, *Shining Stars: A New Generation of Headlamp Technology Will Brighten the Lives of Aging Drivers*, *Auto. News*, Feb. 24, 1997, at 8I, available at LEXIS, News Library, Autonw File.

¹⁵⁵ See *id.* (stating that these lights will improve senior's driving ability by providing more light to the side of the road); This type of headlight will be a helpful addition for elder drivers who have poor peripheral vision. *Id.*

¹⁵⁶ See *id.* (pointing out that HID headlamps do not have a filament, the part of the bulb that usually burns out, as a result, HID bulbs last more than 100,000 miles).

¹⁵⁷ See *id.* (illustrating that a driver would have improved vision when the light happens to be bluish and brighter).

¹⁵⁸ See *id.*

¹⁵⁹ See *id.* (noting that this technology is not only cost effective, but it will also allow designers to explore different body styles with additional space).

¹⁶⁰ See Kisiel, *supra* note 154, at 8I.

needed energy to run a fiber optic headlamp system, which will allow automobile designers to move the headlamps to the center of the automobile.¹⁶¹ Fiber optic systems can reduce energy consumption by two thirds, and they are more durable than traditional headlamps.¹⁶²

While the potential of HID is promising, it costs twice as much as traditional headlights; there are other even less expensive technologically advanced headlamps being developed.¹⁶³ One of these headlamps will include seven bulbs and seven reflectors that will use sensors to automatically react according to the road, weather conditions, and the driver.¹⁶⁴ "In city traffic, for example, three of seven reflectors are designed to provide broad illumination on each side of the vehicle. A different combination of reflectors would provide light with long-distance range for high-speed highway driving. Curves would be better illuminated with yet another set of reflectors."¹⁶⁵

Reverse and lane changing aids have the ability of making the elder driver's most challenging driving tasks easier and safer.¹⁶⁶ "[O]lder drivers often have trouble seeing other vehicles in their blind spots—behind and to the side of the car."¹⁶⁷ Reverse systems such as PanoramicVision include cameras fixed to the sides and rear exterior of the automobile that send an image to a screen on the automobile's dashboard.¹⁶⁸ This technology enables the driver to see what is along side of, and what is behind the automobile while looking forward at the display screen.¹⁶⁹ Such technology can eliminate the dependency on rear view mirrors that are

¹⁶¹ See *id.*

¹⁶² See *id.* (describing that a fiber optic system can illuminate an entire automobile). This would replace the current lighting systems that use over eighty bulbs. See *id.*

¹⁶³ See *id.* (indicating that HID suppliers, such as Robert Bosch, are paving the way and helping the industry by developing more efficient headlamps).

¹⁶⁴ See *id.* (stating that traditional headlights only have one reflector).

¹⁶⁵ Kisiel, *supra* note 154, at 81.

¹⁶⁶ See Anstett, *supra* note 127, at 2-3 (describing new vehicle technologies of LaneCheck and ReversAid that help drivers reduce accidents involving changing lanes and backing up).

¹⁶⁷ Sedgwick, *supra* note 119, at 13E.

¹⁶⁸ See Anstett, *supra* note 127, at 2-3 (providing that the PanoramicVision system was developed by Donnelly, a company that has also developed a lane changing detector and a baby viewer, that allows a guardian to see a child without having to turn around, and other automobile detection systems that use cameras).

¹⁶⁹ See *id.*

inaccurate in their visual representation of an object's proximity to the automobile.

Since many senior drivers must cope with the loss of peripheral vision when the scope of their vision narrows,¹⁷⁰ technologies that assist lane changes, a maneuver that requires acute peripheral vision, can dramatically improve an elderly driver's ability to drive safely.¹⁷¹ Improper lane changes are the cause of about 244,000 accidents in America every year.¹⁷² One of the technologies developed to remedy this problem is a device that changes the view of the driver-side exterior mirror to a wider-angled view when activated.¹⁷³ When the driver activates the turn signal, the wider-angled mirror opens, allowing the driver to get a better view of the approaching traffic.¹⁷⁴

Mirrors and windows that reduce the amount of glare reflected at a driver's eye, as well as the amount of blind spots, are other developments that make lane changes and related driving tasks more manageable. Glare is especially problematic to the many elder drivers who suffer from cataracts, macular degeneration, or glaucoma.¹⁷⁵ These high-tech mirrors will protect the sensitive eyes of elder drivers by electrically darkening when they are exposed to excessive light.¹⁷⁶ In addition to this, "[m]irrors will be bigger and fitted with magnifying glass insets and prisms to widen the angle of view."¹⁷⁷ Studies have shown that these curved or aspheric mirrors have been responsible for decreasing accident rates.¹⁷⁸ Windows will be polarized to reduce the amount of glare, and designers, in an attempt to reduce blind spots, will

¹⁷⁰ See Voelker, *supra* note 32, at 1610 (citing a study of 2500 elderly persons showing a correlation between restricted vision and automobile accidents).

¹⁷¹ See Anstett, *supra* note 127, at 2.

¹⁷² *Id.*

¹⁷³ *Id.*

¹⁷⁴ See *id.*; see also Hinde & Ramesh, *supra* note 8, at 2 (providing that glare is responsible for many accidents involving older drivers).

¹⁷⁵ See *Older Drivers*, *supra* note 23, at 1 (discussing how vision is key in driving and how impairments can lead to crashes).

¹⁷⁶ *Carmakers Catering to Older Drivers*, *supra* note 50, at 33; see also Anstett, *supra* note 127, at 2 (noting that mirrors may soon display information such as driving speed, fuel amounts, and other information so that drivers can have quick access to this information and so that drivers can keep their eyes on the road). However, some experts believe that this has the potential to cause information overload and can distract an older driver. *Id.*

¹⁷⁷ Hinde & Ramesh, *supra* note 8, at 2.

¹⁷⁸ See Anstett, *supra* note 127, at 2 (reporting that drivers who use these mirrors in England and Finland have reduced their risk of crash involvement).

also increase the amount of glass while decreasing the width of metal, plastic and pillars.¹⁷⁹

Additionally, to further reduce the dangers caused by blind spots, and with the hope of preventing all slow-speed accidents, scientists have created the collision warning system.¹⁸⁰ By using high frequency Doppler radar, the collision warning system can issue an alert of approaching peril.¹⁸¹ "The CWS transmits radar signals from the front and side of the vehicle. Upon sensing a potential hazard in front of the vehicle, a combination of lights and audible tones are emitted from the system's driver display unit warning the driver to take evasive actions."¹⁸² This system can effectively prevent a driver from colliding with still or slow-moving objects.¹⁸³ This system is especially helpful in an automobile that has blind spots.¹⁸⁴ The collision warning system was developed to assist drivers in inclement driving conditions, and during nighttime driving.¹⁸⁵

Currently, road designs present many problems for seniors with poor or deteriorating eyesight.¹⁸⁶ "The single greatest concern in accommodating older road users . . . is the ability of these persons to negotiate intersections safely."¹⁸⁷ Sixty percent of the injuries caused by elderly driver crashes occur at intersections.¹⁸⁸ Thirty-seven percent of the fatalities caused by elderly driver crashes occur at intersections.¹⁸⁹ Furthermore, "[f]or drivers 80 years of

¹⁷⁹ See Hinde & Ramesh, *supra* note 8, at 2.

¹⁸⁰ See Dan Holt, *Collision Warning System*, AUTO. ENG'G, Nov. 1, 1996, at 46 (noting that Eaton Corp. developed the system, known as the VORAD EVT-200 CWS), available at LEXIS, News Library, Auteng File.

¹⁸¹ See *id.*

¹⁸² *Id.*

¹⁸³ *Id.*

¹⁸⁴ See *id.* (explaining that the system includes "[a] blind-spot sensor mounted on the side of the vehicle and a display unit mounted in the vehicle near the passenger side mirror [to] alert the driver to potential blind spot hazards.").

¹⁸⁵ See *id.*

¹⁸⁶ See McKnight, *supra* note 117, at 65.

¹⁸⁷ *Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians*, U.S. DEP'T OF TRANSP., Pub. No. FHWA-RD-01-051, at <http://www.tfhrc.gov/humanfac/01105/howtouse.htm#howto> (last visited Apr. 1, 2002) [hereinafter *Guidelines and Recommendations*]; see also *Recommendations for Safer Elder Drivers*, U.S. DEP'T OF TRANSP. (2001), at http://wwwcf.fhwa.dot.gov/tfhrc/safety/pubs/older/rec/rec_1.htm (last visited Apr. 1, 2002) [hereinafter *Recommendations for Safer Elder Drivers*]; see also *supra* notes 14-67 and accompanying text (discussing some of the major problems that cause older drivers to crash at intersections).

¹⁸⁸ See *Guidelines and Recommendations*, *supra* note 187, at 11.

¹⁸⁹ See *id.*

age and older, *about half* of fatal crashes occur at intersections . . . compared with 23 percent or less for drivers up to 50 years of age¹⁹⁰ When an older driver's vision is hampered, distinguishing between the vital and the unnecessary sights of the road becomes more difficult.¹⁹¹ Because of this, and slowing cognitive functions, older drivers require greater distances so they can respond to what they see.¹⁹²

Changes in road design can improve an elder driver's ability to properly anticipate, and to safely execute driving tasks. Altering the angle of intersections,¹⁹³ and transforming intersections that are two-way stops to four-way stops can reduce collisions by fifty percent.¹⁹⁴ Other changes, such as widening receiving lanes,¹⁹⁵ marking lanes and curbs with reflective paint and reflectors,¹⁹⁶ and using separate traffic signals for each lane¹⁹⁷ can make turning at an intersection a less dangerous task for senior drivers. Posting larger roadway signs and markings will make it safer for seniors with poor eyesight to drive. "Highway signs can be made easier for the elderly to see and read by using fluorescent lighting, reduced background clutter, increased size and reflectivity of letters, certain fonts for text, and symbols instead of words."¹⁹⁸ Fur-

¹⁹⁰ *Id.*

¹⁹¹ See *They aren't Dangerous*, *supra* note 7, at 4 (explaining how many seniors may find it increasingly difficult to sort out visual distractions while driving).

¹⁹² See *id.*

¹⁹³ See *Guidelines and Recommendations*, *supra* note 187, at 3 (recommending that intersections that do not have a restricted right of way should join at a ninety degree angle, and that intersections that have a restricted right of way should merge at least at a seventy five degree angle). Designing intersections at these angles makes for a more natural and predictable turn. *Id.*

¹⁹⁴ See *They aren't Dangerous*, *supra* note 7, at 4.

¹⁹⁵ See *id.* (noting that it is easier for an older driver to make a wider, and more gradual turn than it is for them to make sharp turns).

¹⁹⁶ See *id.* (providing that these visual indicators make driving easier and less stressful for seniors); see also *Carmakers Catering to Older Drivers*, *supra* note 50, at 33 (noting that these indicators are very important for senior drivers with poor vision, especially in bad weather conditions).

¹⁹⁷ See *They aren't Dangerous*, *supra* note 7, at 4 (stating that the older drivers frequently find themselves trying to negotiate a turn from the wrong lane). Turning arrow light signals should also be changed to show a green arrow, followed by a yellow arrow, followed by the standard red ball to signal that no turn can be made. See *Guidelines and Recommendations*, *supra* note 187, at 11. It is suggested that the commonly used red arrow, instead of the red ball, confuses drivers. *Id.*

¹⁹⁸ McKnight, *supra* note 117, at 64.

thermore, adjusting the timing of traffic lights¹⁹⁹ will make driving easier for elder drivers, as well as helping to save lives.²⁰⁰

However, changing roads to suit the needs of elder drivers will be very costly.²⁰¹ In fact, the cost of making the necessary adjustments may exceed the budget that some states allocate for highways and roads.²⁰² Therefore, it is important that states conduct the proper research to determine which of their communities have the greatest concentration of older drivers, so that the fruits of these changes can be enjoyed by the maximum number of people who would most benefit from them.²⁰³ This would provide a wise and targeted attack on the problem of poor road design and would provide the needed relief without accruing unnecessary cost.²⁰⁴ But whenever these changes can be made, they should be made, since they improve the abilities of all drivers, thus making roads safer for all users.²⁰⁵

Technologies Assisting Arthritis

The pain and stiffness caused by arthritis can lead to fatigue and distraction while driving that may impede an afflicted driver's ability to react quickly.²⁰⁶ Arthritis sufferers are common in America, especially among the elderly population.²⁰⁷ Due to the prevalence of arthritis in the aging populations, and the market significance that senior's represent to the automobile industry,²⁰⁸ automobile makers have made changes that allow arthritic individuals to drive with increased comfort and safety.²⁰⁹ "Most new [automobile] models can be equipped with a variety of power-operated features, such as power steering, brakes, locks, windows and

¹⁹⁹ See *They aren't Dangerous*, *supra* note 7, at 4 (discussing that an all red phase on traffic lights at an intersection helps prevent crashes by allowing a dead phase in traffic).

²⁰⁰ See *Senior Drivers*, *supra* note 13, at 4-5; see also *Making Roads Safer for Elder Drivers*, *supra* note 27, at 2 (listing the various technological and engineering advances).

²⁰¹ See *McKnight*, *supra* note 117, at 65.

²⁰² See *id.* at 64.

²⁰³ See *id.* at 65.

²⁰⁴ See *id.*

²⁰⁵ See *Improving Transportation for a Maturing Society*, *supra* note 3, at 54.

²⁰⁶ See *supra* notes 46-49 and accompanying text.

²⁰⁷ See *Krebs*, *supra* note 123, at 52 (noting that "one in five Americans has a physical disability, and arthritis due to aging is the biggest culprit").

²⁰⁸ See *id.*

²⁰⁹ See Melissa James, *Don't Miss Out on the Freedom of the Road!*, *ARTHRITIS TODAY*, May-June, 1988, at 24 (on file with the Albany Law Journal of Science & Technology).

"A radar headway sensor, digital signal processor, and a longitudinal controller handle this calculation."²¹⁸ The radar technology evaluates the distance of the leading automobile and adjusts the speed of the car by sending a signal to the engine, or the brakes.²¹⁹ Since the system uses the most technologically advanced electronics and MMIC²²⁰ radar, the microwave parts can be contained in a one-chip system that enables the system to be cost effective.²²¹ These high-end technologies also allow the radar to operate in all weather conditions.²²² "In time [the driver] will have a sensor field around the car, which will couple with the vehicle's intelligence. It's the beginning of the microwave era in automotive electronics, . . . the technology should evolve to collision avoidance systems that provide emergency braking."²²³

*Technologies Assisting Elders Who are Frail*²²⁴

Technological developments have the potential to reduce the high number of older Americans who die, or are seriously injured, in automobile accidents due to frailty.²²⁵ It is both ironic and sad that the devices that are designed to protect drivers actually cause many of these deaths and injuries.²²⁶ This is because safety

Id.

²¹⁸ *Auto Cruise Control Morphs*, ISA: INTECH, Mar. 5, 2001, at <http://www.isa.org/journals/intech/brief/1,1161,579,00.html> (last visited Apr. 1, 2002).

²¹⁹ *See id.* (remarking that the drivers operate the systems the same way they would set a standard cruise control, only the technology used for the adaptive cruise control is in the front bumper or grill of the car). The radar has a range of 492 feet and can track a car at speeds up to 112 miles per hour. *Id.* at 2. However, the automatic braking system will only apply thirty percent of the car's braking power. *Id.* When the road is clear, or when the driver changes lanes, the car will resume the speed that the driver initially set. *See id.*

²²⁰ *See id.* at 2 (stating that "MMIC is a process whereby active and passive devices such as diodes, inductors, capacitors, resistors, and interconnects fabricate on the same gallium arsenide chip.").

²²¹ *See id.*

²²² *Id.*

²²³ *Id.* (predicting that sensor related automobile systems will be a \$2.4 billion industry by 2010).

²²⁴ *See* Alonso-Zaldivar, *supra* note 54, at A1 (noting that adjusting to the frailty of the elderly will present serious challenges for the automobile industry). Technology will play a significant role in making cars more adapted to the needs of frail seniors. *See id.*

²²⁵ *See* Collins, *supra* note 4, at G16; *see also supra* notes 50-56 and accompanying text.

²²⁶ *See* Alonso-Zaldivar, *supra* note 54, at A1 (emphasizing that frail seniors are dying from the chest injuries caused by seat belts and air bags such as broken ribs, collapsed lungs, and heart damage). Eighty-six percent of seniors who die in car crashes suffer from fatal chest injuries. *Id.*

devices are not designed to meet the needs of seniors.²²⁷ "While the 'family' of dummies is being expanded to include an infant, a toddler and an elementary-school-age child, grandmother and grandfather are not yet in the picture."²²⁸ Therefore, seat belts and air bags are too rough on the chests of older drivers. This failure to develop proper safety devices for the elderly has caused them to frequently die in low impact accidents, resulting in a fatality rate twice that of younger adults.²²⁹ However, the startling number of seniors that are killed or seriously injured in low impact crashes has raised awareness of this problem and created a movement to reverse this trend.²³⁰

Automobile makers are beginning to cure these problems by redesigning airbags – by modifying their rate of inflation so that it is comparable to the impact of the crash.²³¹ The inclusion of these smart airbags in hot spots of collision activity will also aid frail bodies to survive crashes.²³² Seat belts are also being changed by using a four-point racing harness instead of the traditional shoulder strap belt. The four-point seat belt will spread the force of a collision evenly throughout the body.²³³ Additionally, inflatable belts can also prevent a severe impact.²³⁴ Soon, technology will provide an automobile that detects a driver's height, weight, and age, and then be able to regulate the safety devices accordingly.²³⁵

Technology's Potential to Confuse Elder Drivers

Despite the positive impact that technology will have on elder drivers' ability to operate an automobile, these needed additions

²²⁷ *Cf. id.* (noting that a healthy young adult is the model that is traditionally used in designing safety devices in automobiles).

²²⁸ *Id.* (acknowledging that safety devices are made primarily for young adults, despite the fact that more and more older people are driving); *see also supra* notes 123-30 and accompanying text (discussing the automobile industry's history of ignoring the needs of elder drivers). However, it seems that this trend is beginning to change. *See supra* notes 123-30 and accompanying text.

²²⁹ *See* Alonso-Zaldivar, *supra* note 54, at A1.

²³⁰ *See id.*

²³¹ McKnight, *supra* note 117, at 64.

²³² *See id.* (noting airbags are being added where impacts often occur, such as in the door panels and in the floor boards).

²³³ *See* Krebs, *supra* note 123, at 52 (comparing the safety and comfort features that make four point belts appeal to elder drivers, to the style elements that these belts represent to younger drivers).

²³⁴ *See* Alonso-Zaldivar, *supra* note 54, at A1.

²³⁵ *See id.* (explaining this point is Rolf Eppinger, chief of biomechanics for the National Highway Traffic Safety Administration when he stated that "[w]e are at a point where we have to say there is no 'one size fits all' for safety").

have the potential of complicating the task of driving.²³⁶ While there are many reasons for a caveat to be attached to seniors using these technologies, there are three main problems that have emerged; a reluctance to change the way they drive, a reluctance to use the technologies, and a variety of problems caused by dementia.²³⁷ "Indeed, the aging baby boomer is far less willing to jump on the newest technological features . . . than the younger set, even though it may fit their safety, security, comfort, and convenience requirements."²³⁸ Studies have indicated that sixty percent of elder drivers admitted that they are anxious when forced to use technology.²³⁹ Furthermore, studies that have tested seniors' abilities to drive vehicles equipped with these technologies have revealed that it takes seniors forty percent longer to respond to them than the response time of younger drivers.²⁴⁰

In order to improve the safety of automobiles and roads, technological innovations must be presented in a manner that is easy to learn, so drivers are willing and able to adapt to them.²⁴¹ However, learning to work a technology will not be enough to insure that it increases safety, one must also learn how these additions make driving safer, this includes being aware of the limitations of technology and the user.²⁴² For example, if visual technologies such as Night Vision and HID headlamps²⁴³ are to make nighttime driving safer, the person driving an automobile equipped with these advances must not test their safety limits by driving at

²³⁶ See e.g., *Road Safety Research Report No. 25*, *supra* note 142, at 1.

²³⁷ See generally *id.* at 2 (examining the effects of technologies on elderly drivers, studies have shown that technologies demand a change in how people drive by adding extra cognitive tasks, thus complicating the task of driving). "This suggests that giving older people extra information to process whilst driving may actually hinder, rather than aid performance." *Id.* at 1.

²³⁸ Krebs, *supra* note 123, at 52.

²³⁹ See *id.*

²⁴⁰ Jim Mateja, *Telematics Raise Age-Old Question in Design*, CHI TRIB., Mar. 22, 2001, at N1 (using a driving simulator, this study tested technologies including navigation systems), available at LEXIS, News Library, Chtrib File. This test showed that older drivers needed thirty three to one hundred percent longer than younger drivers to process this information and that they made more errors using the system. *Id.* "Even when parked, older drivers took almost 80 percent more time than younger drivers to enter information into a navigation system." *Id.*

²⁴¹ See Alison Smiley, *Auto Safety and Human Adaptation*, ISSUES IN SCI. & TECH., Winter 2000-01, at 70 (recognizing that the anticipated safety benefits of technological additions will require a focused attempt to adapt).

²⁴² See *id.* at 70-71; see also McKnight, *supra* note 117, at 67.

²⁴³ See *supra* notes 143-65 and accompanying text.

accelerated speeds or by driving in inferior visibility conditions.²⁴⁴ Adaptive cruise control and automatic braking systems can also present an added danger if misused.²⁴⁵ These technologies may induce an older driver to take longer trips, to drive while they are fatigued, and to devote their attention to non-driving operations.²⁴⁶ Therefore, prior to the introduction of new technologies, automobile manufacturers and the government must research and analyze the technologies affect on the driver.²⁴⁷

There is an enormous need to improve road safety . . . [since] about half a million people are killed annually in traffic crashes. In the United States alone in 1999 more than 40,000 people were killed and more than 3 million were injured. The economic cost in 1994 was more than \$150 billion. Road safety can be improved through high technology, but to do so, the complexities of human adaptation must be addressed and drivers must be informed about how these devices function.²⁴⁸

In order for technology to meet its potential of improving an elder driver's abilities to safely operate an automobile, it must be made to suit the complex needs of the elderly driver.²⁴⁹ To achieve this, researchers are developing simulators that test how elder drivers interact with technological additions to the automobile.²⁵⁰ This is a situation where technology will help other technologies meet their intended goal.

The AgeLab at the Massachusetts Institute of Technology has developed Miss Daisy, a new Volkswagen Beetle converted into a

²⁴⁴ See Smiley, *supra* note 241, at 70. This article also stated that:

[t]here is already good reason for skepticism. Anti-lock brakes were expected to significantly reduce crashes. These devices work by sensing lockup and releasing the brake before applying it again: the same thing a driver does when pumping brakes but far more rapidly. By these means skidding is prevented and steering control is maintained. But as large studies have shown, they have not had a demonstrable effect on overall crash rates. Drivers appear to have changed their behavior in ways that reduced or eliminated the safety cushion provided by the improved braking.

Id. Additionally, it was noted that making changes in road design that will aid elder drivers, will also result in people driving at accelerated speeds. *Id.* at 71.

²⁴⁵ See Alison Smiley, *How Auto Safety Devices Bring New Risks*, CONSUMERS' RES. MAG., Mar. 1, 2001, at 15, available at LEXIS, News Library, Asapin File.

²⁴⁶ See *id.*

²⁴⁷ See *id.*; see also *supra* note 104 and accompanying text (supporting the view that research involving the relationship between medical conditions and crash involvement is the cornerstone of solving the problems of elder drivers).

²⁴⁸ Smiley, *supra* note 245, at 15.

²⁴⁹ See generally Krasner, *supra* note 1, at C2.

²⁵⁰ Cf. *id.*