Chapter 2

Finding a Smart Technical System for Mitigating the Elderly’s Driving Accidents: System Development for Safe Driving for the Elderly

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ABSTRACT

Driving-related injuries associated with elderly drivers are on the rise although the overall rate of driving-related injuries has decreased. To determine the causes of this trend, this chapter introduces the characteristics of the elderly’s aging health conditions and driving behaviours, and also explains existing vehicle systems that use different safety technologies to promote safe driving. This chapter will show that for the most part, current systems are not created by people with driving difficulties caused by health problems, which in turn often afflict the elderly. Moreover, based on an elderly focus group with declining body conditions, this chapter uses an interview to discover the problems they encounter while driving and demonstrates how new system concepts can be developed for the elderly. Finally, this chapter proposes adequate system concepts for the elderly as a solution that would improve driving safety and provide a more enjoyable driving environment for this population.

INTRODUCTION

Some people might prefer that the elderly stay home and only venture out when they have young people to drive them to their destinations. This scenario seemed possible a long time ago, but today we need to support their activities rather than advise them to stay home because the elderly population has become socially and economically sector given the increasing age of the Earth’s population. In the coming years, delivering services tailored to an aging population will likely involve more financial and human resources in regions where a large number of seniors live. With the growing elderly population, the number of

DOI: 10.4018/978-1-4666-9530-6.ch002
elderly drivers has increased because many elderly groups still want to be productive and enjoy their leisure activities in different locations after their retirement. However, driving-related injuries associated with elderly drivers are on the rise, while the overall rate of driving-related injuries has decreased. We have found that the reason elderly drivers have a higher injury rate than young drivers is that technical systems for elderly drivers are not practical enough to protect them (Tefft, 2008, p. 578). In other words, current vehicle systems have not considered the body conditions afflicting the elderly, such as decreased vision, hearing, and slow reaction times, for system developments. Therefore, this chapter will introduce data concerning increasing accident rates for elderly drivers in different regions, such as Asia, Europe, and North America, and emphasise why creating a smart system technology should be a new challenge in the automotive industry based on the fatal-accident statistics for elderly drivers. Also, in this chapter, some of the main characteristics of the elderly — both in terms of age-related health conditions and of driving behaviours — are presented with diverse situations. Moreover, a different set of technological systems for elderly drivers is explored and analysed based on the elderly’s decreased health conditions. Finally, based on the analysis of the current systems, interviews, and various groups’ evaluations as to how elderly drivers can safely operate a vehicle with confidence and avoid accidents, we suggest useful and adequate vehicle-safety system concepts as a solution.

**PROBLEM: GROWING FATAL ACCIDENT RATES FOR ELDERLY DRIVERS**

As elderly people age, their mobility, hearing, and vision decrease. Their vehicle-related fatal injuries and death rates increase to a rate much higher than younger drivers in similar situations. In most countries in the world, and particularly in developed countries, this is a critical issue because the rate of the elderly’s fatal accidents has been growing every year although many safety systems are developed.

Below are statistical traffic safety facts for elderly drivers in different countries. This is presented to recognise that elderly drivers have become more vulnerable than other age groups in vehicle crashes.

First, in the U.S. and Canada, fatal accidents involving older drivers have increased. According to the National Highway Traffic Safety Administration (2014), “In 2012, there were 5,560 people 65 and older killed and 214,000 injured in motor vehicle traffic crashes. These older people made up 17 percent of all traffic fatalities and 9 percent of all people injured in traffic crashes during the year. Compared to 2011, fatalities among people 65 and older increased by 3 percent. Among people injured in this age group there was a 16-percent increase from 2011” (p. 1). Even in two-vehicle fatal crashes involving an elderly driver and a young driver, an older person has an injury rate nearly twice that of a younger driver, i.e., 58 and 35 percent, respectively (NHTSA, 2009, p. 3). Canada’s case about the elderly’s fatal rates are likewise similar. In Canada, per mile driven, seniors are involved in more fatal crashes than most age groups except young drivers. Fatal crash rates are even higher the older the driver is (Transport Canada, 2004, p. 2). One finding in the Transport Canada Road Safety Directorate study was the large percentage of fatally injured drivers who were 65 years of age or older (one-quarter of all fatalities): 25.2 percent. This is a considerable over-representation considering that this age group accounts for slightly more than 12 percent of the population and of licensed drivers. The study also found that an extremely high incidence, i.e., more than three-quarters of fatally injured older drivers were driving improperly prior to the collision: 77.3 percent (Johnson & Howard, 2007, p. 129). Moreover, 40 percent of fatal collisions of drivers 70 and older that involved other vehicles occurred at intersections, compared with 23 percent of fatal collisions for drivers ages 35 to 54 (Lécuyer & Chouinard, 2006, p. 11).