Development Of Ultra Sonic Sensor Driven Automatic Vehicle Reverse Safety System

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Abstract: The vehicle performance has been continuously improved and the study results relating to the safety of car driving have also been continuously reported and demonstrated. Currently, this project focusing in safety of the vehicle which is to develop the prevention systems during vehicle reverse mode using by Arduino controller, linear actuator and ultrasonic sensors. There are also additional features such as visible LCD to display distance measurement with obstacle and also a buzzer to alert or notify the driver. The main objective of this project is to enhance the vehicle safety during reverse mode. There are lots of cases reported in Malaysia because of the children(s) died after they was ran over by their parent's vehicle during vehicle reverse mode which the parents did not notice them. When the gear is shifted to the reverse mode, the sensors which located at the bumper of the vehicle automatically activate and detect the obstacle until 3.5 meter. If the system can detect obstacle less than 40 cm, automatically the braking system activate and the vehicle will stop immediately. At the same time the buzzer will alarm to notify the driver. This system can be installed to various types of vehicles which can avoid casualties and also to give confidence to the driver during reverse mode especially parking their vehicle in a small and narrow space. This system can be installed various types of vehicles.

Index Terms: Reverse mode, Prevention System, Safety.

I INTRODUCTION

Every year, thousands of children are killed or seriously injured because a driver backing up is invisible to them. A back-over incident typically takes place when a car is backing out of a driveway or parking space. According to the National Highway Traffic Safety Administration (NHTSA), more than 6,000 people are injured yearly by vehicles that are backing up. Of that number, 2,400 are children, and more than 100 of those children will die as a result of their injuries, according to the child-safety organization Kids and Cars. Furthermore, its shows that about 80% to 90% of women drivers are nearly less confidence when making reverse parking. Therefore, it would help by developing this prototype can be a method that can avoid the loss of life and enhance the confidence to drivers who want to park backwards.

II LITERATURE REVIEW

David G. Kidd and Andrew Brethwaite have done research on visibility of children behind 2010–2013 model year passenger vehicles using glances, mirrors, and backup cameras and parking sensors. Back-over crashes can result in severe and fatal injuries to pedestrians or people standing behind the vehicle. Based on data from the Not-in-Traffic Surveillance (NiTS) system, the Fatality Analysis Reporting System, and the National Automotive Sampling System General Estimates System, an estimated 18,000 injuries and 292 fatalities occur each year due to back-over crashes (Austin, 2008).About 2000 of these injuries were estimated to involve children younger than 5. Children are at a higher risk of being involved in a back-over crash because their shorter stature makes them harder to see. One factor that contributes to back-over crashes, especially those involving children, is vehicle rear visibility. Rear visibility is typically worse in larger vehicles like trucks and SUVs compared with passenger cars.

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Consumer Reports (2012) measured the distance from the vehicle's rear bumper to the location where a cone 28 in. tall was first observed by drivers 5 ft, 1 in. and 5 ft, 8 in. tall using glances over the right shoulder. The 28-in. cone was used to approximate the height of a 1-year-old child. For the 5-ft, 1-in. driver, the average rear sight distance was longest for pickups and shortest for minivans. Pickups also had the longest rear sight distance for the5-ft, 8-in. driver, and midsized sedans had the shortest. The blind zone for each vehicle and the average minimum sight distance without and with technology was calculated for each tar-get height and then aggregated among vehicles in each class. Table 3shows the average blind zone and minimum rear sight distance for all the study vehicles combined and by vehicle class for each target height. The average blind zone for the 30.2-in. tall object across all vehicles (240.24 ft2) was twice as large as the average blind zone for the 42.7-in. tall object (116.67 ft2). The average minimum sight distance for a 30.2-in. tall object (27.3 ft) was more than twice as long as the average distance for a 42.7-in. tall object (13.2 ft). The average blind zone and average sight distance for each vehicle class decreased as the target height increased. The smallest blind zone and average sight distance for each target height was observed among small cars. Large SUVs had the largest blind zone and average sight distance for each target height, followed closely by midsize SUVs. Eight vehicles were equipped with a backup camera system and a parking sensor system. The independent contribution of each technology to reducing blind zones was explored. Among these eight vehicles, the average percent reduction in blind zones for each target height provided by backup camera systems alone was about2–8 times larger than the percent reduction in blind zones provided by parking sensor systems alone (Table 4). Backup cameras alone reduced blind zones by 72–99 percent, and parking sensor systems alone reduced blind zones by 12–48 percent. The area detected by parking sensor systems was not completely redundant with the area visible using backup cameras. Across these eight vehicles, the average percent reduction in blind zone was 2–3 percentage points greater when using both technologies compared with reductions provided by backup camera systems alone. In conclusion, the results showed that rear visibility in terms of blind zone and average minimum sight distance was significantly poorer in larger vehicles compared with smaller