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Intelligent Drive Assistant System

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***Abstract*- Most of the academic research on driving support systems focuses on automating the actual driving rather than assisting the driver by enhancing its awareness of the car's surroundings. None of such automated driving systems are currently available to the public. On the other hand, several types of practical driving-aid devices have been developed and made available on the market. Blind-spot detectors, lane change assistants, and back-up/parking sensors are a few examples. The current technology in driver support systems is diverse in terms of functionality, methodology and implementation. The common denominator of all those systems is obstacle detection by sensing: to this end they utilize various forms of sensors, such as laser light, ultrasonic, radar, infrared, and CCD cameras, which are very expensive techniques. Reckless driving is another major moving traffic violation. It is usually a more serious offense than careless driving, improper driving, or driving without due care and attention and is often punishable by fines, imprisonment, and/or driver's license suspension or revocation. Reckless driving is often defined as a mental state in which the driver displays a wanton disregard for the rules of the road; the driver often misjudges common driving procedures, often causing accidents and other damages.**

Index Terms- Braking, Arduino &sensor etc.

I. INTRODUCTION

The vehicle has been used as a human transportation device more than 100 years. Since then, vehicles have been investigated in many ways and have become a technology intensive device. Few decades ago, electronic and sensor technologies were merged into vehicles as an intelligent driving assistance system. It is a system to help the driver in its driving process for safety and convenience with electronic sensors. Intelligent vehicle systems offer great potential to future mobility. An increase of intelligence in vehicle applications may improve safety and provide comfort. Several sources indicate the benefits of Intelligent Driver Assistance Systems and other Intelligent Transportation Systems to be significant. The sensor monitors driving circumstances and detects hazard events instead of human sense of vision, distance, and direction. A large fraction of all automobile accidents is caused by the drivers lack or lapse of concentration while operating Ease of Use their vehicles. Some drivers tend to occupy themselves with distracting activities, such as tuning the radio, eating, talking to passengers, or making cellular phone calls. Other drivers find it difficult to maintain focus on driving, e.g., due to fatigue or health problems [2]. Elderly drivers may exhibit difficulties in personal mobility making it more difficult for them to reliably monitor the vehicle perimeter [3], due to harsh road. They may also develop other conditions having a negative (albeit not disqualifying) impact on their ability to focus on the road [4]. In this report, we discuss the design concept and operation of a driving assistant, whose responsibility is to alert the driver to the presence of potentially hazardous objects within the vehicle‘s perimeter. By combining tactile and visual feedback, the system effectively extends the driver‘s range of perception as far as road conditions are concerned. In addition to that, to put a check on reckless or rash driving, an accelerometer is used to detect rash driving and intimate concerned authorities regarding the same. The accelerometer is also used to provide data regarding road banking and accordingly a safe driving speed for the said angle of banking.

Thus helping the driver navigate through a busy road, it will also reduce the stress of driving and bring in positive correlation into the overall experience. The net outcome of this assistance will be a reduced probability of accident. The goal of our work reported in this report was to establish the set of criteria for an effective implementation of a driving assistant, to define such a system, and to build its working model from inexpensive off-the-shelf components. The implementation was meant to yield further insights into the problem. For the sake of feasibility and easy demonstrability, the system has been installed on a ride-on toy car; however, its scalability to a real vehicle has not been lost from sight. One of our objectives was to make sure that the assistant could be in principle installed on any vehicle without permanent modifications to its exterior. For this reason, its sensor modules communicate over a link and are powered of batteries.

II. LITERATURE SURVEY

In completing this project, some literature reviews have been done on several resources. The theory and description about the project have been considered as guidance in implementing this project work. In this chapter, an overview of some applications that are similar to the project and related project designs are presented. Nearly half of all accidents are rear end collisions and over 90% of injuries sustained by occupants whose vehicles are struck in rear end collisions are in the neck region. More than 200,000 people in US suffer from such injuries annually [4]. A review of accident data in seventy-two 20 mph zones found that average mean speeds were reduced by 9 mph, from 25 mph to 16 mph in the zones [3]. On average, for every 1 mph speed reduction, there was a 6.2% accident reduction. All road accidents in the zones fell by 61%, and there was no evidence of accident migration onto surrounding roads. Traffic flows in the zones reduced by 27%. The effects were particularly significant for the most vulnerable road users:

- All pedestrian accidents down by 63%
- All cyclist accidents down by 29%
- Motorcyclist accidents down by 73%
- Child accidents down by 67%
- Child pedestrian accidents down by 70%
- Child cyclist accidents down by 48%
- Peculiarities.

The statistics of India are chilling, as at least 13% people die every hour in road accidents in the country as per the latest report of national crime records. In 2007-1, 14,000 people in India lost their life in mishaps, which is significantly higher than the 2006 road death figures in China (89,455). The Nissan Brake Assist system with preview function utilizes information provided by Adaptive Cruise Control sensors to judge when emergency braking application may be required based on the distance to the followed vehicle and relative velocity. When an impending collision is detected a small braking force is applied to minimize the separation between the brake pad and rotor to reduce the break response time. The small braking force is activated when the target deceleration for stopping without colliding with vehicle ahead exceeds 5.88m/s2

The 2006 Mercedes-Benz S-Class is equipped with Brake Assist Plus (BAS PLUS) and PRE-SAFE brake. The available information suggests that both systems utilize a single 77GHz radar sensor capable of monitoring a typical three lane motorway environment in front of the vehicle with a narrow field of view angle of nine degrees up to certain distance. Two additional 24GHz radar sensors with an 80 degree field of view monitor the area immediately in front of the vehicle up to a distance of 30m. DISTRONIC PLUS is claimed to be an additional driver assistance system which also relies upon the radar sensors to provide adaptive cruise control at speeds between 0 and 200km/h, maintaining headway to the vehicle in front by automatically breaking the vehicle to standstill if required and then accelerating the vehicle as soon as the traffic situation allows

Collision mitigation by braking is a joint development between Ford Motor Company‘s research and Advanced Engineering group and the Volvo safety centre previewed on the Mercury Meta one concept vehicle. The system uses the radar and the camera sensor to detect the vehicles on the road ahead, to determine whether a collision is imminent based on the position, speed or direction of other vehicle. Using estimates of collision threat and driver intent, the system provides warning to the driver and enhanced brake control when required by amplifying the driver‘s braking and automatically applying full braking when it determines with certainty that a collision with another vehicle is unavoidable. It is claimed that depending on the speed and road factors, the braking can automatically reduce vehicle speed by five mile/h or more before an impact

III. PROPOSED SYSTEM

As stated in the previous section, our main objective was to define and functionally verify a new inexpensive driving assistant addressing the need for broader area coverage and more effective stimulation for the driver. The design comprises of a network of sensors mounted around the exterior body of the vehicle. The system also employs an accelerometer to detect the rash driving and inform the concerned authorities regarding the same. The proposed system contains various physically separate components: (i) four of them are the sensor modules, called nodes in the sequel, to be attached to the car‘s exterior (ii) an accelerometer sensor that indicates reckless driving and alerts to slow down the speed, (iii) one controller responsible for coordinating the operation of the nodes, collecting data from them and presenting alerts to the driver through a display or beep. The sensor modules cover the two front corners and the blind spots on both sides of the vehicle. By the use of ultrasonic sensor, that calculates the distance of the obstacles or automobiles which are either stationary or in motion, information is given to the driver to be with precaution and take measures in order to be safe from colliding. The accelerometer sensor used in the system further informs the driver about the rash driving above a speed limit which may damage the car by various means.

IV. OVERVIEW OF THE SYSTEM

The main function of the driving aid system is to detect the obstacles that potentially bring harm to the vehicle and driver. Mapping system can be displayed on a graphical user interface, hence to assist the driver to obtain the surrounding information of the vehicle. In addition to that, to put a check on reckless or rash driving, an accelerometer is used to detect rash driving and intimate concerned authorities regarding the same. The accelerometer is also used to provide data regarding road banking and accordingly a safe driving speed for the said angle of banking. Thus helping the driver navigate through a busy road, it will also reduce the stress of driving and bring in positive correlation into the overall experience. The net outcome of this assistance will be a reduced probability of accident

Block diagram

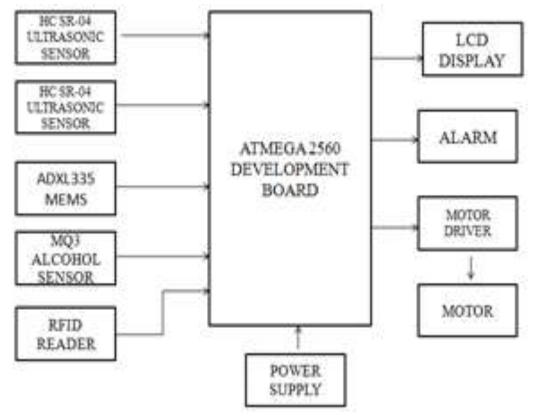

Fig: Block Diagram

V. METHODOLOGY

The following ADAS are available in various production models from a variety of OEMS:

Autonomous Cruise Control

Autonomous cruise control (ACC; also called as adaptive cruise control or radar cruise control) is an cruise control system for various road vehicles that will automatically adjusts the speed of our vehicle to maintain a safe distance from vehicles ahead. There are basically two types of systems through we can attain the adaptive cruise control, those are, laser based systems and radar based systems.

Laser based system uses light pulses whereas Radar based system uses radio waves to develop a communication between the vehicles. The radar based system is preferred over laser based system because the in adverse weather conditions such as fog and if at all the front vehicle whose speed has to be tracked is covered with dust then laser based system will show no use. Thus based on the speed of the front vehicle our vehicle slows down when the distance between two vehicles is less and accelerates to the preset value when there is a considerable amount of distance between the vehicles

Figure. Adaptive Cruise Control using Radar based systems

Automotive Navigation System

As we know today people are using the global positioning system commonly called GPS system to know the address of the locations they need to travel. This GPS system can be modified and implement inside the dashboard of the car to obtain the real time traffic information. The traffic information comes from a variety of sources such as traffic data providers, transportation department, police and even emergency services, road sensors, traffic cameras, and also aircraft reports. This information is made to be compiled and delivered through radio frequency (FM/HD Radio or satellite) to our navigation system embedded inside the car. In the terrestrial FM applications, the traffic signals are broadcasted over the FM Radio Data System (RDS), which is a special application of the radio band for sending small amounts of digital information. Most of the car stereos support FM radio signals, which is how you can see radio station call letters or other artist and various songs title information on your display when tuned to certain amount of radio stations

Electronic Stability Control

Electronic stability control (ESC), even referred to as electronic stability program (ESP) or dynamic stability control (DSC), is one of the computerized technology that improves a stability of vehicle by detecting and reducing loss of traction, even called as skidding. When ESC senses loss of steering control, it automatically applies the brakes to control "steer" of the vehicle where the driver intends to go. Braking will be automatically applied to wheels individually, such as the outer front wheel to achieve over steer or the inner rear wheel to undergo under steer. Some ESC systems also tend to reduce engine power until control is regained. ESC will not improve a vehicle's cornering performance; instead, it helps to minimize the loss of control of vehicle. One-third of major accidents could be prevented by the use of this technology

VI. RESULTS

During normal driving the ESC tends to work in the background and continuously monitor steering and vehicle's direction. It compares the driver's intended direction which is determined through the measurement of steering wheel angle to the vehicle's actual direction which is determined through measured lateral acceleration, vehicle rotation, and the individual road wheel speeds. ESC interrupts only when it detects a probable loss of control in steering, i.e. when the vehicle is not going where the driver intended to steer.For example, when skidding during the emergency evasive swerves, under steer or over steer during wrongly judged turns on slippery roads, or even hydroplaning. ESC may also interrupt in an unwanted way during high-performance driving, because input of steering may not be always directly indicative of the intended direction of travel that is called controlled drifting. ESC estimates direction of the skid, and then applies brakes to the individual wheels asymmetrically in order to create torque about the vertical axis of the vehicle, opposing the skid and bringing the vehicle back to track with the driver's provided direction. Additionally, the system may even reduce engine power or operate the transmission to slow the vehicle down.

VII. CONCLUSION

The strength of ADA systems is great, provided ADAS is completely accepted and widely introduced in the future. The ADA systems will all have to be made as fail-safe as possible. Whenever the system fails to succeed, safety is to be determined by the provisions taken to avoid major accidents and in case of any accident the measures to minimize the consequences for passengers. Acceptability from customers of ADAS is highly dependent upon solid demonstration of these many features. Acceptability is also found to be most dependent of the form in which ADAS applications are implemented. For the end-user or customer the benefits should be clear and preferably directly noticeable. For this reason comfort enhancing features need a better changeover than safety enhancement properties. Most drivers consider themselves as at least better drivers with respect to safe behavior than average driver. Strict requirements for ADAS applications by all stakeholders are safe (and valid) operation and also reliability, false alarms are not all acceptable for end-users particularly.

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