International Journal of Information & Computation Technology.
ISSN 0974-2239 Volume 4, Number 15 (2014), pp. 1583-1587

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Hybrid System for Driver Assistance

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Abstract

In the past four Years, Road Traffic Injuries (RTI) ranked fourth among the leading cause of death. Nearly 1.3 million people die every year on the world's roads and 20 to 50 million people suffer non-fatal injuries, with many sustaining a disability as a result of their injury. However, active safety systems like ABS (Anti−lock Braking System) and ESP (Electronic Stability Program) offer possibilities for improving traffic safety by assisting the driver in his driving task.

During poor weather conditions, most of the driver assistance system doesn't produce accurate results. In order to assure road safety, the researchers have paid attention on developing various driver assistance systems. The goal of our proposal is to build an intelligent driver assistance system (using the sensors) the Driver, to deploy in a car, as a step toward building an intelligent vehicle. The hybrid driver assistance system is for more safety. It provides the passengers with more safety than the passive and active driver assistance system. The system has autonomous vehicles, intelligent vehicles, and smart highways.

Keywords: Road Traffic Injuries, Anti−lock Braking System, Electronic Stability Program.

Introduction

Most of the driver assistance systems used currently is derived as a visual based system interaction channel which displays complex information at a high rate [3]. As this requires a high visual processing capability the driver attention to the driving task is considerably reduced. Hence, there is a tendency for information to be misread as the driver's attention ceases and is not focused at the right place due to visual information overload. These driver assistance systems increase the driver's reaction time to detect an event or incident and reduce the view of the road whilst driving [4]. The in-vehicle environment becomes information-intensive where the visual channel

is overloaded, hence unnecessarily putting the driver's and the passengers in an unsafe situation. The hybrid driver assistance system is proposed to achieve all the unsafe situations as mentioned and to make safer in-vehicle environment.

The Hybrid driver assistance system is for more safety. It provides the passengers with more safety then the passive and active driver assistance system. The system has autonomous vehicles, intelligent vehicles and smart highways.

Autonomous vehicles

Autonomous vehicles are automobiles that are equipped with sensors, computers and a control system to drive by themselves. The sensors allow the autonomous vehicles to perceive the environment –roads, pedestrians, other vehicles, potential hazards, etc. – as well as the driver, passengers and various components of the vehicle itself. The computers process the information from the sensors and determine actions to take, which are then executed by the control system.

An autonomous car, also known as a driverless car, driver-free car, self-driving car or robot car, is an autonomous vehicle capable of fulfilling the human transportation capabilities of a traditional car. As an autonomous vehicle, it is capable of sensing its environment and navigating without human input. Robotic cars exist mainly as prototypes and demonstration systems. Autonomous vehicles sense their surroundings with such techniques as radar, GPS, and computer vision. Advanced control systems interpret sensory information to identify appropriate navigation paths, as well as obstacles and relevant signage. Some autonomous vehicles update their maps based on sensory input, allowing the vehicles to keep track of their position even when conditions change or when they enter uncharted environments.

Advantages

- Fewer traffic collisions, due to an autonomous system's increased reliability and faster reaction time compared to human drivers.
- Higher speed limit for autonomous cars.
- Increased roadway capacity and reduced traffic congestion.
- Reduction in the need for traffic police and vehicle insurance

Intelligent vehicles

Intelligent Vehicles with the human in control are appearing to be more promising; these observe the traffic situation and support the driver by providing warnings and advice as needed. Intelligent vehicles are also equipped with computers and sensors so they can perceive the environment, model and predict the driver's behavior, and take appropriate actions, Example issuing a warning when the driver dangerously deviates from her lane.

Intelligent vehicle technologies commonly apply to car safety systems and self-contained autonomous electromechanical sensors generating warnings that can be transmitted within a specified targeted area of interest, say within 100 meters of the

transceiver. In ground applications, intelligent vehicle technologies are utilized for safety and commercial communications between vehicles or between a vehicle and a sensor along the road. Intelligent vehicle technologies provide instantaneous on the road information to the motorist who wishes to map a route to a specific destination and expects the system to assist in determining the best course of travel. The information provided by the in-vehicle system updates approximately every minute (depending on the speed of the vehicle) all the transmitter beacon information self-recorded by the vehicle while traveling on the road.

Smart highways

Smart Highway is an innovative concept for smart roads of tomorrow. The goal of smart highways or automated highway systems on the other hand is to make highways safer and more efficient through communication between vehicles and the control center. Intelligent vehicles could provide similar benefits through cooperation among themselves. The smart highways will have a Server Center on highways through which vehicles can communicate and will be able to know about the traffic, lanes and speed limits. For example there are three lanes, lane 1 and 2 having high traffic then server center will pass this information to vehicle and vehicle will automatically go to lane 3. This will helpful to reduce traffic. While using this lane server center pass the information to vehicle as to speed up the vehicle as the lane have low traffic. Therefore this will be helpful to drive fast and will low risk and high safety.

We will use the fully automated systems.These are the next step beyond driver assistance, and operate without a human driver in the control loop. Automated highway systems, using fully automated passenger cars, are expected to significantly benefit traffic safety and throughput, but are not considered for short-term introduction.

The cars will have integrated passive and active safety systems. In addition to passive safety systems that are activated during the crash, a pre-crash system can mitigate the crash severity by deploying active and passive safety measures before a collision occurs. Pre-crash safety measures, such as brake assist and seat belt pretensioners, have recently been introduced on the market.

Related Work

In the paper [2] the Driver Advocate technique is used which is need to perform three core classes of tasks to successfully assist the driver: monitoring the driver(“Human Driver”), establishing the driver model(“User Model”) and interacting with the driver(“Driver Interaction”).

For the Driver Interaction core, the technique is adopted the Soar architecture. It has been used in flexible cooperative team based agent application and driving agents.

The Proposed System

In our system the smart highways have server centers. 1 server center within few

kilometers and so on. Now when our intelligent vehicles have to go through these highways they first message to server centers asking for information. The message will be send by system. This system which will made using Operating System of its own.We will provide an application to the intelligent vehicle system and the server center system. This system will automatically send the message to server centers whenever the car will initially get start to drive. The message will have the destination area. After receiving message the server center will reply with all the proper map, information of weather, which lane to be chosen of highway and so on. The intelligent vehicle will have start its journey according to the message information, sensors are also there which will do instant work like braking, turning and so on. We will use environmental sensors in 4 sides of intelligent vehicle which will be used in left, right, front and backend. Left and right sensors will be used for lane departure and for overtaking taking. Front and backend sensors will be used for maintaining the distance between the vehicles and prevent them from collision.

Conclusion

Much work needs to be done however, before the driver assistance could be deployed in a real car assisting drivers in an actual driving environment. This paper presents the new concept of hybrid driver assistance system. The concept is used to enhance the safety and comfort. We have used the autonomous vehicles which are vehicles are equipped with sensors, computers and a control system to drive by themselves, Intelligent vehicles and smart highways. This would make up the system which would be safer and would likely reduce the vehicle related road accidents.

We conclude this paper by discussing some of the interesting challenges we have to face while implementing this system [4].

Climatic Conditions

Climate conditions like heavy rainfall, snowfall, storms and etc. The system has to overcome through all these conditions. Condition like heavy rainfall can affects the sensors and another device hence faulting the whole system. Heavy snowfall can jam the smart highways and hence halting the whole system.

Another challenge is related to the vast amount and diverse nature of the data and knowledge the system needs to deal with from statistical or numeric data.

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