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Review on Automatic Control Vehicle

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ABSTRACT

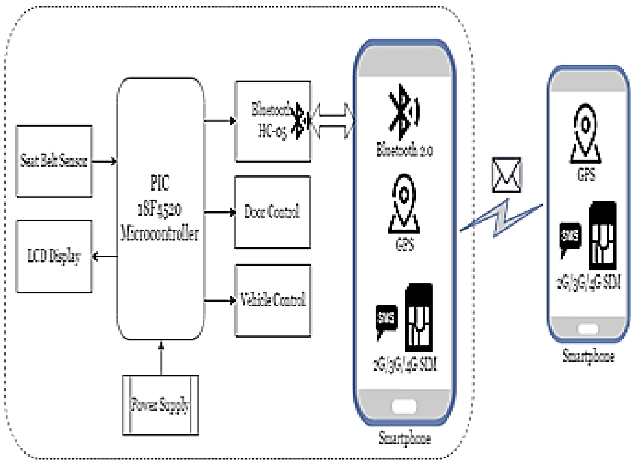
In last two decades there is drastic change in techonlogy and there are recent changes to the field of mechanical engineering as automobile industry is having a demand on a very techosuportive platform. Mechatronics is emerging and booming now a days and many mechanical systems are replaced by mechatronics systems due to high prisions and accuracy. Even use of mechatronics drastically increased the performance of automobile and other systems in order to get more and more intelligent and power efficient systems. In this project we not only going to enhance the performance of the systems but also add some desirable features to vehicle in order to provide safety measures to the driver. We are also providing a automatic system which
Keywords : Sensor, Radar, Lidaer, Microcontroller, GSM, CMOS, NMOS.

I. INTRODUCTION

A system consist of a controller PIC18F4520 which is going to act as an brain of the system which is going to monitor and control the action by the verification of appropriate inputs. It will process the inputs and will take appropriate action. Seat belt sensor, door control and vehicle control is prointerface with PIC18F4520 along with display and power supply. This specially designed systems is placed inside the vehicle. As wirelessly connected with mobile by using Bluetooth and GPS module to remote mobile. Hence we can also provide the security regarding tracking the vehicle which will be the added advantage of our system.

In 2009, the U.S. National Highway Traffic Safety Administration (NHTSA) began studying whether to make frontal collision warning systems and lane departure warning systemsmandatory.

The system block diagram is given as below.



System Placed Inside the Vehicle

In 2011, a question was submitted to the European Commission regarding stimulation of these "collision mitigation by braking" systems.[2] The mandatory fitting of Advanced Emergency Braking Systems in commercial vehicles will be implemented on 1 November 2013 for new vehicle types and on 1 November 2015 for all new vehicles in the European Union. This could, according to the impact assessment, ultimately prevent around 5,000 fatalities and 50,000 serious injuries per year across the EU.

II. LITERATURE REVIEW

Ooka M, Sugiura F, proposed an automatic seat belt applying device on October 22, 1974 where the seat belt is fastened over the occupant automatically in correspondence with opening or closing of the door of a vehicle. A conventional seat belt guide rail is arranged to form a virtually linear line along a diagonal connecting the lower section in the rear on the internal surface of a door. MasaharuSaji and KamiMigusa proposed an automatic seatbelt on August 21, 1990 where lap seat belt and shoulder seat belt are automatically set to restrain a seated person end of each belt is in a guide ran diagonally disposed on the inner surface of the door. Second ends of the belts are on the inner side of the bottom seat and on the inner side of the seat back respectively. Jesse R. Hollins proposed automatic seatbelt buckle and unlatching mechanism on June 15, 1976 and a seat belt buckle automatic unlatching mechanism including a seat belt arrangement comprised of a first seat belt strap and a second seat belt strap. Attached to one end of the first seat belt strap is a latching tongue and attached to one end of the second seat belt strap is a tongue latching mechanism. Chris Lee, discussed Analysis of injury severity of drivers involved in single and two-vehicle crashes on highways in Ontario on 1st February 2014. This study analyzed driver's injury severity in single and two-vehicle crashes using the 5-year crash records in Ontario, Canada. To account for variations in unobserved effects of variables on injury severity among observations, Heteroscedastic Ordered Logit (HOL) models were developed for identifying the association between injury severity and explanatory variables. For two-vehicle crashes, crash records were separated into nine data sets of different combinations of vehicle types considering the differential impacts of the collision on vehicles due to difference in their size and weight. Vehicles were classified into cars, light trucks, and heavy trucks. Timo Lajunen discussed "Why Turks do not use seat belts?" an interview study on 12 November 2006.Despite the effectiveness of seat belt use and legislation, seat belt use rate is low in Turkey. The aim of this study was to investigate the motives to use and not to use a seat belt in different traveling conditions in a sample of car drivers and passengers. Interviews were made face to face with 221 interviewees from different age and occupation groups. Frequently reported reasons for using a seat belt were traveling conditions, safety, situational conditions, habit of using a seat belt, and avoiding punishment.

a vehicle tracking system is an electronic device, installed in a vehicle to enable the owner or a third party to track the vehicle's place. This paper proposed to design a vehicle tracking system that works using GPS and GSM technology. This system built based on embedded system, used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM). This design will continuously watch a moving Vehicle and report the status of the Vehicle on demand.

Kai-Tai Song and Chih-Chieh Yang have a designed and built on a real-time visual tracking system for vehicle safety applications. In this paper built a novel feature-based vehicle-tracking algorithm, automatically detect and track several moving objects, like cars and motorcycles, ahead of the tracking vehicle. Joint with the concept of focus of expansion (FOE) and view analysis, the built system can segment features of moving objects from moving background and offer a collision word of warning on real-time. The proposed algorithm using a CMOS image sensor and NMOS embedded processor architecture. The constructed stand-alone visual tracking system validated in real road tests. The results provided information of collision warning in urban artery with speed about 60 km/hour both at night and day times.

Intelligent Vehicle Dynamic Situational Awareness

Intelligent vehicle subsystems have been part of consumer vehicles for decades. The first elec-tromechanical cruise control systems began a long slide toward removing physical control of the vehicle from the human driver. Ever since, intelligent systems have provided enhancements in both convenience and safety. Anti-lock brakes can take control of braking when wheel lock-up is detected. These systems enable a panicked driver to both brake and steer at the same time, an impossibility with locked brakes (Jing et al., 2014). Back up and blind spot sensors, initially features of luxury brands, are now ubiquitous on cars at even basic trim levels. They provide situational awareness and warning to drivers of nearby objects or imminent collisions. The logical next generation of this technology lies in backup cameras, which enable drivers to totally rely on the car's sensors, driving in reverse using only an image on a dashboard screen for guidance.

Adaptive cruise control now keeps a constant following distance despite other vehicle's varying speeds. Satellite navigation and communication systems enable some vehicles to transmit and receive accurate location and other telemetry information. Near field sensors in select vehicles enable automatic parallel parking, completely hands free.

The combination of all of the above systems means that some vehicles already possess the ability to navigate, accelerate, steer, and brake, all without direct driver input. The greatest barrier to full intelligent control, virtual autonomy, is accurate lane guidance, and replicating the driver sense, necessary to navigate busy highways and inconsistent infrastructure.

Intelligent lane guidance, via image process-ing or infrastructure cues, is advancing rapidly, but replicating driver sense still presents a challenge. Human drivers can best process chal-lenging conditions, and make decisions based on information not immediately apparent to a sensor array. One aspect of human driver sense, which computers can effectively substitute for, is slip recovery. This is an aspect not heavily explored by previous research into intelligent

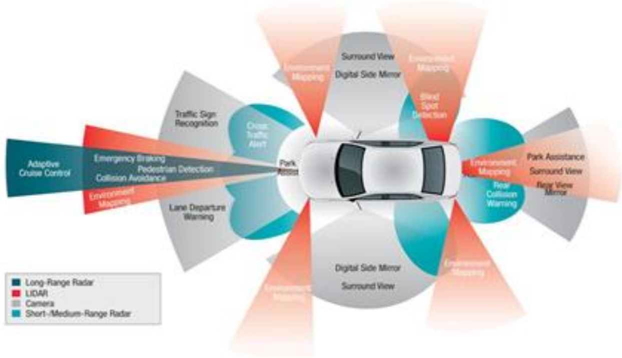


Figure 1. A visual reprresentation of sensor fusion

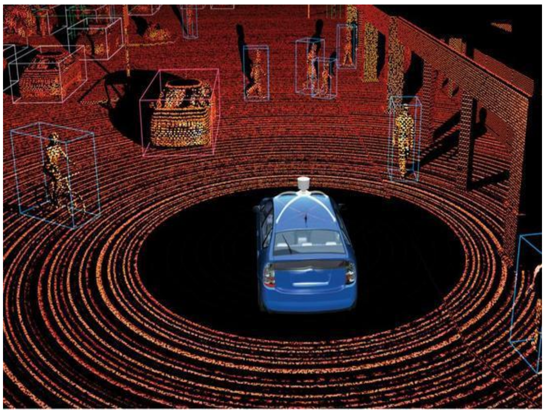


Figure 2. LiDAR Virtual world

Sensors

Intelligent vehicles rely on an overlapping group of sensors, which together fuse to create a virtual operating environment. For the purpose of this research, sensors fall into two categories: external and internal.

External sensors provide information about the world around the vehicle, enabling the com-putation of a safe and efficient trajectory toward a destination. They primarily include RADAR, LiDAR, ultrasonic, GPS, and a day camera. Figure 1 shows all of these systems fused together and each sensors' strengths and weaknesses.

RADAR sensors, currently used in some adaptive cruise control systems, provide the greatest clarity for relative speed. Utilizing the Doppler Effect, they can determine the relative speed of objects around the vehicle. Depending on model and placement, their wide field of view can detect objects of interest both in and around the vehicle's planned path. The main drawback of RADAR is the clarity of the data received. Because of the broad beam, RADAR cannot adequately discern the shape and contour of smaller objects. Its best use on an intelligent vehicle is rapid determination of rate of closure and long-distance object sensing (Lundquist and Schön, 2009).

LiDAR (Figure 2) provides a more precise virtual image of the world immediately around the vehicle. Due to the narrow beam width of the laser, a mechanical scanner is necessary to cover the target area. This results in some latency compared to RADAR, but together, they provide a fused image of a vehicle's surroundings. Precision, range, cost, and speed are all tradeoffs with LiDAR. An in-telligent vehicle may incorporate multiple LiDAR sensors to enhance the quality of the virtual world model.

Ultrasonic sensors are currently in use in most reverse detection systems. They provide accurate, low cost, range detection of near obstacles, and will inform the fused virtual image of near obstacles around the entire vehicle. This will enable lane changes and emergency swerve maneuvers without unintentionally impacting near objects.

GPS provides an absolute position, nav-igation, and speed reference. It will enable macro-scale acceleration and speed calculations based on map data and road models, as well as provide continuous calibration of the Inertial Measurement Unit (IMU) and speed sensors. It does not however, provide the accuracy necessary to maintain lane guidance.

Internal sensors include the host of vehicle sensors, which inform the vehicle computers of the subsystems. The key sensors related to intelligent vehicle operation are: wheel speed, steering angle, yaw rate, and acceleration.

Wheel speed and steering angle are used in concert to provide closed loop feedback to the vehicle controller. When a trajectory is commanded, the steering and operating state of various Finally, the yaw and acceleration sensors, combined into an IMU, provide a measure of error correction to the above speed and angle sensors. Under load, the dynamic performance of a rubber-tired vehicle will not exactly match simple kinematic models. This inertial measure-ment will enable closed loop feedback to correct for slip, and prevent loss of control. Doing so is critical because the inertial sensors provide a much faster feedback loop than the refresh time of the virtual fused model (Jing et al. and Liu, 2014

III. ADVANTAGES

1) This project not only provides the efficient automation but aslo privides security for the vehicle system.
2) Vehicle will not be turn on unless and until we were the seat belt which is the onother advantage and it will motivate the people to were the seat belt.
3) This project will also ensures that wether the door is properly locked or not if no then the message will display on the display and vehicle will start only after proper closing of door.
4) Hence accident or mishap can be avoided.
5) The vehicle can only access by authenticated user only hence providing security from theft.
6) At any point of time we can find location of the vehicle using GPS.

IV. ACKNOWLEDGEMENT

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