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Speed Control and Shared Steering Control Between a Driver and an Automation: by Buzzer Intimation

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Abstract: Driving is a dangerous activity which leads a serious human and economic consequences. Based on statistics, unintended lane departure is the second most frequent type of single light-vehicle accidents. In many cases, the accidents can be attributed to degradation in driver performance, which is caused by such factors as fatigue, drowsiness, or inattention. This fact has motivated major research effort aimed at helping drivers and improving safety, particularly through the use of active systems that have the potential to prevent vehicle accidents. Several advanced assistance systems have been proposed over the last decade to improve vehicle lateral control. Some of them are based on the principle of mutual control between the driver and the automation system. The challenge in designing such human–machine interaction is how to combine the adaptability of humans with the precision of machines because manual control tasks are prone to human error and fully automated tasks are subject to wide-ranging limitations.

Key words:

INTRODUCTION

Embedded systems consist of processing cores that are typically either microcontrollers or digital signal processors. The embedded system is a computer system designed for specific control functions within larger systems, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts. By contrast, a general-purpose computer, such as a personal computer, is designed to be flexible and to meet a wide range of end-user needs. Some commonly used devices are controlled by an embedded systems. An embedded system is a computer system designed for specific control functions within a larger system, often with real-time computing constraints. It is embedded as a part of a complete device often including hardware and mechanical parts. Physically embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers. Complexity is varied from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure. Many embedded systems have substantially different design constraints than desktop computing applications. No single characterization applies to the diverse spectrum of embedded systems. However some combination of cost pressure, long life-cycle, real-time requirements, reliability requirement. The dictionary defines an accident like “an unexpected and undesirable event, a unforeseen and without apparent cause”. Strictly speaking, most accidents are not accidents at all they are collisions that could and should have been avoided. Five factors contribute to the vast majority of collisions. In ascending order they are:

- Equipment Failure
- Roadway Design
- Poor Roadway Maintenance
- Driver Behavior
- Skill

Nearly 95% of motor vehicle accidents (MVAs, in the USA, or Road Traffic Accidents, RTAs, in Europe) involve some degree of driver behavior that combined with one of the other three factors. Drivers always try to blame road conditions, equipment failure, or other drivers for those accidents.

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- Equipment Failure-Manufactures are required by law to design and engineer cars that meet a minimum safety standard. Computers, combined with companies extensive research and development, have produced safe vehicles that are easy and safe to drive.
- Roadway Design-Motorists may blame roadway design for accidents, but it's rarely the cause. Consultants such as the Texas Transportation Institute have spent years getting road barriers, utility poles, rail road crossings and guardrails to their current high level of safety.
- Poor Maintenance-Roadway maintenance contributes to some motor vehicle accidents, but not to the extent that drivers use it as an excuse. Unfortunately maintenance schedules and procedures vary greatly from city to city and state to state, so nationwide standards don't exist.
- Driver Behavior -Humans tend to blame somebody or something else when a mistake or accident occurs. Recently, European study concluded that 80% of drivers involved in motor vehicles accidents believed that the other party could have done something to prevent the accident.
- Skill A miniscule 5% admitted that they were the only one at fault. Surveys consistently reveal that the majority consider themselves more skillful and safer than the average driver. Some mistakes occur when a driver becomes distracted, perhaps by a cell phone call.

Literature Survey: Gilead Tadmor and Leonid Mirkin [1] proposed Time domain variational analysis is used in a reduction to an open loop differential game, leading to a complete, necessary and sufficient characterization of suboptimal values and an explicit state space design, in terms of a parameterized (nonstandard) algebraic matrix Riccati equation in a general continuous time linear system setting. Guoyong Shi *et al*. [2] proposed Balanced truncation is a well-known technique for model-order reduction with a known uniform reduction error bound. However, its practical application to large-scale problems is hampered by its cubic computational complexity.

Huiqin Du *et al*. [3] proposed Managing uncoordinated interference becomes a substantial problem for heterogeneous networks, since the unplanned interferences from the femtos cannot be coordinately aligned with that from the macro/pico base stations (BSs). Due to the uncoordinated interference, perfect interference alignment (IA) may be not attained. Jessica Lee. W and Henrietta L. Galiana, Fellow [4] proposed Ocular tracking of targets in biological systems involves switching between two strategies: slow pursuit and fast corrective saccades producing pursuit nystagmus. Mario Goldenbaum *et al.* [5] proposed It is known that if the objective of a wireless sensor network is not to reconstruct individual sensor readings at a fusion center but rather to compute a linear function of them, then the interference property of the wireless channel can be beneficially harnessed by letting nodes transmit simultaneously. Nicolaos B. Karayiannis *et al*. [6] proposed A general formulation of optical flow computation is presented and a mathematical framework for the development of practical tools for computing optical flow is outlined. Shahin S. Nudehi *et al*. [7] proposed The interface is designed to allow experienced surgeons mentor trainee surgeons through shared control of a surgical robot.

Shinn-Jang Ho *et al*. [8] proposed the newly-developed IGA with intelligent crossover based on orthogonal experimental design (OED) is efficient for solving intractable engineering problems with lots of design parameters. YohanPetetin and François Desbouvries [9] proposed Random finite sets (RFS) are recent tools for addressing the multi-object filtering problem. The probability hypothesis density (PHD) Filter is an approximation of the multi-object Bayesian filter, which results from the RFS formulation of the problem and has been used in many applications.

Proposed System: In the scope of the project is control the main aim to monitoring the driver unit. Then the control system takes this as input and monitors the Steering wheel and if found to be uncertain that is the angle of wheel turning is not exact with the turning then the control system takes control over the steering wheel and also intimates the user about this. The prototype is designed with PIC Microcontroller and a steering wheel set up.Drivers have been shown to use "near" and "far" vision of the roadway for steering, which is represented in a model by the angles between the car heading and two distinct points. The near point is used to maintain a central lane position. It is assumed to be at a convenient distance from the front of the vehicle. It is near enough to monitor lateral position but far away enough to be seen through the vehicle windshield (look ahead distance *ls*, fixed here at 5 m). The far point is used to account for the

upcoming roadway curvature. It is assumed to be the tangent point. The Buzzer intimation system is fixed with vehicle by zigbee transmitter or receiver fixed on both side of the vehicle and to alert the in front vehicle by buzzer alarm when overtaking.

Project Description: The supply of 5V DC given to the system, which is converted from 230V AC supply. Firstly, the step down transformer is used to convert the 230V AC into 12V AC. The microcontroller will support only the DC supply, so the AC supply is converted to DC using the bridge rectifier. The output of the rectifier will have ripples so the 2200uf capacitor for filtering using to the those ripples. The output from the filter is given to the 7805 voltage regulator, which converts the 12V DC into 5V DC. The output obtained from the regulator is filtered using the 1000uf capacitor, so the pure 5V DC is getting as the output from the power supply unit. Here PIC microcontroller using, which will be capable of getting the supply of 5V DC so it can be used to convert the 230V AC supply into 5V DC supply. The type of microcontroller chosen to the paper is the PIC16F877A microcontroller which is used to control the motor when the Steering is not turning properly. The whole programming will be written in the microcontroller itself depending upon its requirement. The motors of that robot will be controlled by using the driving circuit in which the ULN2003 driver IC will be used to provide the proper current rating to the motor. The sinking current of the ULN driver is around 500mA. The DC motor is used to rotate the vehicle wheel like as a steering wheel; it's connecting with relay unit. Input coming from microcontroller The buzzer which used to indicate the car has a obstacles before it.

CCTV stands for Closed Circuit TV. CCTV uses one or more video cameras to transmit video images and sometimes audio images to a monitor, set of monitors or video recorder. Most wireless CCTV cameras use the 2.4 Gigahertz frequencies to transmit their video images to a monitor or DVR (digital video recorder). Usually, frequencies can be slightly changed to have more than one group of cameras in a specific space. Wireless CCTV cameras used at this frequency can easily transmit through most walls and obstacles; however each individual location will have its own operating limits. The CCTV camera using to capturing the images and sending the signals to the controller section. A liquid crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals (LCs). LCDs do not emit light directly. The main use of this is to view the operation going on inside the robot. Through the pc only can be used to get the image of the PEDESTRIAN and according of the image the voltage is given to micro controller. Node 1 and Node 2 Zigbee transmit the vibration parameters. Monitoring section receives that parameter and monitor through the PC. Software is used to compile the coding of the desired application for the corresponding embedded system. This is the embedded C compiler which is compatible for the PIC16F877A micro controller to compile the code. The CCS PCW compiler is specially designed to meet the special needs of the PIC micro MCU controllers where the tools allow developers to design application software quickly for these controllers in a highly readable, high-level language. The compilers include limitations while comparing with a more traditional C compiler. The hardware limitations make many traditional C compilers ineffective. As an example of the limitations, the compilers will not permit pointers to constant arrays.

Block Diagram for Steering Control:

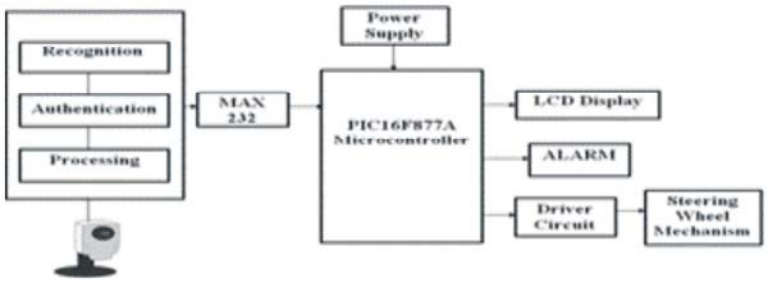


Fig. 1: Block diagram for steering control

The Fig 1 shows the block diagram of shared steering control block. The Web camera is fixed in front of the vehicle to capture the images, The captured images are processed by the PC system installed with MATLAB software, By using MATLAB the image is processed to check the characteristics of road. RS232 converts the data

in to serial bits in PIC16F877A; the microcontroller connects the different pheriperalls by ports. In every turning, an angle is displayed in LCD screen. The whole setup is designed with PIC Microcontroller and steering wheel mechanism. This setup will indicate the turning angle by display fixed in through vehicle.

Block Diagram for Buzzer Control:

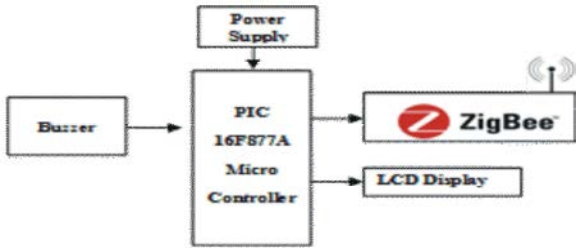
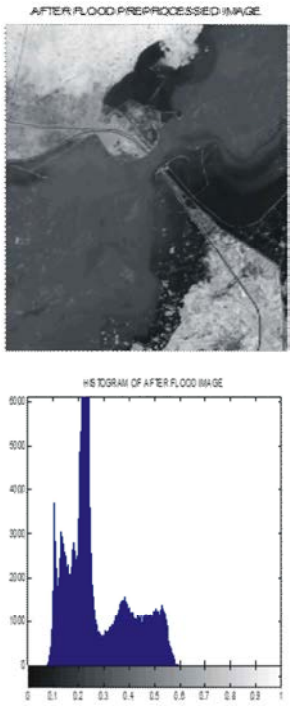


Fig. 2: Block diagram for buzzer control

The Fig 2 shows the block diagram of buzzer control. The whole setup is designed with PIC Microcontroller and buzzer control mechanism. Zigbee used to communicate the nearest in front vehicle. The buzzer is used to indicate the overtaking intimation to the in front of the vehicle. The buzzer indication through zigbee and it also sensing space for avoid hit the vehicles. LCD display which is used display speed of vehicle and alert signal by means of alarm sound.

Experimental Results:



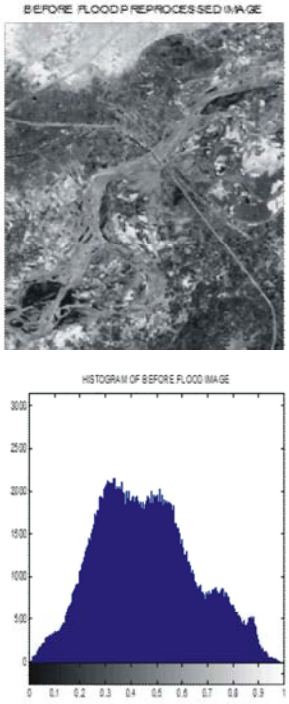
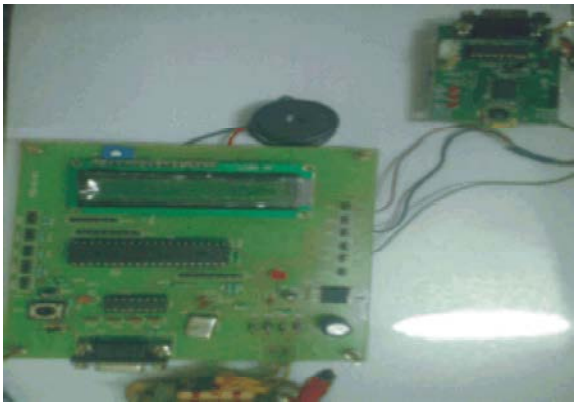


Fig. 3: Simulation Output Buzzer & Steering Control Section



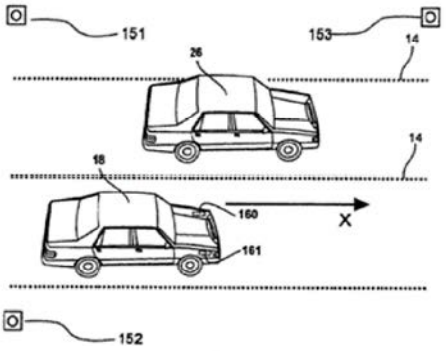


Fig. 4: Buzzer Control Section(Setup for overtaking intimation)

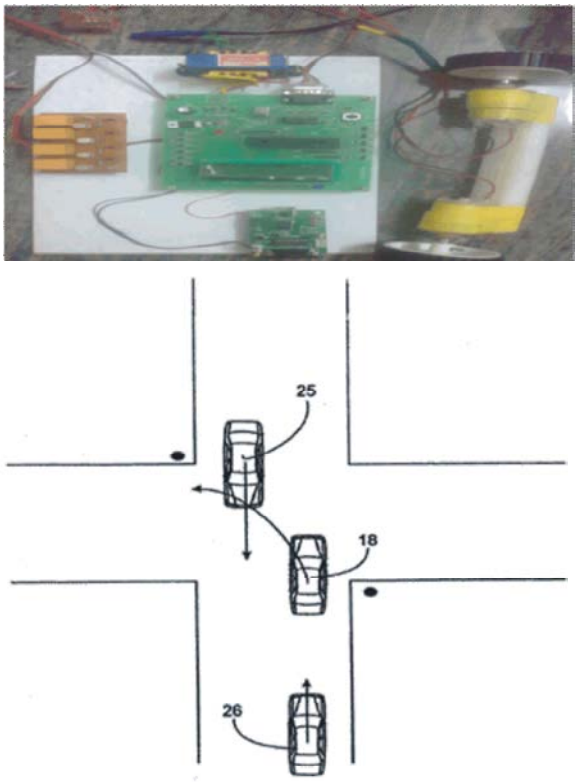


Fig. 5: Shared Steering Control Section (Setup for steering control mechanism)

Based on this global model, a steering assistance system has been designed to perform shared control of the steering wheel. A simulator study (Fig 3) showed that an improved performance lane, keeping with a low level of negative interference between the driver and the system, could be achieved. Robust stability analysis in the presence of driver model variability was also carried out. The results were compared with those achieved on the driving simulator. The performance and robustness of the proposed H2-Preview controller was shown for a large class of driver models. It can be implemented with GPS and automatic speed control system. The GPS system is used to find the destination route, current location nearest fuel station and motels. The speed control system that controls the speed of vehicle depends on road condition and the vehicle moving on that way to near the vehicle showed in Fig 4 & 5.

CONCLUSIONS

It is due to the driver's fatigue, traffic accidents keep with a yearly increasing of a high rate. This project shows the new fatigue detection techniques and control system methods used to detect uncertainty and road characteristics. In this technique uncertainty will be detected immediately and speed will be controlled. This paper proposes an intelligent car system for accident prevention and making the world a much better and safe place to live.

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