ENHANCING ROAD SAFETY USING VEHICLE TO VEHICLE COMMUNICATION

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ABSTRACT

Ever increasing number of fatal traffic accident around the world can be significantly reduced if modern technology is incorporated within the automobile to assess the physical condition of the driver at regular intervals during the movement of the vehicle and preventive measures are automatically taken for the safety of all concerned entities, both within the vehicle and outside the vehicle. In this paper her we deal with present state detector system is presented which can monitor the physical state of the driver at regular intervals during the entire journey of driving and if need arise, it automate the vehicle to stop. In this case of multiple failures to raise the alertness level of the other vehicle drivers, this designed system can inform the other vehicle drivers in nearby through ESP module and in case of accidents data recorded during the entire journey can help the law enforcement authorities about the rouge driver on the road. This model of the design has been Successfully implemented which leads to the conclusion that such a system can help in keep watching the driver state at all times while driving, it communicates with other vehicle and facilitate in avoidance of any traffic accidents involving driver's alertness.

Keywords: Alcohol sensor, accident avoidance, driving alertness and ESP module.

I.INRODUCTION

One of the main reasons attributed to the increasing number of traffic accidents around the world is the alcoholic state of the driver which results in either complete or partial impairment to control the vehicle while in motion, and therefore puts the life of the driver and others in danger. Traffic police, in its effort to get rid of drunk drivers, administers breath analyser test for those drivers who are on the road but there is currently no mechanism to monitor the driver's condition by the other drivers on road while he is driving the vehicle.

Driving under influence (DUI) can cause vehicle accidents which leads to fatal problems and death in worst cases. Also drowsiness and drunken condition of the drivers resulting from taking medicines irresponsibly or tiredness and fatigue of the drivers also contribute to road accidents. It is therefore crucial to develop a monitoring system within the vehicle which can keep an eye on the health of the driver while driving and can alert firstly the driver, in case of non responsive driver, the law enforcement authorities about the condition of the driver and presence of a possible accident-prone vehicle on the road. Thos can result in reducing the number of collision accidents and can save precious lives and assets.

Presently there is no known device installed in the vehicle which can find whether the driver is drunken or not. In this paper, we have proposed and implemented a system which can identify whether the driver is drunken or not by monitoring the breath continuously, by the sensor attached in the seat belt and gives a warning if the threshold reaches abnormal limit, if happen so, the vehicle will automatically stops and at the same time these credentials will be passed to the pool of drivers on the road through the DSRC communication. If the driver does not respond positively within a certain time interval, the system has the capability of applying brakes to the vehicle and alerting law enforcement authorities about the rouge driver on the road. Here we have limited ourselves to the discussion of only the electrical components

and working of designed present state analysis in this paper, and have left out the details of mechanical braking system and mechanism of communication with the law enforcement authorities as supplementary research work for the future.

II.PREVIOUS WORK

Shih-Nan Lu introduced a method that involves the data bus system which is used for the transmission of the data which consist of the speed limit and behavior of the driver and it is trying to find a balance point between the development of vehicle speed limit and the protection of driver's safety.. In this paper we try to develop a system to provide the prior to accident information to the vehicle control unit so that it enables the vehicle to prevent the happening of accident. During the vehicle movements the system will continuously record the vehicle's moving status and conditions so that the record will provide the decision basis in the accident investigation if it unfortunately happens the fatal accident [2]Huang Zhu developed the wireless technologies such as DSRC (Dedicated Short Range Communication), vehicles on a highway which can communicate with each other to share safety-related information. This paper proposes a communication protocol for vehicle collision warning system on a highway. With the vehicle status information shared in the ad hoc mobile network consisting of vehicles, the protocol is able to predict potential collision in different emergency scenarios by applying corresponding invariants. A forward collision warning mechanism is designed to propagate the warning in a platoon of vehicles with minimum number of messages while at the same time covering all endangered vehicles. A simulation on SPIN shows the correctness and effectiveness of the protocol.[3]Suresh B. Mer (2014) aim to avoid vehicular accident by providing advisory to the driver as less congestion, mishap warning, road investigation, etc using vehicle to vehicle communication V_2V.Technological developments in electronics, computing, identifying, robotics, control, signal processing, and communications makes these things possible. Different technology like WAVE is based on the IEEE 802.1p standard, DSRC, CALM standard mainly used in v2v communication. One major technical challenge in all technology is to achieve low-latency in delivering emergency warnings in various road situations. 5G technology with its specific potential feature [4] David S. Blome used correlation filters that can track complex objects through rotations, occlusions and other distractions at over 20 times the rate of current state-of the-art techniques. This paper presents a new type of correlation filter, a Minimum Output Sum of Squared Error (MOSSE) filter, which produces stable correlation filters when initialized using a single frame. A tracker based upon MOSSE filters is robust to variations in lighting, scale, pose, and non-rigid deformations while operating at 669 frames per second. Occlusion is detected based upon the peak-to side lobe ratio, which enables the tracker to pause and resume where it left off when the object reappears.[5]Ning Lu used various wireless connectivity for vehicles that enables the communication between vehicles and their internal and external environments. In this paper, we focus on wireless technologies and potential challenges to provide vehicle-to-x connectivity. In particular, we discuss the challenges and review the state-of-the-art wireless solutions for vehicle to-sensor, vehicle-to-vehicle, vehicle-to-Internet, and vehicle-to road infrastructure connectivity.[6] GOH CHIA CHIEH proposes a novel Vehicle to Vehicle (V2V) communication system for collision avoidance which merges four different wireless devices (GPS, Wi-Fi, Zigbee and 3G) with a low power embedded Single Board Computer (SBC) in order to increase processing speed while maintaining a low cost. Collision avoidance data processing includes processing data for vehicles on express ways, roads, tunnels, traffic jams and indoor V2V communication such as required in car parks. Effective methods are proposed to address these technical challenges through parallel Central Processing Unit (CPU) and Graphic Processing Unit (GPU) processing. With this, parallel V2V trilateration and parallel bandwidth optimization, multi-dimensional real time complex V2V data streaming can be attained in less than a second. The test results have shown that there is at least a 4 to 10 times improvement on processing speed with parallel CPU and GPU processing used in V2V communication depending on different road safety conditions. [7]Swati B. Raut developed a

VANET to reduce the collision of the vehicles and congestion control in the intersection of the roads Efficient monitoring of vehicles is need of time for smooth traffic flow.. It uses Intelligent Control Unit (ICU) and Vehicle to Vehicle communication to predict the collision probability at highway intersection. The scheme is implemented at open street map, on location of interest and makes use of warning system based on collision probabilities. Simulation results show the collision probability for near crash, no crash and crash.

III.EXISTING WORK

Vehicle collision based on VANET is proposed which address the issue of collision avoidance. Vehicular ad-hoc networks provide distributed real time communication of traffic hazards and road conditions among vehicles in a radio line of sight. VANET turns every participating car into a wireless router or node, allowing the cats approximately 100 to 300 meters of each other to connect and, in turn, create a network with the wide range. As cars fall out of the signal range and drop out of the network, other cars can join in, connecting vehicles to one another so that a mobile internet is created. It is estimated that the first system that will integrate this technology are police and fire vehicles to communicate with each other for safety purposes.

A VANET can't predict when nodes in the system have a high dynamic characteristics and a special demand for low delay. Due to this, the safety system within the intelligent transportation system (ITS) has attracted a lot of interests in how to decrease the number of accidents in highway scenario using wireless data communication. Intelligent transportation system consists of the backbone, management system such as transportation management center, and communication points to vehicles such as road Side Units (RSUs). The VANET other, etc provides a more effective way for vehicle to vehicle communication, vehicle o road side communication, sharing of information within each.

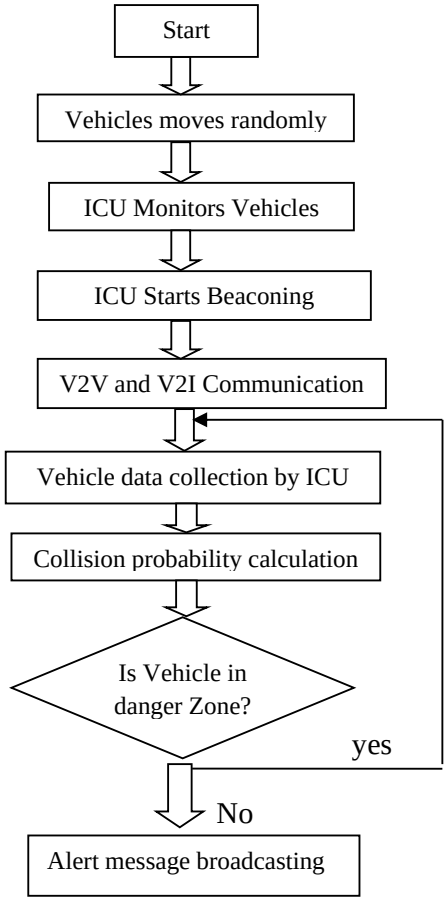

Fig.1. Overview of existing model

It uses the V2V communication by means of intelligent control unit to predict the collision probability at highway intersection. It provides us with the capability of predicting the chances of collision on highway with the use of vehicle-to-vehicle communication by means of ICU communication. First part deals with the road network creation in SUMO and places ICU near intersection. The ICU will start monitoring the location of vehicles in its range and also keep track of the information about these vehicles. Having the current information about the vehicles, ICU will calculate the collision probability of the vehicles approaching towards the accidental zone. Depending upon the information stored and calculated future path of the vehicles the criticality of situation is calculated. The ICU will broadcast alert messages to the corresponding vehicle which are in danger. The scheme is implemented at the open street map, on location of interest and makes use of warning system based on collision probabilities.

IV.DESIGN

A.MOTIVATION

Intelligent Transportation System (ITS) ensures the information transmission so real time, secure reliability that realizes the long distance control. It is an advanced application which, without embodying intelligence as such, aims to provide innovative services relating to different modes of transport and traffic management and enables user to be make safer, more coordinated, and smarter use of transport networks. This paper is about a design of a new fashion auto- guard which is a smart measurement generalized in the automobile security area. Number of cars on roads, streets and parking places is constantly increasing. It leads to increased traffic load and accidents. Intelligent Transportation System (ITS) are permeability of the road, increase quantity of lanes, improve public transport infrastructure. The alternative method is to create and deploy on which enables optimal use of existing road infrastructure by interactive management of all traffic.

In this paper, we propose a new method for improving vehicle safety and to analyse driver's present state. More importantly, the proposed method can reduce the theft up to a great extent (and even complete details of the vehicle like ownership details and vehicle specifications) and the driver's present mode of the driver will be detected. The drunken state of the driver can be analysed like whether he is drunken or not, whether he is in sleepy mode and it can be informed to the nearby vehicles.

B.HARDWARE

The main components of our system are shown in fig

(i)Microcontroller (ii) Alcohol sensor (iii) LCD display (iv) Power supply (v) Motor (Speed control module) (vi) ESP8266

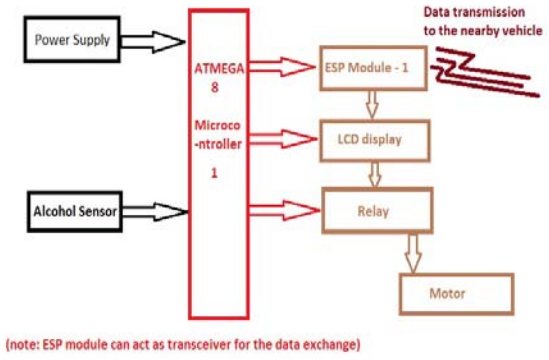

Fig.2. Data transmission in vehicle 1

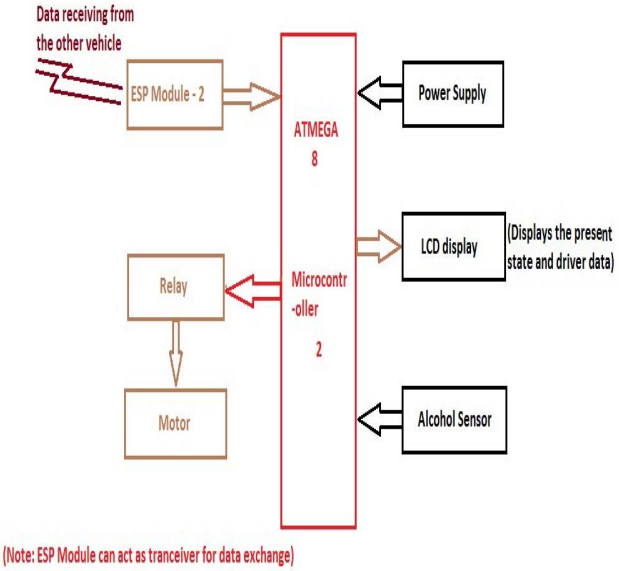

Fig.3. Data transmission in vehicle 2

Microcontroller is the heart of our system which is responsible for the synchronizing among all sub-components, and also plays the role of the decision maker when to sound the buzzer, instruct the motor to apply the vehicle braking system, or to contact law enforcement authorities in case the first two options do not heed desired results. The microcontroller is powered by DC supply, commonly available from the cigarette-lighter knob in most car's dashboards. The alcohol value which is detected by the alcohol detector are fed into microcontroller. If the threshold value of the alcohol sensor is more than 600 baud rate the value will gets displayed in the LCD display as a warning message intimating the current state of the driver. The microcontroller can be interfaced to the vehicle braking system which starts applying the brakes slowly if warranted by the condition of the driver. A networking card can also

be connected with the microcontroller to send a message to the law enforcement authorities, if desired.

C.SOFTWARE

In our design, we have used Arduino is a microcontroller board based on the Atmega328 (datasheet). It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. A program for Arduino may be written in any programming language with compilers that produce binary machine code for the target

processor. Atmel provides a development environment for their microcontrollers, AVR Studio and the newer Atmel Studio.

D. HOW DOES THE SYSTEM WORK?

Our system starts functioning as soon as the driver turns the key to start the car's engine. The state analysis module, installed at a suitable position on the dashboard is use to monitor the state of driver's present state while the car is in motion. The alcohol sensor transmits the real time values information to the microcontroller installed in our system. After the microcontroller receives the information coming from the sensor, it starts to compare the difference between the successive readings of the alcohol information. If the threshold value reaches and make comparison with the previous values ,if the threshold value reaches above the fixed level system activates the motor to stop and digital values send over to WIFI and the driver in car 2 will analysis the speed ,other credentials of driver and alcohol value will be saved in the database for further uses. In case of accidents these details will be very useful for the cops.

V. IMPLEMENTATION

The designed system was successfully implemented using Arduino UNO board (containing Atmega 328p microcontroller) [22], LCDo3-I2C/serial LCD [23], ESP 8266 module, MQ-2 *Alcohol* sensor, and a DC motor.

VI.CONCLUSION

The below diagram shows how the communication is being transferred from one ESP to another ESP.

The ESP kit is capable of transferring the messages from one point to another where the message signals such as driver state and the alcohol value is transmitted from one ESP to another and is displayed in the LCD for driver vision analysis. Once the LCD displays the message the driver is aware of the point of Accident that is going to happen. The battery is triggered with some charge to the module obtaining it the ESP works as per the operation. The quick seconds of communication between the ESP and displays in LCD plays a major role in preventing the accidents. Thus the prevention of accidents through ESP plays a perspective role in human lives.

VII.ACKNOWLEDGEMENT

The project was completed in the department of Electronics and Communication Engineering at Excel Engineering College, under the supervision of the authors.

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