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Review paper of Vehicle control system using CAN protocol

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ABSTRACT— Nowadays economical automobiles are developed by more of electro mechanical parts with analog interface for efficient & cost-effective operation. Generally, a vehicle is built with an analog driver-vehicle interface for indicating various vehicle statuses like speed, fuel level, engine temperature etc. This paper presents a design & development of cost-effective solution for digital driving interface with a semi-autonomous vehicle improving the driver-vehicle interaction with increase in safety.Our designed system uses sensors to digital format and visualize them to the vehicle driver through a LCD display.The communication module used here is an embedded network bus CAN, which has efficient data transfer.

Keywords: Controller area network (CAN), Vehicle Sensors, Communication Module.

I. INTRODUCTION

The driving is make easier and safety and reduce human efforts. A vehicle was generally built with an analog driver-vehicle interface for indicating various parameters of vehicle status like temperature, pressure and speed etc. To improve the driver-vehicle interface, an interactive digital system is designed. According to today's upcoming technologies vehicle is one of the important necessities of human being. With rapidly changing computer and information technology and much of the technology finding way into vehicles. They are undergoing dramatic changes in their capabilities and how they interact with the drivers. Although some vehicles have provisions for deciding to either generate warnings for human driver or controlling the vehicle autonomously, they usually must make these decisions in real time with only incomplete information so, it is important that human drivers still have some control over the vehicle. Advanced in-vehicle information systems provide vehicles with different types and level of intelligence to assist the driver. The introduction into the vehicle design has allowed an almost symbiotic relationship between the driver and vehicle by providing a sophisticated and intelligent driver-vehicle interface through an intelligent information network. The project describes the development and implementation of digital driving system for a semi-autonomous vehicle. CAN
communication protocol is chosen to realize the objective.

II. RELATED WORK

Electric Vehicle Monitoring System Using MATLAB/App Designer: This paper [1] focuses on the creation of a graphical interface which enables the user to monitor the most important variables fromthe electric vehicle. The App Designer environment from MATLAB has been the main resource used to develop this interfacebecause it offered an enhanced design environment and an expanded UI component set. At its current development state, it is not areplacement for GUIDE because it has a limited graphics support and some existing graphics components are not supported yet. Thedata acquisition has been done using the low-cost platform, NI USB 6001. Thanks to this card, the sensor signals will be transferred tothe PC, so the user will be able to know what is happening with the variables to monitor. To measure some variables, the signal fromthe sensors is adapted to the voltage range of the data acquisition card. The usage of several adapters is therefore necessary for thecircuits.

A Novel IOT Access Architecture For Vehicle Monitoring System: This paper [2] presents a prototype of the Internet of Things (IoT) is becoming

increasingly important for traffic monitoring,medical treatment, and other industrial applications. With the continuous development of the IoT, more and more "things" will beable to access to the IoT. Considering a large number of heterogeneous "things", how to provide a unified access mechanism to theIoT is a fundamental and key issue. In this paper, we propose a novel IoT access architecture based on field programmable gate array(FPGA) and system on chip (SoC), which can provide a unified access to the IoT for a wide variety of low-speed and high-speeddevices with associated extendibility and configurability. We have adopted an IEEE1451.2 standard for this design and applied theproposed design to vehicle monitoring system. The results indicate that the system can provide good performance in the practicalapplication.

Smart Vehicle Monitoring System For Air Pollution Detection Using WSN: This paper [3] presents a Wireless Sensor Network (WSN) which plays an important role in the application of environmentalmonitoring. Mostly air pollution being major issues as cause many hazardous effects on the ecological system of human being.Therefore, the need for monitoring air pollution around the city and the public transport buses and cars are a very important problemtoday. Basically, environmental monitoring methods have difficulties in wired sensor network but by using WSN it is possible toachieve the challenging issues by implementing internet/intranet. This proposed research concentrates on measuring the gas level ofair contamination around the cities and reduces the manpower and also increases the overall flexibility of sender and receiver. Themain objective of the proposed system for the moving vehicles is monitor the NO2, Humidity, Temperature, CO levels of aircontamination by using the NO2 sensor, Humidity sensor, Temperature sensor, CO sensor. In our proposed work MANET (Mobile AdHoc Network) routing algorithm is used which has nearly 28 mobile nodes(Vehicles) provide a coverage area of 300meters around thecity. The sensor data of the vehicles will be sent to the smartphones of the appropriate drivers to monitor effectively. The result of theproposed method includes the following parameters such as data type, the speed of transmission, coverage of the system, coveragearea size, and No.of vehicles to closely monitor the proposed system.

Cloud-Based Vehicle Monitoring System in VANETs:

Integration of Cloud computing with VANET is supposed to be the next big thing because of its scalability and reliability. Invehicular ad hoc networks (VANETs) the network services and applications (e.g., safety messages, vehicle navigation data) require anexchange of vehicle and event location information. This paper proposes a new VANET-Cloud-integrated service called CVMS:(Cloud-Based Vehicle Monitoring System in VANETs) as service in which, vehicles moving on the road serve as witnesses ofdesignated events, capture the real-time video or photo of the specific location, route or a deadly accident. A group of vehicles withmounted on board navigation units collaborate to form the vehicular cloud and sends the real-time data to the central cloud using theroadside cloud. The proposed real-time cloud-based video capture system has experimented with various scenarios of video-basedroad services. The algorithm for efficient lane changing, navigation data transferring from vehicular cloud to the central cloud in areal-time environment has been implemented on a simulator of an onboard camera based embedded system. The goal of this service isto recognize and track faulty vehicle, emergency vehicles, video and photo capturing of any event, route or location. The presentedwork demonstrates the potential of our proposed system for enhancing and diversifying real-time video services in road environments.

Design and Implementation of Mobile Vehicle Monitoring System based on Android Smartphone: The paper [8] presents the design and implement a mobile vehicle monitoring system using Android smartphones. Users can observe their vehicles' information using a mobile screen anytime, anywhere. Our proposed design is composed of small theGPS/GNSS receiver terminal, modern data acquisition modem, cellular data transmission network, and the smartphone application.We comprehensively discuss the key technologies in terms of hardware and software aspects employed in the systemincludingpossible indoor positioning wireless technologies. The designed system in the paper is implemented and tested in practicalexperiments. Experimental results have proved that the proposed monitoring system is correct and feasible for vehicle owners.

Development of Remote Vehicle Monitoring System for Surveillance Applications: This paper [6] describes a portable sensing system that can be placed adjacent to a road and can be used for vehicle counting,vehicle classification, and vehicle speed measurements. The proposed system can make these traffic measurements reliably for trafficin the lane adjacent to the sensors. The developed signal processing algorithms enable the sensor to be robust to the presence of trafficin other lanes of the road.

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Vehicle classification into pre-defined classes such as cars, trucks, and tractor trailers typically requiresmeasuring the size or length of the vehicle.

Research of Electric Vehicle Security Assurance and Monitoring System: This paper [15] has introduced the security assurance and monitoring system of public electric vehicles' operation. An effectivemanagement system based on the GPS and 3G network was designed in this study. The system can be categorized into three parts:center management platform, vehicle terminal, wireless transmission network. The experiment results showed that the system realized functions such as real-time data acquisition, processing, wireless transmission and remote monitoring on 3G network technology.

III. MOTIVATION

We see everyday thousands of road accidents in this accident as many as thousands of peoples injured in a world. More than hundreds of people die and many people are disabled for live life normally this is a result of lack of speed control and violating the road rules. The highlighted interaction of several factors like lack of experience of drivers, low awareness of measures, broken rules, excessive speed of the vehicle, ignore the temperature of the engine. Vehicle control system helps the driver to control over the vehicle and check the parameter in the vehicle on screen at the same timing of driving, parameters like temperature, fuel.

IV. LITERATURE REVIEW

Advanced in vehicle system provides vehicles with different types and levels ofintelligence to assist the driver. Significant amount of research and literature isavailable.

1. **Sneha shingate, Y.V.Chavan" Smart vehicle controlled system based onARM",2015:**.The ARM7 controller is used in many applications. In this paper it is used as the core controller, to control the entire vehicle. A voice recognition module will beused for human interaction with the vehicle. This module will be at thetransmitter side i.e. with the person, which gives the desired commands. Thecontroller used at the transmitter side is PIC controller. This signal will be receivedby the controller at the receiver end placed on the vehicle for controlling. Incontrolling mainly four operations will be performed i.e., forward, stop, left, rightin this prototype. To provide safety IR sensors will be used which gives feedback

at the receiver end whenever there is any obstacle. For real time operation µcos-iiwill be used to enhance the performance of system.

2.ShahianJahroni" control of autonomous ground vehicle",2017: This paper presents a brief review of the developments achieved in autonomousvehicle systems technology. A concise history of autonomous driver assistance systems is presented, followed by a review of current state of the art sensortechnology used in autonomous vehicles. Standard sensor fusion method that hasbeen recently explored is discussed. Finally, advances in embedded softwaremethodologies that define the logic between sensory information and actuationdecisions are reviewed.

3. **Prof. Manoj Sonune "Advanced vehicle control system", 2017:**In the last few decades, Automobile Industry has been at its peak for developingrevolutionary technologies to create a safe environment for both the driver andthe Vehicle while driving on the road and to make them less prone to accidents.Two major causes of Road accidents are Fault detection using analog means ornon-accurate information about the vehicle parameters and the ignorance ofDriver. This paper presents the digital framework of a control system with integrated system of sensors connected to high-speed microcontroller and proper alert and warning systems to warn the driver of any unforeseen dangers. The ideato make driving more advanced and comfortable led to the designing of Digital Driver warning and control system that provides a real time performance byincorporating CAN protocol into the system. This paper also focuses on digitaltransmission of traffic light status to the driver inside the vehicle and to get rid ofthe glaring effect at night that is a health issue as well as one of accident causes.

4. **Margarita Martinez "Autonomous vehicles: Theoretical and practical challenges",2018:**

Autonomous driving is expected to revolutionize road traffic attenuating currentexternalities, especially accidents and congestion. Carmakers, researchers andadministrations have been working on autonomous driving for years andsignificant progress has been made. However, the doubts and challenges to

overcome are still huge, as the implementation of anautonomous drivingenvironment encompasses not only complex automotive technology, but alsohuman behavior, ethics, traffic management strategies, policies, liability, etc. As aresult, carmakers do not expect to commercially launch fully driverless vehicles inthe short-term. From the technical

perspective, the unequivocal detection ofobstacles at high speeds and long distances is one of the greatest difficulties to
face. Regarding traffic management strategies, all approaches share the visionthat vehicles should behave cooperatively.

5. Bishwaji Pal, samithakhaiyum "Recent advances in software sensors andcomputation platform used in autonomous vehicle a survey", 2019: Autonomous vehicles will be getting mass acceptance in near future and is one ofthe biggest computer science dream to come true. It is also considered the keytechnology to solve human social problems caused by the dependency ofautomobiles in human life. AV will give the next level entry in artificialintelligence. But AV is also riddled with numerous issues in its design,implementation and practicality. In this paper we will be comparing existingautonomous vehicles and upcoming vehicles and compare them on theirdeployed vehicles in market, its intelligence to handle different types of problems,total miles driven and failure while in autonomous mode. Miles ridden to learnthe AI, Range & Resolution of LIDAR, other sensors, Traffic sign recognition, complicated road with traffic handling. Software framework used, Computationhardware platform used and total computational strength.

6. Live Video Streaming using Raspberry Pi with Face Detection: In today's world, surveillance systems like CCTV are extremely popular but they require high cost for installation and they are not much flexible and scalable. Live Video Broadcasting Like Television is also afar complex and high cost process for video streaming. On the other hand, our proposed system of live video streaming using raspberry pi through cloud server are far more simple and low cost with high level of accessibility through internet. This system gives both flexibility inters of architectural changes and scalability in terms of increase of users to access the video streaming

V. CONCLUSION

We see everyday thousands of road accidents in this accident as many asthousands of peoples injured in a world's. More than hundreds of people die andmany people are disabled for live life normally this is a result of lack of speedcontrol and violating the road rules. The highlighted interaction of several factorslike lack of experience of drivers, low awareness of measures, broken rules,excessive speed of vehicle, ignore the temperature of engine. Vehicle controlsystem helps the driver to control over the vehicle and check the parameter invehicle on screen at the same timing of driving, parameters like temperature,fuel.This system is based on CANbased control system is a standard protocol for reliable communication betweensensors, actuator, controller and other node in real time application.

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