
Review paper of Vehicle control system using CAN protocol**Snehal V. Sakle**Department of Electronics & Telecommunication Engineering
Bapurao Deshmukh, College of Engineering, Sevagram Wardha – 442 102 (M.S.)**Prof. Mr. R. D. Kadam**

BDCOE, Sevagram, Assistant. Prof. of Department of Electronics & Telecommunication Engg

Dr. Miss. J. D. Dhande

Assistant Prof. of Department of Electronics & Telecommunication Engg.

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.

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 from the electric vehicle. The App Designer environment from MATLAB has been the main resource used to develop this interface because it offered an enhanced design environment and an expanded UI component set. At its current development state, it is not a replacement for GUIDE because it has a limited graphics support and some existing graphics components are not supported yet. The data acquisition has been done using the low-cost platform, NI USB 6001. Thanks to this card, the sensor signals will be transferred to the PC, so the user will be able to know what is happening with the variables to monitor. To measure some variables, the signal from the sensors is adapted to the voltage range of the data acquisition card. The usage of several adapters is therefore necessary for the circuits.

II. Main part

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 be able to access to the IoT. Considering a large number of heterogeneous “things”, how to provide a unified access mechanism to the IoT 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-speed devices with associated extendibility

and configurability. We have adopted an IEEE1451.2 standard for this design and applied the proposed design to vehicle monitoring system. The results indicate that the system can provide good performance in the practical application.

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 environmental monitoring. 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 problem today. Basically, environmental monitoring methods have difficulties in wired sensor network but by using WSN it is possible to achieve the challenging issues by implementing internet/intranet. This proposed research concentrates on measuring the gas level of air contamination around the cities and reduces the manpower and also increases the overall flexibility of sender and receiver. The main objective of the proposed system for the moving vehicles is monitor the NO₂, Humidity, Temperature, CO levels of air contamination by using the NO₂ sensor, Humidity sensor, Temperature sensor, CO sensor. In our proposed work MANET (Mobile Ad Hoc Network) routing algorithm is used which has nearly 28 mobile nodes(Vehicles) provide a coverage area of 300meters around the city. The sensor data of the vehicles will be sent to the smartphones of the appropriate drivers to monitor effectively. The result of the proposed method includes the following parameters such as data type, the speed of transmission, coverage of the system, coverage area 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. In vehicular ad hoc networks (VANETs) the network services and applications (e.g., safety messages, vehicle navigation data) require an exchange 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 of designated events, capture the real-time video or photo of the specific location, route or a deadly accident. A group of vehicles with mounted on board navigation units collaborate to form the vehicular cloud and sends the real-time data to the central cloud using the roadside cloud. The proposed real-time cloud-based video capture system has experimented with various scenarios of video-based road services. The algorithm for efficient lane changing, navigation data transferring from vehicular cloud to the central cloud in a real-time environment has been implemented on a simulator of an onboard camera based embedded system. The goal of this service is to recognize and track faulty vehicle, emergency vehicles, video and photo capturing of any event, route or location. The presented work 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 the GPS/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 system including possible indoor positioning wireless technologies. The designed system in the paper is implemented and tested in practical experiments. 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 traffic in the lane adjacent to the sensors. The developed signal processing algorithms enable the sensor to be robust to the presence of traffic in other lanes of the road. Vehicle classification into pre-defined classes such as cars, trucks, and tractor trailers typically requires measuring 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 effective management 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.

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.

III. Literature review

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

1. Sneha shingate, Y.V.Chavan” Smart vehicle controlled system based on ARM”,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 be used for human interaction with the vehicle. This module will be at the transmitter side i.e. with the person, which gives the desired commands. The controller used at the transmitter side is PIC controller. This signal will be received by the controller at the receiver end placed on the vehicle for controlling. In controlling mainly four operations will be performed i.e., forward, stop, left, right in 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 μ cos-ii will be used to enhance the performance of system.

2. Shahian Jahroni” control of autonomous ground vehicle”,2017: This paper presents a brief review of the developments achieved in autonomous vehicle systems technology. A concise history of autonomous driver assistance systems is presented, followed by a review of current state of the art sensor technology used in autonomous vehicles. Standard sensor fusion method that has been recently explored is discussed. Finally, advances in embedded software methodologies that define the logic between sensory information and actuation decisions are reviewed.

3. Prof. Manoj Sonune “Advanced vehicle control system”, 2017: In the last few decades, Automobile Industry has been at its peak for developing revolutionary technologies to create a safe environment for both the driver and the 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 or non-accurate information about the vehicle parameters and the ignorance of Driver. 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 idea to make driving more advanced and comfortable led to the designing of Digital Driver warning and control system that provides a real time performance by incorporating CAN protocol into the system. This paper also focuses on digital transmission of traffic light status to the driver inside the vehicle and to get rid of the 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 current externalities, especially accidents and congestion. Carmakers, researchers and administrations have been working on autonomous driving for years and significant progress has been made. However, the doubts and challenges to overcome are still huge, as the implementation of an autonomous driving environment encompasses not only complex automotive technology, but also human behavior, ethics, traffic management strategies, policies, liability, etc. As a result, carmakers do not expect to commercially launch fully driverless vehicles in the short-term. From the technical perspective, the unequivocal detection of obstacles at high speeds and long distances is one of the greatest difficulties to face. Regarding traffic management strategies, all approaches share the vision that vehicles should behave cooperatively.

5. Bishwaji Pal, samitha khaiyum “Recent advances in software sensors and computation platform used in autonomous vehicle a survey”, 2019 : Autonomous vehicles will be getting mass acceptance in near future and is one of the biggest computer science dream to come true. It is also considered the key technology to solve human social problems caused by the dependency of automobiles in human life. AV will give the next level entry in artificial intelligence. But AV is also riddled with numerous issues in its design, implementation and practicality. In this paper we will be comparing existing autonomous vehicles and upcoming vehicles and compare them on their deployed vehicles in market, its intelligence to handle different types of problems, total miles driven and failure while in autonomous mode. Miles ridden to learn the AI, Range & Resolution of LIDAR, other sensors, Traffic sign recognition, complicated road with traffic handling. Software

framework used, Computation hardware 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 a far 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

Conclusion

We see everyday thousands of road accidents in this accident as many as thousands of peoples injured in a world’s. 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 vehicle, ignore the temperature of engine. Vehicle control system helps the driver to control over the vehicle and check the parameter in vehicle on screen at the same timing of driving, parameters like temperature, fuel. This system is based on CAN based control system is a standard protocol for reliable communication between sensors, actuator, controller and other node in real time application.

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