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Intelligent Wireless Vehicle Communication for Obstacle Avoidance

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Abstract:

Transportation problems are turning into more critical due to the complication of traffic structure and increase of vehicles on roads. Intelligent vehicle communication provides a free space to the vehicles to communicate among them to avoid collision using RF. The vehicles share information to avoid collision. The main application of this paper is to provide safe and secure journey to the people on the road. ARM controller controls the whole working of the system and through Wi-Fi the information are transferred between the vehicles. The decision is taken automatically by the controller regarding the movement of the vehicle. The goal is to avoid collision thereby providing efficiency, safety and security to the vehicles and passengers. A warning is given as alert to the driver to prevent collision.

Key words: **ARM7, Wi-Fi, Sensors, RF module**

I. INTRODUCTION

In Intelligent Transportation System, IOV is a crucial part of a country's information construction. With the increasing city holdings of cars, there are more and more traffic jams, so requirements are that Intelligent Transportation needs more improvement. The key technology Of Intelligent Transportation is Vehicle positioning System is the IOV.

Internet of vehicles (IOV) is a new field of research that aims to study remote agents (people, vehicles, robots) as they interact and collaborate to sense the environment, process the data, propagate the results and more generally share resources. But there are several untrusted zones (cloud services) were there may be chances of hacking all the private data. The driving habits of various individuals are different and we don't have any system which can monitor these conditions. Here we provide secure and privacy-preserving access control to users, which guarantees any member in a group to anonymously utilize the cloud resource. A Driver Behavior Reporting System that works by collecting and sending actual, real-time data directly from nearby car whenever it is being driven. You stay aware and informed, so you can reinforce responsible driving habits, or immediately address areas of concern.

Vehicular communication (VC) systems will enable many exciting applications that will make driving safer, more efficient and more comfortable. But this necessitates the introduction of security and privacy enhancing

mechanisms. In this paper we focus on practical aspects associated with the implementation and deployment of such a secure VC system. We also provide an outlook to future research challenges.The proposed project is implemented in two sections. First one known runs with ARM as master node and another as ARM data acquisition node to which sensors are connected. Communications between two nodes are accomplished through High Speed CAN communication. Sensors connected are ultrasonic, speed, and Smoke sensors.

Block Diagram:

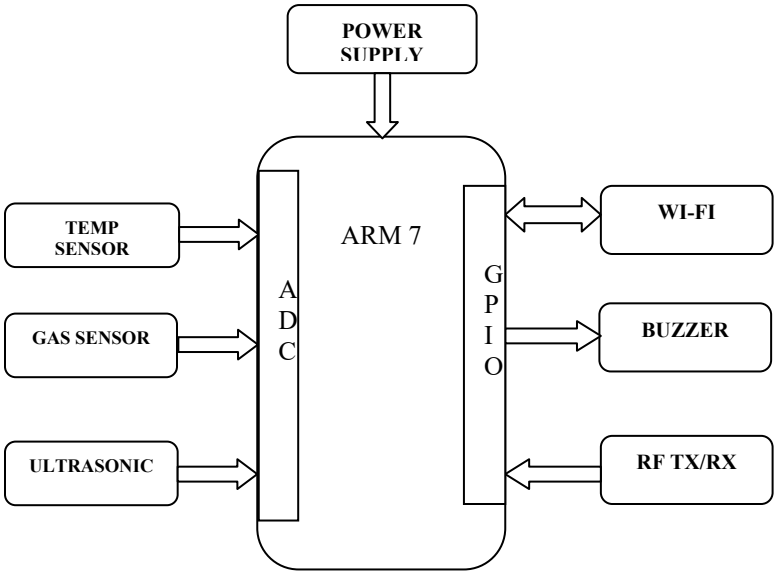

Fig1: IOV system

II. Design and Implementation

An IOV System that works by collecting and sending actual, real-time data directly from the car whenever it is being driven and upload in a cloud network. The smoke level in the automobile we uses the gas sensor. In this proposed work , we are using a MQ5 sensor which pick up heat changes in the sensor element in response to the change in the gas parameter like methane. . The sensor has excellent sensitivity combined with a quick response time. The sensor can also sense iso-butane, propane, LNG and cigarette smoke.

Ultrasonic is used to find the object detection. Which can be broken down into three functional units, the receiving circuit, the transmitting circuit, and the MCU circuit. The receiver and transmitter circuits can work independently of the MCU, which made testing with a signal generator quite useful

At the heart of the receiver circuit is one of the ultrasonic transducers. The transducer converts an incoming sound wave and converts it into a voltage signal. This signal needs to be cleaned of noise, amplified, and turned into a TTL-type signal for the MCU. The signal from the transducer is fed through a capacitor to filter out noise and then through a voltage divider to center the signal at 2.5 volts. From here, the signal needs to be amplified to guarantee true TTL levels. Through an operational amplifier LM358 the digital output will be send to the microprocessor GPIO peripheral.

IR sensor is used to find the RPM of the motor. An IR will pass an invisible light to the photodiode. Due to this the photodiode will conduct. If any objects interrupt the transmission, then the photodiode will stop the conduction. This conduction and non-conduction property of the Photodiode will pass high and low signal to the controller. These

signals will be counted through capture input of the controller and will be calculated as the RPM. The finalized value will be transmitted through the Wi –Fi to the cloud network.In oder to get the road sign different RF transmitters will be set into the

III. System Hardware

LPC2148 Processor:

LPC2148 Microcontroller Architecture. The ARM7TDMI-S is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer (RISC) principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed Complex Instruction Set Computers (CISC). This simplicity results in a high instruction throughput and impressive real-time interrupt response from a small and cost-effective processor core.

Pipeline techniques are employed so that all parts of the processing and memory systems can operate continuously. Typically, while one instruction is being executed, its successor is being decoded, and a third instruction is being fetched from memory. The ARM7TDMI-S processor also employs a unique architectural strategy known as Thumb, which makes it ideally suited to high-volume applications with memory restrictions, or applications where code density is an issue.
The key idea behind Thumb is that of a super-reduced instruction set. Essentially, the ARM7TDMI-S processor has two instruction sets:
• The standard 32-bit ARM set.
• A 16-bit Thumb set.

Smoke sensor:

Ideal sensor for use to detect the presence of a dangerous LPG leak in your car or in a service station, storage tank environment. This unit can be easily incorporated into an alarm unit, to sound an alarm or give a visual indication of the LPG concentration. The sensor has excellent sensitivity combined with a quick response time. The sensor can also sense iso-butane, propane, LNG and cigarette smoke.

Fig3: Smoke sensor

Ultrasonic sensor:

The ultrasonic sensor finds the distance through an echo pulse. The sensor provides precise, stable non- contact distance measurements from 2cm to 4 meters with very high accuracy. Its compact size, higher range and easy usability make it a handy sensor for distance measurement and mapping. The operating frequency of the sensor is 40khz.

The pulses of 40 kHz frequency will be send to the ultrasonic transmitter. The transmitter will convert this voltage into sound waves and then transmit it for a particular distance. Within the range if any object comes , the sound signal

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will be reflected back to the ultrasonic receiver as an echo pulse. The time duration between the transmission and receiving pulse will gives the object distance. Speed of ultrasonic wave is 347 m/s.

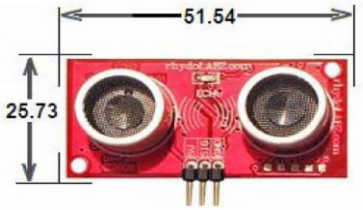

Fig2. Ultrasonic sensor

DC motor:

DC motors are configured in many types and sizes, including brush less, servo, and gear motor types. A motor consists of a rotor and a permanent magnetic field stator. The magnetic field is maintained using either permanent magnets or electromagnetic windings..Motors are the devices that provide the actual speed and torque in a drive system. This family includes AC motor types (single and multiphase motors, universal, servo motors, induction, synchronous, and gear motor) and DC motors (brush less, servo motor, and gear motor) as well as linear, stepper and air motors, and motor contactors and

Wireless communication:
Wi-Fi :

In this project , an Wi-Fi module based on the universal serial interface network standard, built-in TCP / IP protocol stack, enabling the user serial port, Ethernet, wireless network (wifi) interface between the conversions. Through the device, the traditional serial devices do not need to change any configuration; data can be transmitted through the Internet network. The sensor datas will be transmitted to the cloud network through this module.

RF communication:

Radio Frequency, any frequency within the electromagnetic spectrum associated with radio wave propagation. When an RF current is supplied to an antenna, an electromagnetic field is created that then is able to propagate through space. Many wireless technologies are based on RF field propagation

RF Transmitter

The TWS-434 extremely small, and are excellent for applications requiring short-range RF remote controls. The transmitter output is up to 8mW at 433.92MHz with a range of approximately 400 foot (open area) outdoors. Indoors, the range is approximately 200 foot, and will go through most walls. The TWS-434 transmitter accepts both linear and digital inputs can operate from 1.5 to 12 Volts-DC, and makes building a miniature hand-held RF transmitter very easy

RF receiver:

RWS-434: The receiver also operates at 433.92MHz, and has a sensitivity of 3uV. The WS-434 receiver operates from 4.5 to 5.5 volts-DC, and has both linear and digital outputs.

V. Conclusion

Using the internet of things, a System that works by collecting and sending actual, real-time data from the car whenever it is being driven to a cloud network is implemented in this paper. The acquisition node collects the sensor information to the processing node through can network and will be transmitted to the Wi-Fi network. Road safety is also established in the project through the RF module. This project will bring an efficient improvement in the vehicular network.

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