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A PATH FOR HORIZING YOUR INNOVATIVE WORK

STUDY OF ISSUES IN AUTOMATIC VEHICLE OVERTAKING SYSTEM FOR ACCIDENT AVOIDANCE

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Abstract

With the advent of industrialisation and increasing luxurious lifestyle, transportation has become the major part of our lives. Today large numbers of vehicles run during day and night time. Nowadays the number of accidents is increasing due to negligence of the driver. Negligence such as dozing off, attending phone calls, lack of awareness, exhaustion due to prolong driving, etc.

This project covers overtaking of the vehicles without manual efforts. The sensors will be present on the vehicle which will be detecting the distance between the neighbouring vehicles and itself. When this distance reduces, the sensors will sense them and the overtaking mechanism will be triggered.

INTRODUCTION

The development of advanced driver assistance systems (ADAS) to aid in driving-related tasks has a key role to play in the automotive field.

Assistance systems – to prevent accidents or to make driving safer – which alert the driver of imminent risks through visual or audible signals have been included in commercial cars in recent years. Although these techniques are necessary and provide a warning to the driver, their dependence on human reaction time for a decision to be made remains a problem.

The first system introduced in commercial vehicles with the potential to influence traffic safety was adaptive cruise control (ACC) .This was an extension of cruise control (CC) – CC allows the driver to set a driving speed – in which the vehicle is capable of following a leading car on highways by automatic action on the throttle and brake pedals, i.e., longitudinal control. Lateral or steering control, however, remains one of the toughest challenges in the development of commercial ADAS. The currently most advanced system is lane keeping assistance (LKA) which provides limited additional steering torque to aid the driver in maintaining the vehicle within the lane if a potential lane departure is detected. In previous work, a lane-change controller was developed in the AUTOPIA program, determining experimentally the relationship between the speed and the lane-change distance using vehicle-to-vehicle (V2V) communication to perform the maneuver. This system was based on a prior knowledge of the state of the road. However, the development of ADAS in mass-produced cars allows one to assume that autonomous or semi-autonomous vehicles will be driving on our roads in the medium to long term. Consequently, it is obligatory to have a system capable of permitting the coexistence of these.

Tri-state address pins providing a maximum of 531,441 (or 312 kinds of vehicle with today's human driven vehicles on the roads. Given this premise, all the sensorial information will have to be on board the autonomous vehicle, and the path-tracking actually generated will have to depend on the traffic conditions. Our goal is to develop a system whose behavior is as close to that of the human driver as we can make it. To this end, different trajectories will be generated depending on the leading vehicle's characteristics as obtained from vision-based information.

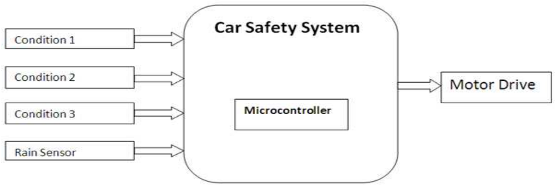

Figure 1 Car Safety System

II. Related Work:

If you have ever driven a car with an automatic transmission, then you know that there are two big differences between an automatic transmission and a manual transmission:

* There is no clutch pedal in an automatic transmission car.
* There is no gear shift in an automatic transmission car. Once you put the transmission into drive, everything else is automatic.

Both the automatic transmission (plus its torque converter) and a manual transmission (with its clutch) accomplish exactly the same thing, but they do it in totally different ways. It turns out that the way an automatic transmission does it is absolutely amazing!

A. Encoder

What is Encoder?

An encoder is a device, circuit, transducer, software program, algorithm or person that converts information from one format or code to another, for the purposes of standardization, speed, secrecy, security, or saving space by shrinking size.

B. RF Module

The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK).

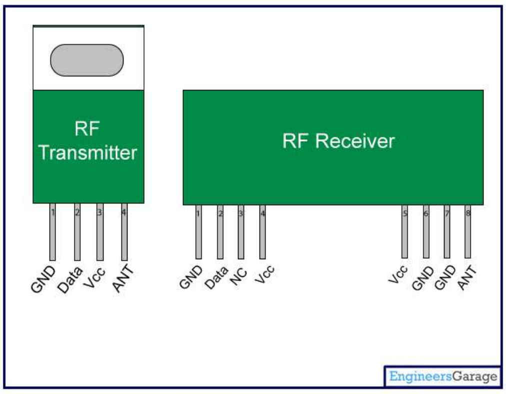

Figure 2 RF Module

Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources.

This **RF module** comprises of an **RF Transmitter** and an **RF Receiver**. The transmitter/receiver (Tx/Rx) pair operates at a frequency of **434 MHz** An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin4. The transmission occurs at the rate of 1Kbps - 10Kbps.The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter.

C. Decoder:

Definition

A decoder is a device which does the reverse operation of an encoder, undoing the encoding so that the original information can be retrieved. The same method used to encode is usually just reversed in order to decode. It is a combinational circuit that converts binary information from n input lines to a maximum of 2^n unique output lines.

PT2272 is a remote control decoder paired with PT2262 utilizing CMOS Technology. It has 12 bits of) address codes; thereby, drastically reducing any code collision and unauthorized code scanning possibilities. PT2272 is available in several options to suit every application need: variable number of data output pins, latch or momentary output type.

D. IR Sensors

It consists of ir transmitters and receivers. In this project we are using three ir sensors.

Uses of sensors:

Use of front sensor

When the front sensor detects that vehicle is below the safe limit then it will check for sufficient space and will move the vehicle right up to a specific distance and specific angles and will overtake the car.

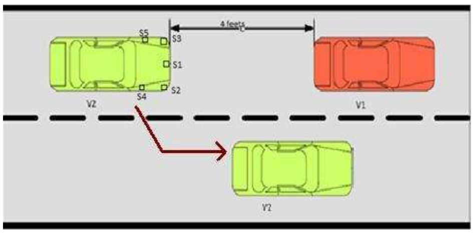

Figure 3 Front Sensor Working

Use of right sensor

If another vehicle is in right then right sensor gets activated. Here, if this condition is satisfied then vehicle will shift itself left at a particular distance and at a given angle it will move and will overtake the front vehicle.

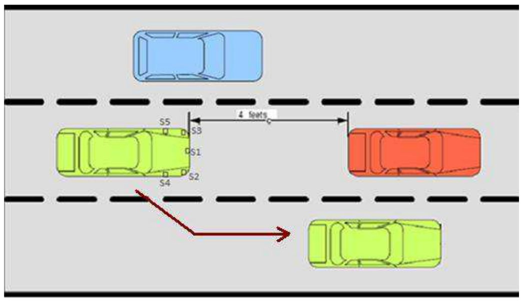

Figure 4 Right Sensor Working

Use of left sensor

If another vehicle is in left then left sensor gets activated.Here, if this condition is satisfied then vehicle will shift itself right at a particular distance and at a given angle it will move and will overtake the front vehicle.

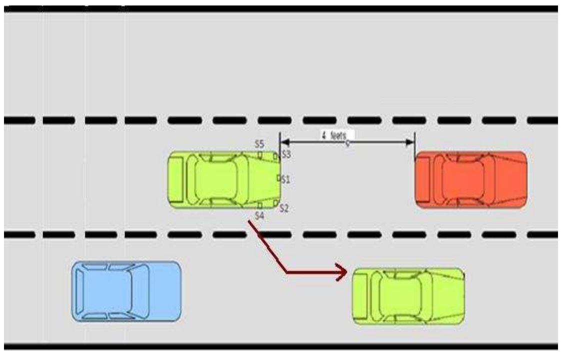

Figure 5 Left Sensor Working

III. DESCRIPTION OF MODULE

A. Keypad:

Microcontroller

Keypad will have 3 buttons – left, right, front.

Microcontroller GPIO pins configured for receiving input will sense which key is pressed. Generate an event and Interrupt system signals microcontroller to call Interrupt Service Routine.

It in turn generates a digital signal for encoder.

Encoder

Encoder converts incoming signal digits to pulses

e.g. –

If 0 then length of pulse be 38 PIC instructions.

If 1 then length of pulse be 102 PIC instructions.

RF transmitter

Transmitter transmits signals from keypad to receiver located in vehicle. Its range is now predicted to be 100 meters

B. Vehicle:

RF Receiver

RF receiver is located in vehicle. Receiver receives signals from keypad and gives it to decoder.

Decoder

Decoder is situated between RF receiver and microcontroller of vehicle. Decoder converts incoming pulses to digits.

Microcontroller

Microcontroller GPIO pins configured for receiving input will receive digits from decoder.

Generate an Input event and Interrupt system signals microcontroller to call Interrupt Service Routine.

It in turn generates a signal for motor. Motor is responsible to move vehicle.

Current Amplifier

To increase strength of current so that it can drive motor.

Relay Circuit

There is a coil inside. When current flows through the coil a magnetic field causes the internal paddle to move positions. This paddle usually carries large currents or large voltages.

Motor

Motor drives vehicle as per instructed by microcontroller.

IR transmitter

Continuously transmits infra red rays to detect an obstacle.

IR receiver

- If there is any obstacle IR beam will dash and reflected back. It is catch by IR receiver.

- An event is generated.

- Interrupt system informs microcontroller.

- Microcontroller stops executing current instruction.

- Calls ISR.

- Makes decision 'where to move vehicle to drive safely?'

C. How modules are arranged? (Block diagram) –

i.Keypad:

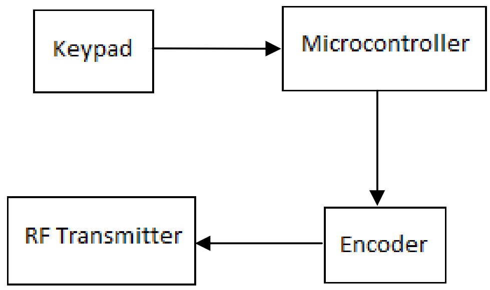

Figure 6 Module1 (Keypad)

ii.Vehicle:

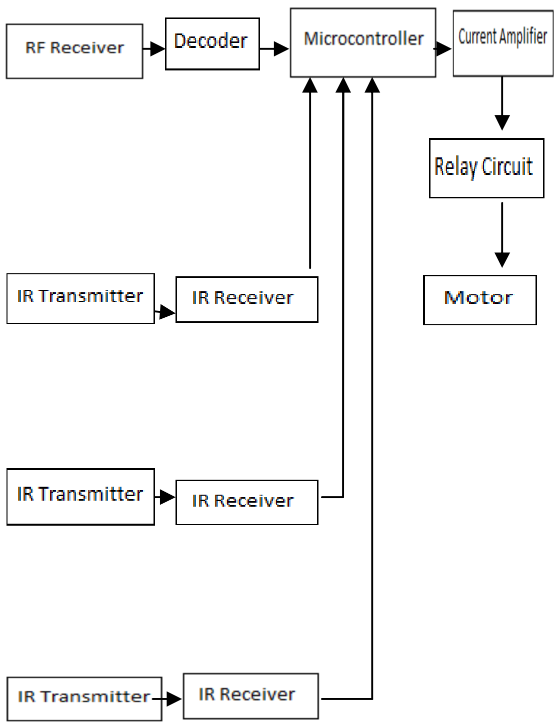

Figure 7 Module2 (Vehicle)

FUZZY LOGIC BASED INTEGRATED CONTROL SYSTEM

Recently, various electronic control techniques and control systems, such as anti-lock braking system, traction control system, and so on are being developed greatly and applied widely to improve the ride comfort, safety and operation stability in vehicle. Many theories and design methods for antilock braking systems have been proposed several literatures for decades. Researchers have considered a lot of control strategies and methods of anti-lock braking systems, which have been demonstrated effective for ABS system. Georg.F.Mauer proposed Fuzzy technique for ABS in 1995 and David E Nelson has implemented fuzzy logic based

ABS for electric vehicle. Now computers are increasingly in driving-related tasks in some commercial vehicles. As evident from literature, collision warning and avoidance systems

are currently of prime interest in present automotive research and development. Fuzzy techniques are proposed for CAS by Jose E. Naranjo, Carlos Gonzalez and Chan yet Wong. However, none of these papers investigated regarding simultaneous control of ABS and CAS. In this paper we make an

Attempt to control both ABS and CAS together and control logic is fuzzy logic based. Moreover, this is implemented in HCS12 microcontroller using CAN protocol and important results are brought out. When there are more electrical control devices in the modern cars, such as power train management system, antilock braking system (ABS), and acceleration skid control (ASC) system, etc, the functionality and wiring of these electric control units are getting more complicated. Therefore, it is of great concern to upgrade the traditional wire harness to a

Smart car network. In 198Os, a Germany car component provider Robert Bosch Co. introduced an in-car network; the controller area network (CAN) bus, to replace the complex and expensive traditional in-car wiring.

CONCLUSION

Calibrating the alignment of automotive distance radar modules during installation and subsequent service in automotive workshops by means of directly analyzing the direction of the radar beam is a challenging task putting high requirements on accuracy, robustness, usability, and costs. At the same time, there are few proposals for concepts addressing this problem up to now. Besides classic receiver architectures, one promising alternative is the six-port technology. This concept is based on interferometric analysis of the phase delay of a propagating wave between two receiver antennas

placed in a certain distance to each other. The achievable Tolerances are extremely low and make this robust, Cheap, and easy to handle architecture an ideal candidate for aligning automotive radar modules to the thrust vector of the car.

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