

INTELLIGENT EMBEDDED CONTROL WARNING SYSTEM FOR CAR REVERSING

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ABSTRACT

In today's fast world, while driving car some time we may need to reverse the car or while parking we usually need to reverse car but as we can't see the object at backside it might happen that back of car get stuck on the object causing minor or major accident which affect physically as well as economically. To such situation some developments have been done in car design.

Most of the car drivers used the reverse radar or a reverse camera to detect the road situation behind the vehicle when it is engaged in reverse gear. As a matter of fact, the pedestrians can virtually know if the vehicle is backing up or not only by seeing the permanent bright reverse lamps. And as there is not much change with the reverse lamp to be seen, therefore their warning function for pedestrians seems to be still insufficient eventually.

Therefore, this research tries to design a set of embedded intelligent car backup warning system so as to promote the safety of the walkers or the other drivers on the road. This embedded system uses android operating system with android and matches with the ARM developing board for developing the intelligent touch panel operating mode.

The UART interface on the ARM developing board controls the frequency converter, RC server and LED by using PIC16F877 to transform the signal of the sensors. ultrasonic sensors are used for distance calculation and camera and LCD touch screen is used have view of object behind the car. Apparently, from the test results, it has been proven that this system can reach the goal of automatically controlled car back-up warning function truly.

KEYWORDS: APR Sensors, ARM Board, Camera, LCD Screen, PIC16F877A, Ultrasonic Sensors

INTRODUCTION

This embedded system uses android operating system with android and matches with the ARM developing board for developing the intelligent touch panel operating mode. The UART interface on the ARM developing board controls the frequency converter, RC server and LED by using PIC16F877 to transform the signal of the sensors. Ultrasonic sensors are used for distance calculation and camera and LCD touch screen is used have view of object behind the car.

This system use sensors to detect the distance, vehicle, speed and ambient brightness so as to computing signal of the sensor by the fuzzy logic controller. Controller uses the embedded system to work as the computing platform of fuzzy logic controller.

As the embedded controller has to process the graphic user interface, for the purpose of preventing it from being poor of computing performance, not only the program code should be optimized but need to use the microprocessor for picking up the signal of the sensors so as to transfer the computing as well as generate the PWM signal finally.

It truly can reduce the processor load effectively and avoids the computing being carried out on some processor only. Owing to that, it can avoid taking samples insufficiently in the process of picking up the signal of the sensors. [1][11]

PRINCIPAL OF OPERATION

System includes

- The design of the intelligent embedded control warning system for car reversing,
- The design of the test mobile frame,
- To establish operating system
- The design of the control program. And we would like to have further detailed descriptions individually as below:

PSU: power supply unit is provided to PIC16F877A of 3v pp.

PIC16F877A: we use PIC16F877 to convert the digital analogy as well as to convert the aided digital scale of sensors in order to facilitate the telecommunication transmission in series.

MAX232: It is used to have communication between controller and ARM board.

RS232: It is used to have TTL logic conversion.

ARM Base Board: ARM 11 MPCORE is used in which RS232 is inbuilt. SD data card is provided for recording video etc. touch screen LCD monitor is provided to have a view of obstacle behind vehicle. USB is also inbuilt on ARM board for interfacing camera and transferring data serially. [3][7]

Sensors: After camera sensors we are having ultrasonic sensors to have idea of distance. Ultra sonic is three pin sensor (5v, GND, OUT) of range 4 ft. servo motor to view from all angles. LED to blink and give warning to pedestrian’s .LDR to activate LED in dark. ADC to covert analog measurement to digital [2][9]

Test Mobile Frame: It is made up of motor and motor driver L293D having buzzer for pedestrian’s safety. The design of the intelligent embedded control warning system for car reversing This system use sensors to detect the distance, vehicle speed, and ambient brightness so as to computing the signal of the sensors by the fuzzy logic controller. It truly can reduce the processor load effectively and avoids the computing being carried out on some processor only. Owing to that, it can avoid taking samples insufficiently in the process of picking up the signal of the sensors. Framework diagram is shown as Figure 1. We use PIC 16F877 to convert the digital analogy as well as to convert the aided digital scale of sensors in order to facilitate the telecommunication transmission in series. To receive the control signals from embedded system by ARM board and according to the contents of these control signals to generate PWM signal so as to control the rotation of the server as well as switching the different electric current of the mode with constant-current. The RS232 serial interface of embedded system [4][6]

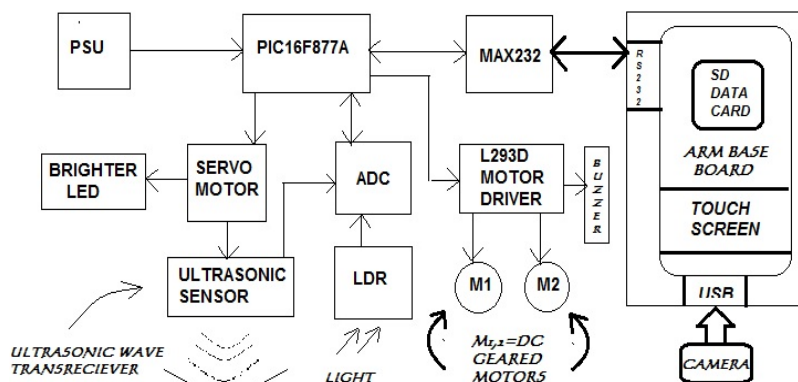


Figure 1: The Framework Diagram of the Intelligent Embedded Control Warning System

OPERATING SYSTEM

Android is a Linux-based operating system designed primarily for touch screen mobile devices such as smart phones and tablet computers. Initially developed by Android, Inc., which Google backed financially and later bought in 2005, Android was unveiled in 2007 along with the founding of the Open Handset Alliance: a consortium of hardware, software, and telecommunication companies devoted to advancing open standards for mobile devices. The first Android-powered phone was sold in October 2008.

Android is open source and Google releases the code under the Apache License. This open source code and permissive licensing allows the software to be freely modified and distributed by device manufacturers, wireless carriers and enthusiast developers. Additionally, Android has a large community of developers writing applications that extend the functionality of devices, written primarily in a customized version of the Java programming language. These factors have contributed towards making Android the world's most widely used Smartphone platform, overtaking Zambian in the fourth quarter of 2010, and the software of choice for technology companies who require a low-cost, customizable, lightweight operating system for high tech devices without developing one from scratch. As a result, despite being primarily designed for phones and tablets, it has seen additional applications on televisions, games consoles, digital cameras and other electronics. Android's open nature has further encouraged a large community of developers and enthusiasts to use the open source code as a foundation for community-driven projects, which add new features for advanced users or bring Android to devices which were officially released running other operating systems [10].

ADVANTAGES

- Reduces the financial burden of maintaining your vehicle and maximize its value upon re- sale.
- Increased confidence when parking.
- Poor rear visibility is no longer a major concern when reversing and provides great assistance to less mobile drivers.
- Recognized as a standard safety driving aid by all the main car manufacturers. [5]

DISADVANTAGES

- EXPENSIVE - 40% more than regular system.
- DELICATE – Car temperature must be monitored.[9]

VIEW OF SYSTEM



Figure 2: View of System

CONCLUSIONS

This research truly can make the operation of reversing warning system be possible with comfort and ease. And the operation of it can be done very well in the limited condition. We use android to work as the OS of the controller. With camera driver can view obstacle easily. Ultrasonic sensor gives distance of obstacle from car. LED warns pedestrians while reversing car. Buzzer and APR sensors are used for Audio and voice indications. Automatic brake system implemented with 2.5 feet distance with reverse obstacle. So with this system the Possibilities of collision while reversing the car are almost negligible. This system Safely Reverse & Park your Car in Total Comfort and Confidence, Preventing Tragic Accidents with Children, the Elderly & Pedestrians, Protecting Car from Bumps, Scrapes & Expensive Collisions, Make the risk out of parking and reversing.

REFERENCES

1. A. Shalom Hakkert, Victoria Gitelman, Eliah Ben-Shabat, "An evaluation of crosswalk warning systems: effects on pedestrian and vehicle behavior," Transportation Research Institute, Technion- Israel Institute of Technology, Technion City, Haifa 32000, Israel,)
2. Hitoshi Miyata, Makoto Ohki, Yasuyuki Yokouchi, Masaaki Ohkita, "Control of the autonomous mobile robot DREAM-1 for a parallel parking," Department of Electrical and Electronic Engineering, Faculty of Engineering, Tottori University, 4-101, Koyama-Minami, Tottori 680, Japan, Mathematics and Computers in Simulation 41 (1996) 129-138.
3. Nikolaj Zimic, Miha Mraz, "Decomposition of a complex fuzzy controller for the truck-and-trailer reverse parking problem," University of Ljubljana, Faculty of Computer and Information Science, Trzaska cesta 25, SI-1000 Ljubljana, Slovenia, Mathematical and Computer Modelling 43(2006)632-645.(Pubitemid43330884)
4. Massaki Wada, Student Member, "Development of Advanced Parking Assistance System," IEEE, Kang Sup Yoon, Member, IEEE, and Hideki Hashimoto, Member, IEEE, IEEE Transactions on Industrial Electronics, VOL. 50, NO.1, Feb 2003.
5. Tsung-hua Hsu, Jing-Fu Liu, Pen-Ning Yu, Wang-Shuan Lee and Jia- Sing Hsu, "Development of an Automatic Parking System for Vehicle," Automotive Research and Testing Center, Changhua County, Taiwan, R.O.C., IEEE Vehicle Power and Propulsion Conference (VPPC), September 3-5, 2008, Harbin, China.
6. Yanan Zhao, Emmanuel G. Collins Jr., "Robust automatic parallel parking in tight spaces via fuzzy logic," Department of Mechanical Engineering, Florida A&M University-Florida State University, Tallahassee, FL, USA, Robotics and Autonomous Systems 51 (2005)
7. G. Bruzzone, M.Caccia, G.Ravera, A.Bertone, Standard Linux for embedded real-time robotics and manufacturing control systems, Robotics and Computer-Integrated Manufacturing 25pp.78-190,2009.
8. http://en.wikipedia.org/w/index.php?title=Ultrasonic_sensor&oldid
9. <http://en.wikipedia.org/w/index.php?title=Androide&oldid=515778698>
10. "Digital communication: Fundamentals and applications" by Bernard Sklar, Pearson Education publication, fourth edition, year 2003, pp. 461-466.