

Advanced Automatic Vehicle Anti-collision using Ultrasonic Signal

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Abstract— the aim of the project is to avoid vehicle collision. Now a day's so many accidents are happening in the roads. This creates a time delay for passenger, huge traffic in the road and life loss for the accident persons and vehicle damage. We can avoid these things by using ultrasonic anti-collision instrument. This instrument is fixed in front side of the vehicle. The vehicle collision can be avoided by using this topic. Opposite vehicles are sensed by using ultrasonic signal. The microcontroller switching on the ultrasonic transmitter & receive the output signal of ultrasonic receiver. By doing distance measurement calculation the system can find out the distance of the opposite vehicle from your vehicle. If the distance is our set value, the controller will energize braking system. The buzzer will give warning beep. The beep duration is depends upon the distance between the two vehicle.

Key words: Advanced Automatic Vehicle Anti-Collision, Ultrasonic Signal

I. INTRODUCTION

Along with the science and technology fast development, the ultrasonic wave more and more will be broad in the science and technology application. This article has carried on the theoretical analysis to the ultrasonic sensor range finder possibility, the use simulation electron, the digital electron, the microcomputer connection, the ultrasonic wave transducer, as well as.

The ultrasonic wave in medium knowledge and so on dissemination characteristic, use take STC89C52 monolithic integrated circuit as the core low cost, the high accuracy, the microminiaturized numeral demonstrated the ultrasonic wave distance gauge the hardware electric circuit and the software design method has designed the system overall concept in this foundation, finally has realized each function module through the hardware and the software. Key words: STC89C52, ultrasonic wave, sensor, LCD, Measuring distance Ultrasonic back-draft rangefinder (known as electron optics) automotive anti-collision reversing device, can safe adjunct to sound or more intuitive digital form the dynamic display of around obstacles. Its earlier products are to use buzzer alarm, hum more anxious, and says vehicles from obstructions closer. Subsequent product can display the car from the body after the obstacles distance. Most of its products detection range in 0.4 ~ 1.5 m, some product can achieve 0.35 ~ 2.5 m, and have distance display, sound alarm, area-warning and azimuth instructions, some products also has the boot self-checking function. Still appeared on the market at present with voice alarm function of products. These products are the main problem is big, alarm measuring blind area lags behind, without considering the automobile braking inertial factors and make drivers brake lag, the anti-interference ability is not strong, misstatement or more. The automotive anti-collision radar is able to realize impact-proof alarm functions, basically have ultrasonic this intangible

ruler, it recently obstacles distance measurement, and told to the owner. Actually ultrasonic range-finding principle simple: it emit ultrasonic echo, and receive reflected by microcontroller counter obtain both lag using formula $S = t, Ct / 2$ calculating distances, including S for cars and obstacles, C for the distance between acoustic propagation in the medium speed.

This paper introduces the ultrasonic ranging system only have 2 ultrasonic transducer (known as probe) respectively, decorate in cars left and right after 2 position. Capable of detecting forward and reverse direction obstacle distance, the rear-view mirror built-in display element display distance and direction, issued must be sound, plays the role of hints and alert. System USES a STC89C52 SCM two way ultrasonic signal cyclically acquisition.

Ultrasonic frequency above 20 KHz refers to the wave. In order to use the ultrasonic detection means, must generate as ultrasonic wave and receiving damnation. Complete the functions of the device are called the ultrasonic sensor, habit, ultrasonic transducer or ultrasonic probe. Ultrasonic sensors have both transmitters and receivers, but a ultrasonic sensors can also has the sending and receiving the sound waves of the dual role. Ultrasonic sensors is using the principle of piezoelectric effect and ultrasonic energy conversion, be in namely emit ultrasonic, energy conversion, launch ultrasonic, And in the stockades, received echo ultrasonic vibration into electrical signal.

Ultrasonic ranging principle generally USES the time method (TOF crossing of a flight). First measured ultrasonic from the launch to meet obstacles returns experience of time, again multiply ultrasonic speed of get twice the distance between the sound source and obstacles. Measuring distance a variety of ways, short can use ruler, long-range laser displacement etc, are suitable for high accuracy of ultrasonic ranging in long distance measurement. Because of ultrasound in standard air of propagation speed 331.45 meters per second, by single-chip microcomputer is responsible for timing, SCM use 12.0 M crystals, so the system of measurement precision theory can achieve mm level.

Because of ultrasonic directivity strong, energy consumption is slow, in a medium transmission distance, thus ultrasonic can be used for distance measurement. Using ultrasonic detection distance, the design is more convenient, computing process also relatively simple, and the measurement precision can also meet the requirements.

Ultrasonic generator can be divided into two kinds: one kind is to use electrical means producing ultrasonic, one kind is with mechanical approach to producing ultrasonic. This design belongs to nearly distance measurement, can use commonly use the piezoelectric ultrasonic transducer to achieve trigger unit.

Using ultrasonic ranging work, can according to measuring launch reflection wave and the time interval

between the measured distances, so as to achieve the effect. It mainly have three ranging methods:

- Phase assay, phase assays high precision, but detection though limited range,
- Sound amplitude assay, acoustic amplitude assay vulnerable reflection wave influence;
- Ferrying more time assay, crossing the time assay way of working is simple, intuitive, in hardware control and software design are very easy to implement. Its principle is: from the launch emit ultrasonic detection sensor, the gas medium spread to receive sensor of time, this time is crossing the more time.

This design is the use of ultrasonic ranging the crossing the time assay. In the mobile vehicles of the application of ultrasonic sensor is the use of ultrasound in air of directional spread and solid reflective characteristics (p-wave) and by receiving their launch ultrasonic reflecting signal, according to the ultrasonic issued and echo receiving the Windows and propagation speed, calculate transmission distance, thus obtains the obstacles to vehicle distance.

II. DESCRIPTION OF EMBEDDED SYSTEM

We want to control everything without moving an inch and this remote control of appliances is possible through Embedded Systems.

Each day our lives become more dependent on "Embedded systems", digital information technology that is embedded in our environment the need to carry some specific tasks by using hardware and software made the advent of "Embedded Systems."

Man's immense case to find new things for making life as comfortable as possible lead to the invention of many new things like radio, T.V., etc. and at one stage leading to the invention of computers. This brought in to light many fields which are bringing unimaginable invention things at the doorstep of common man. One such field is "Embedded Engineering".

Embedded systems have made their way into almost every electronic device in use today. Right from our watches, cell phones, they form an integral part of the circuit. Each of the systems is unique and the hardware is highly specialized to the application domain.

There are many paradigm shifts taking place due to information explosion and the concept of autonomous vehicle is one shift. The car, which is embedded, can simulate the human driver completely and direct the vehicle on the road. Autonomous vehicle has been the dream of scientists for long. Now their dream has come true as with drastic changes in technical brilliance and developments in different fields with EMBEDDED SYSTEM as pioneer.

III. HARDWARE COMPONENTS

- Power Supply: 5v DC
- Micro controller AT89C52
- Buzzer: Freq-1 to 18 kHz (5v-12Vdc)
- LCD: 2*16 characters
- Relay
- Ultrasonic transmitter and receiver
- Software used :Kiel Micro Vision 3

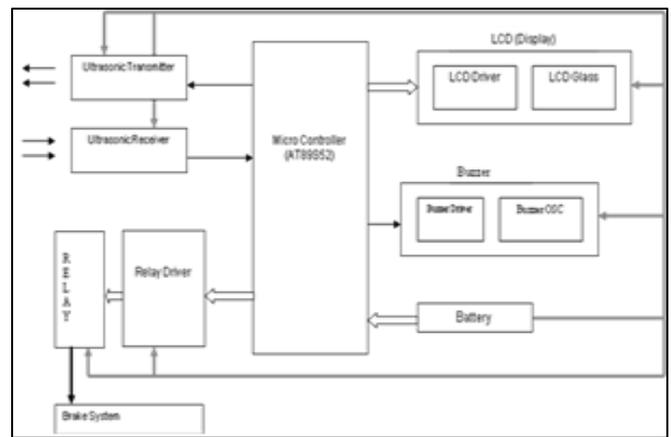


Fig. 1: Block Diagram

A. Power Supply

The microcontroller and other devices get power supply from AC to DC adapter through voltage regulator. The adapter output voltage will be 12VDC non regulated. The 7805 voltage regulators are used to convert 12V to 5v DC.

B. LCD (Liquid Crystal Display)

- Used to display the distance between the vehicles.
- The most common type of LCD controller is the Hitachi 44780 which provides a relatively simple interface between a processor and an LCD.
- In our project we used two-line display.

C. Microcontroller-AT89C52

- The AT89C52 is a widely available in market, cost effective, low power and high-performance CMOS 8-bit microcontroller.
- The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry- standard 80C51 instruction set and pin out.

D. Ultrasonic Rays

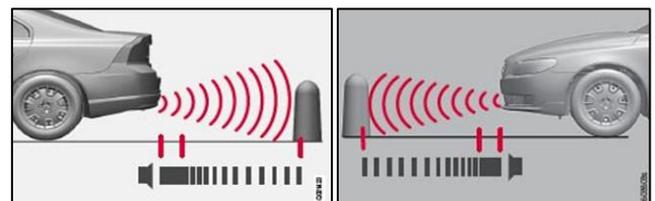


Fig. 2: Ultrasonic rays

Ultrasonic is acoustic energy in the form of waves having a frequency above the human hearing range. Ultrasonic can be used to locate objects by means similar to the principle by which radar works these high-frequency acoustic waves reflect from objects.

The distance to an object can be determined by measuring the delay between the transmission of an ultrasonic pulse and the return of the echo.

1) Ultrasonic Transducer

a) (Transmitter & Receiver)

Ultrasonic signals can be used to locate objects by means similar to the principle by which radar works. Ultrasonic TXR is used to transmit ultra-sonic signals. These high-frequency ultrasonic waves reflect from objects, on which it is incident. The distance to an object can be determined by measuring the delay between the transmission of an ultrasound pulse and the return of the echo.



Fig. 3: Ultrasonic Transducer

E. Applications of Ultrasonic Rays

- Ultrasonic rays are used in electronic, navigational, industrial, and security applications.
- It is also used in medicine to view internal organs of the body.
- Ultrasonic rays are used in industry to analyse the uniformity and purity of liquids and solids.
- Ultrasonic rays can be used in sonar systems to determine the depth of the water in a location.

IV. CONCLUSION

- This is helpful to prevent accidents occurring by the vehicle.
- This is also useful to measure the distance between the two vehicle.