Parking System Using Ultrasonic

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Abstract: ***Ultrasonic is nothing but acoustic frequencies between 16 KHz and 1GHz. Ultrasonic is acoustic energy in the form of waves having a frequency above the human being range. The highest frequency that the human ear can detect is approximately 20 thousand cycles per second (20,000Hz). This is where the sonic range ends, and where the ultrasonic range begins. Ultrasonic devices are used to detect objects and measure distances. So in this paper we discuss about ultrasonic waves in parking system so that we can avoid accident in case of parking in backside.***

Keywords: Ultrasonic, frequency, acoustic, energy, waves, object

1. Introduction

Time and cost are two important factors of human life. Whether for an individual or a business. As quality of life increases, more and more people inhabits cities. Urban life requires centralized public facilities. Shopping complexes are an important point of interest both for a city's inhabitants as well as for visitors. With the emergence of modern shopping complexes which Provide a variety of services, more and more people are Attracted to visit them. Hence, more shop owners prefer to locate their business in shopping complexes to target more customers and increase revenue. Recently, shopping complexes have begun providing services much more diverse than just pure selling and buying. Customers can use banking services, post offices, food courts, cinemas; children's play areas, and so on. The growth of shopping malls has influenced shopping culture and behavior. For instance, in Malaysia window-shopping, or visiting shopping complexes simply for looking rather than buying, is a common activity.Providing sufficient parking for visitors is one of the main issues in developing shopping complexes. Offering safe and secure parking lots with a sufficient number of spaces and paying attention to handicapped drivers are a few of the factors which can increase customer loyalty and attract customers to visit a shopping mall more frequently. Among the various types of parking lots are multilevel parking, roadside, roadside with ticket and barrier gate and roadside with parking meter; of these, the multilevel parking lot is the most preferred by patrons If you have problems for your car parking then this kit is for you. Using (ultrasonic) sound waves, whose frequency is beyond our range of hearing, we can "measure" a distance. Consequently, a sensors mounted at the back of the car can give an indication of the distance between your car and the car parked behind you or other obstacles. When the preset minimum distance is crossed, an audible signal is generated. There is increasing concern about accidents involving young children being run over by slow moving vehicles, particularly in private driveways from reversing motor vehicles They are private property therefore are not recorded in road accident statistics. There is increasing concern about accidents involving young children being run over by slow moving vehicles, particularly in private driveways. The Motor Accidents Authority of New South Wales coordinated and funded the initial investigations into this problem. Measurement of the rearward field of view for a range of popular passenger vehicles revealed most had a very poor view of objects the size of toddlers behind the vehicle. This was the case with conventional sedans as well as sports utility vehicles that are generally over represented in this type of accident.

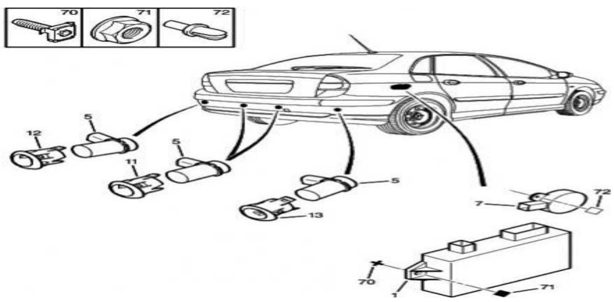

Figure: 1.1

With the help of this project we are presenting a little unit that is both inexpensive and easily fitted to any car and should help to prevent expensive mishaps. The unit uses ultrasonic to determine the distance to an obstruction, the presence of which is indicated initially by an L.E.D. As well as its intended use, this unit could also be suitable for a blind or partially sighted person to indicate the presence of obstacle in their path. The basic principle is that A signal is transmitted which bounces back from the target to a receiver, which measure the time taken for the echo to return. For long distance radar, radio frequency signal is use but we taking only short distance (up to few tens of meters) therefore ultrasonic offer a simpler method. Despite the frequency being beyond the range of human hearing, the speed of the sound is still roughly 300m/sec, or 1m every 3ms. This short of time is easily resolved using ordinary components. Ultrasonic beams are also moderately directional (having a beam width of about 30degree) so that only the object roughly in front of the transmitter should be detected. The master oscillator controls a 40 kHz oscillator which drives an ultrasonic transmitter producing an ultrasonic beam directed at the target. The beam is reflected back, picked up by the ultrasonic receiver whose output signal is amplified. For the indication of the obstacles buzzer and L.E.D are using. Presently, the detection technique of laser, radar, infrared ray and ultrasonic have been widely applied at the aspects of safety technique of car collision avoidance and distance measurement. At the aspect of collision avoidance laser, radar and infrared ray are commonly applied to measure the control range between two cars and the range which should be measured behind the car. At the aspect of distance measurement the technique of ultrasonic is applied to measure the detection range when a car change the driveway and to detect the obstruction behind the car when backing up or parking|. Because of the expensive price, the distance measurement system of backing up with the technique of laser and radar is only set on the minority of slap-up cars, so the research of the distance measurement system of backing up with high ratio of capability and price for the medium cars and the low-end cars is an important task of auto-electron industry. The automatic distance measurement system of backing up introduced in this paper can automatically measure the distance between the trail of the car and detect the obstruction behind the car, further more it can show the distance and give a sound-light alarm in real time, so it can ensure the car to run safely and reduce the accident ratio. The driver does not need to intermeddle in or manipulate this system. This system will have a prosperous application prospect. It will cut a way through the market of the medium cars and the low-end cars and provide a new research method for the car collision avoidance. The automatic distance measurement system of backing up is an electro-mechanical integrative instrument, which adopts the technique of ultrasonic sensor and SCM. When the electric signal is imported into the emitter, the emitter transmits ultrasonic, the receiver receives the reflected wave, the sound wave transmitting time and the distance are in direct ratio, so obtain the function of distance measurement.

2. Related Work

In recent years the problems of young children being struck by reversing motor vehicles has come to attention. Many of this accident occur on private property and therefore are not recorded in road accident statistics. A special effort is needed to determine the number and characteristics of this accident. Such an investigation was initiated by the motor accident s authority of NSW in response to initial findings of the Child Death Review team. The result of that initial investigation is described by Henderson (2000). In New South Wales between January 1996 and June 1999, 17 children were killed by reversing motor vehicles on private driveways. In other words, private driveway is as hazardous as public roads for toddlers. Large four-wheel-drives (4WDS) and commercial vehicles appeared to be over-represented in the accidents. The Henderson report identified some vehicle-related countermeasures that might be utilized to address the problem. This included proximity sensors that alert the driver when an object is detected within a certain distance of the rear of the vehicle and visual aids that give the driver an improved rearward field of view. The MAA therefore commissioned further research on vehicle related countermeasures. This paper sets out the results of that research and subsequent developments. The work is reported in detail by Paine and Henderson (2001).

The methods involving the following activities:

a) A review of technology for proximity sensors and visual aids that might address the problem of children being run over by reversing vehicles. Automotive engineering, sensors technology and occupation safety literature and websites were reviewed.

b) Measuring the rearward field of view of a range of vehicles. A vacant factory was leased. The floor and walls were marked with a distinctive grid. Arrangement was made for a total of nine vehicles to attend the site. For each, the rearward field of view from the drivers' eyes position was photographed and the extremities of that view were measured.

a) Theoretical investigation of the dynamics of the situation to establish required detection distances. The analysis considered the initial speed of the vehicles, the distance at which the sensors detected an object (such as a child) and sounds the alarm, the time is takes the driver to react to the alarm and apply the brakes, and the braking distance.

b) Acquiring and evaluating sample proximity sensors and visual aids. Three ultrasonic and one microwave ('radar") proximity sensors were acquired. These were evaluated using the grid on the factory floor –the tester approaches the rear of the vehicle along marked longitudinal lines and noted when the alarm first sounded. This produced a horizontal detection pattern for each device.

Determining the improvement provided by these devices when fitted to motor vehicles. For one of the test vehicles the data about rearward field of view was combined with data about the detection pattern for the best proximity sensors and the best visual aid (the video camera) to determine if all critical blind sport were covered. ultrasonic, transmitted and received technique. The research and the design of processing system about measuring signal channels and calculating signal .The important part is the hardware and the software design about the SCM signal processing system, the compensation and the emendation of the system error and the random error of signal measured, design of the interface about distance display system and the sound-light alarm system and the drivers, the research of the anti-jamming and reliability of the automatic distance measurement system of backing up.

Two vehicle-related countermeasures were examined: proximity sensors that warn the driver when an object is behind the vehicle and visual aids such as video cameras. Proximity sensors that are designed as a Parking aid has a typical detection distance of 1.5m And so the maximum reversing speed is 3km/h. This Is likely to be too slow for typical driveway situations But, with simple technology, longer detection Distances are likely to be associated with too many False alarms. Initial results suggest a combination of proximity Sensors and video camera would provide the best Assistance to the driver although the technology is Improving rapidly and other solutions are possible. A method of assessing and rating the rearward field Of view of vehicles has been developed by the Insurance Australia Group and the results for popular Vehicles in Australia are presented.

Very little research appears to have been done on vehicle-related countermeasures for reversing accidents. The few relevant studies relate to occupational safety in open cut mines. There is a scarcity of information about the rearward field of view from motor vehicles and methods of improving this view.

3. PRINCIPLE

"A signal is transmitted which bounces back from the target to a receiver, which measures the time taken for the echo to return."

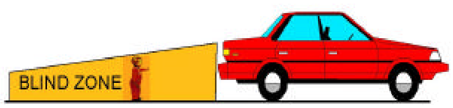

Figure 2

For long distance radar, radio frequency signals are used, but for short range application (up to a few tens of meters) ultrasonic offer a simpler method. Despite the frequency being beyond the range of human hearing, the speed of the sound is still roughly 300m/sec, or 1m every 3ms. This short of time easily resolved using ordinary component. Ultrasonic beams are also moderately directional (typically having a beam width of about 30 degree) so that only the object roughly in front of the transmitter should be detected. The master oscillator control a 40 kHz oscillator which drives an ultrasonic transmitter producing an ultrasonic beam directed at the target. The beam is reflected back, picked up by the ultrasonic receiver whose output signal is amplified. The resulting signal is used to set a bistable which has been previously reset at the start of the transmission.

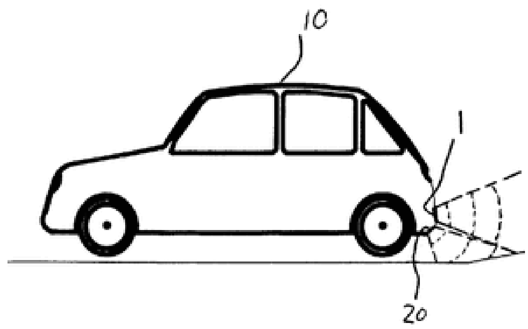

Figure 3

The result is a pulsed output from the bistable. The duration of the pulses depends on the time between the transmission and its reception. At very large distance, the reflected signal is too small to set the bistable and so the output remains low, while at decreasing distances, the output spends more and more time in the logic high state. This P.W.M (pulse width modulated) waveform is fed into a simple integrator which produces a D.C voltage proportional to the distance from the target. This could be read on a suitably calibrated meter but here it is used to control a voltage controlled oscillator (VCO) which produces an audio tone increasing in pitch, as the distance to the target is reduced. The range obtainable from such a system is limited by four factors:

- The power transmitted
- The gain of the echo amplifier
- Target reflection efficiency
- The direction in which the echo is reflected

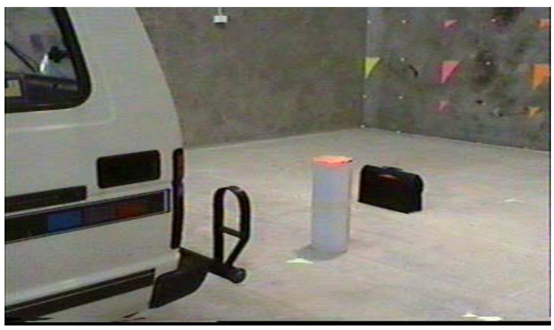

Figure 4:

This will obviously be different for large flat surfaces perpendicular to the beam than or irregular or angled surface which will tends to absorb or disperse the signal rather than reflect it towards the receiver. Sophisticated ranging system include a variable gain amplifier to amplify weak received signal more than strong ones to provide a constant amplitude return signal to get around these problem. Fortunately in this application, where a miss is as good as a mile, we are only interested in short ranges (normally less than one meter) which make such measures largely unnecessary, even with poorly reflected surfaces.

4. RESULT & DISSCUSSION

4.1 Result

The ultrasonic distance measurement is an untouchable detection mode. Compared with else detection modes, it does not influence by ray, temperature and colour etc, and it has the great capability to adapt to the circumstance. The ultrasonic sensors adopts transmission mode or reflection mode on the physical configuration , the reflection mode has the single explore-head and the double explore-head, his system adopts double explore-head reflection head mode, it is that the sending signal and the receiving signal are on the same side. The double explore-head mode has a unique advantage, which is that there is mush less blind are than single explore-head mode. Because the sending explore-head is separated from the receiving explore-head, the sending explore head is does not have sending voltage directly, theoretically, it does not have blind area. But the receiving circuit is influenced by the sending circuit more or less, and the ultrasonic from the sending explore-head possibly move around to the receiving explore directly. So there should be existed some blind area, but in fact more less than the blind area of signal explore-head. It is the ultrasonic pulse echo technique (sonar technique) that is most widely used in the continuous distance measurement technique.

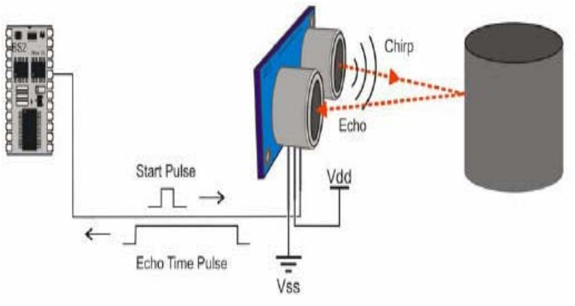

Figure: 4

The working principal is: the sender sends ultrasonic pulse, and then the sound wave transmitted in the medium. The sound wave reflected when it's come against the object. Recording the time from sending to receiving, we can calculate the distance from the sensor to reflection point according to the velocity of sound in the medium. If the vertical distance from the sensors to the object detected in L, the time from sending to receiving is t,the velocity of sound is c, then the distance measured L=(c*t)/2. For the sending and receiving reflection mode, if the distance between the centers of two sensors is 2a, the diagonal path from the sensors to object detected is s, then s=(c*t)/2, generally speaking the sending and receiving sensors are put close, when s>>a, L nearly equal to s. the ultrasonic detection distance related with size, figure, material and position of the object. Generally speaking, the detection distance is farther if the façade of the reflector is smooth and flat than that if the façade of the reflector is coarse. The detection distance is farther if the reflector façade is vertical to the sending signal than that if there is an obliquity between the reflector façade and the sending signal.

4.2. Discussion

Ultrasonic distance measurement has blind area and distance limitation. The reason of existing blind area has been discussed in the ultrasonic distance measurement working principal; the reason of existing distance limitation is that the amplitude value of received signal should be larger than the set of threshold value at least. The threshold value is decided by the demand of the ratio of signal and noise. If the demand is higher, we can demand that the threshold values is larger than decuple of the noise no matter how low the demand is, the least amplitude values of the received signal should be bigger than that of noise, or it is difficult to distinguish the needed signal from the noise.

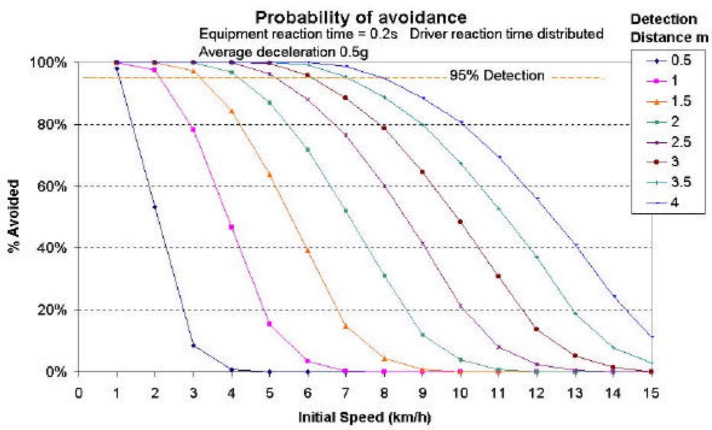

Figure 5:

Sending pulses modulation technique: the number of the pulse is alterable during each sampling period according to the different distance. The farther the distance is, the more the number of the pulses is; the shorter the distance is, the fewer the number of pulses is. Delay receiving technique: there are scattering objects widespread in the air, for example dust and fluid drop, and the reflecting surface is not smooth, all the phenomena mention above can bring hash. Because a large quantity of dust and rough surface can bring the weak but large number of hash, then the system of distance measurement displays the error reading.

Time delay compensating sending remainder swing: delaying some time after sampling to eliminate sending remainder swing from disturbing next sampling. In fact the precision and the distance of measurement are influenced by many factors. If you want to improve the precision and the distance of measurement you can adopt the measures as follow:

1) Emendation of the velocity of sound: there are many factors influencing on the velocity of sound, example air components, temperature, and intensity of pressure

2) Setting focalizing implement: setting focalizing implement can change the open angle of the wave bundle; enhance the ability of distance measurement.

5. Conclusion

Time delay compensating sending remainder swing: delaying some time after sampling to eliminate sending remainder swing from disturbing next sampling. In fact, the precision and the distance of measurement are influenced by many factors. If you want to improve the precision and the distance of measurement you can adopt the measures as follow: -

1) Emendation of the velocity of sound: there are many factors influencing on the velocity of sound, for example the air component, temperature, intensity of pressure, and these factors can influence each other, from great velocity of sound grads.

2) Setting focalizing implement: setting focalizing implement can change the open angle of the wave bundle; enhance the ability of distance measurement.

Refrences

[1] Amin Kianpisheh, Norlia Mustaffa, Pakapan Limtrairut and Pantea Keikhosrokiani, July 2012, Smart Parking System (SPS) Architecture Using Ultrasonic Detector, International Journal of Software Engineering and Its Applications 6(3),51-58.

[2] Aswathy Natesh, Sudhi Sudharman, March 2015, An Intelligent Approach in Parking System for Car Parking Guidance and Damage Notification based on GPS**,** International Journal For Advance Research In Engineering And Technology(ijaret),3(3), 18-22.

[3] Pothana.Siva Naga Mani, Vaseem Ahmed Quershi , R.Venkatesh , January 2015, Sensor Based Automated Parking System for Slot Tracking and Auto Parking Of Vehciles, International Journal of Engineering Research and Applications (IJERA),15-18.

[4] Shinu N Yoannan, Vince T Vaipicherry, Don K Thankachan , Prof. Ram Prasad Tripathy, October 2013, Security System Based on Ultrasonic Sensor Technology, IOSR Journal of Electronics and Communication Engineering (IOSR-JECE), 7(6), 27-30.

[5] Michael Paine, Adam Macbeth, Michael Handerson, 2001,The Danger To Young Pedestrians Reversing Motor Vehicles,466,1-11..

[6]Candow M.(2000) Safe Reverse Sonar, VCDS Safety Digest, August 2000 http://www.vcds.dna.ca/.

[7]Henderson M.(2000) Child deaths and Injuries in Driveways, October 2000, Motor accidents Authority of NSW. (available at www.maa.gov.au)

[8] Integrated Electronics by Jacob Millman Christors C.Halkias.

[9] Basics of Electronics by Godse & Bakshi

[10] http://www.google.com

[11] http://www.wikipedia.com

[12] Electronics for u.