

ADVANCE AUTOMATIC BREAKING SYSTEM FOR VEHICLE

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Abstract - An ultrasonic vehicle breaking system includes an ultrasonic wave emitter provided in a front portion of an automatic breaking vehicle producing and emitting ultrasonic waves frontward in a predetermined distance in front of the vehicle. Ultrasonic receiver also formed in a front portion of the vehicle operatively receiving a reflective ultrasonic wave signal as reflected by obstacles positioned within the predetermined distance in front of the automatic breaking vehicle. The reflected wave (detection pulse) was measured to get the distance between the vehicle and the obstacle. Then system is used to control servo motor based on detection pulse information to push pedal brake to brake the vehicle intermittently for automatically breaking the vehicle for a safe breaking purpose.

Key Words: Auto breaking, Microcontroller, Object Detection, Sensor Fusion, Ultrasonic Sensor

1. INTRODUCTION

Driving is a compulsory activity for most people. People use their vehicle to move from one place to other place. The number of vehicle is increasing day by day. Proportionally the numbers of accidents are also increasing. Nowadays, the numbers of accident is so high and uncertainly. Accident will occur every time and everywhere and cause worst damage, serious injury and dead. These accidents are mostly caused by the delay of the driver to hit the brake. The increasing demand for flexibility as well as technological Even though there are several advanced technological innovations are available today for vehicle safety, the growth in the number of accidents is continues regularly. Most of these accidents are especially due to collision or intersectional accidents. One of the most important causes behind the intersectional accident is bad weather conditions. Recently it has been reported that nearly 36% of the accidents in the India are occurred due to bad weather conditions. Here bad weather condition means a high rain or high snow falling or bad dark light etc. in those specific conditions the drivers feel very hard to drive to recognize the vehicles and speed of the vehicles which passing around them and may cause to severe accidents.

The main target is, vehicles can automatically brake due to obstacles when the sensor senses the obstacles. The breaking circuit function is to brake the car automatically when the sensors detect any. Automatic Breaking is a technology for automobiles to sense an imminent collision with another vehicle, person or obstacle or a danger such as a high speed approach to a stop sign and to respond with the breaking system by either recharging the brakes or by applying the brakes to slow the vehicle without driver input. Efforts have been reported for sensing vehicle surroundings with different visible, non visible (infrared) light and time-of-flight sensors. Although ultrasonic sensors are well accepted technology for distance sensing applications.

2. HARDWARE DEVELOPMENT

- i) Ultrasonic Transmitter
- ii) Ultrasonic Receiver
- iii) Analysis Tool
- iv) LCD Display
- v) DC MOTOR

2.1 ULTRASONIC TRANSMITTER

Ultrasonic transmitter transmits the ultrasonic waves toward a road surface to find out the obstacle. The range that obstacle detected is depends on the range of ultrasonic sensors that used.

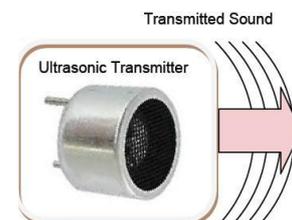


Fig. 21: Ultrasonic Transmitter

2.2 ULTRASONIC RECEIVER

If the ultrasonic wave detect the obstacle, its will produce a reflected wave. An ultrasonic receivers is used for receiving the ultrasonic waves reflected from the roads surface to generate a reception signal. There is ultrasonic transducer that will transform back the sound wave to

electrical energy. This signal amplified by an amplifier. The amplified signal is compared with reference signal to detect components in the amplified signal due to obstacles on the road surface. The magnitude of reference signal or amplification factor of the amplifier is controlled to maintain a constant ratio between the average of the reference signal and the average of the amplified signal.

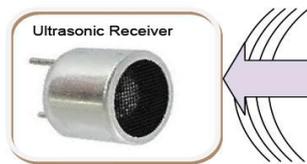


Fig. 2.2: Ultrasonic Receiver

2.3 ANALYSIS TOOL

The purposes required for the tool are described below:

- i) Emergency breaking system
- ii) Stereo Multi-Purpose Cameras
- iii) Ultrasonic Sensor

The magnitude of the reference signal or the amplification factor of the amplifier is controlled to maintain a constant ratio between the average of references signal and the average of the amplified signal. This allows the ultrasonic sensor to examine the existence of vehicles. Once this is complete the sensors give an alarm as to an obstacle detected. The processed signal will be send to the breaking circuit. The breaking circuit here is also known as the Emergency Breaking System. The Emergency System is known as an independent road safety system designed for vehicles. This is able to detect incidents where the speed relative to this and the distance between the target and the host suggests here that a collision is impending. At the breaking circuit, brake pressures are applied here automatically. This provides the maximum brake boost instantly as soon as the driver engages the brakes. After this if the driver's steering actions or the brake that he applies is not sufficient to avoid a collision then the Emergency Breaking System with the maximum pressure given by the brakes will be to support mitigation of the impact. This system is recognized as Emergency Breaking System and it ensures full reduction in speed. The emergencies breaking system plays a major role in this and it is the highest escalation step for a very safety system to immediately respond to a critical incident.

i) EMERGENCY BREAKING SYSTEM

The entirely new purpose all depend on the existing sensor system that comprises a new Emergency Breaking System and an ultrasonic sensor. This behaves as eyes for the entire vehicle. Initially imagine a moving object on the

ground which is accelerating at a speed of 100Km/hr which is about to collide with another moving object. During the point of collision, the distance sensor which had already been installed in the vehicle gives an input to the alarm, which gives an alert to the person who is controlling the vehicle. This will then automatically activate the automatic brake system. In the automatic brake system the vehicle will come to a complete stop gradually when applying brakes automatically to a maximum extent of deceleration of 0.4g, when it is about to collide.

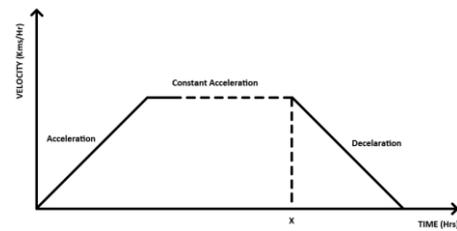


Fig. 2.3(a): Acceleration without Brakes

ii) STEREO MULTI-PURPOSE CAMERAS

The intention of this method is to avoid from accidents from taking place. The stereo multi-purpose camera (SMPC), i.e. is a camera for short and "5D Vision" technology, the range of visual for the vehicle is greatly increased. This camera which provides spatial intelligence of up to 50 meters in front of the vehicle and there is an environment recognition of 500 meters. Vehicles driving ahead and pedestrians also have a variety of traffic signals and on-road markings that are detected and have been assigned a spatial grouping. The data from short-range ultrasonic sensors that are positioned all around the vehicle as well as from long-range ultrasonic sensors with an approximate-range detection capability provides data on the distance from detected objects. This so-called "sensor blending" enables the interactive cooperation of the vehicle's active and passive protective and safety technology. The detection of moving object is very important and very essential for intelligent vehicles. It produces a framework to detect objects that are in motion on road using astereo camera. Here this kind of approach also enables an assist to further develop the system to be able to detect slowly moving object in a very disturbed environment.

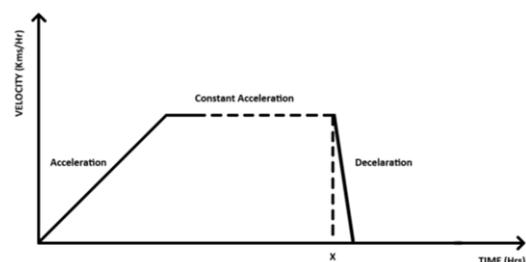


Fig. 2.3(b): Deceleration with Brakes

iii) ULTRASONIC SENSOR

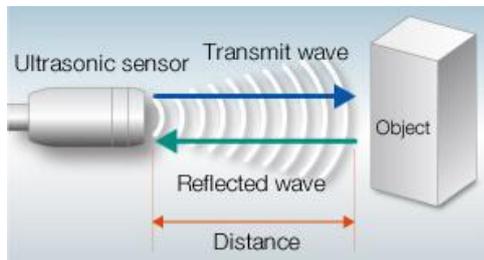


Fig. 2.3(c): Ultrasonic Sensor

Ultrasonic sensors are transmitting and receiving ultrasonic signals. These signals have a frequency range from 65 kHz up to 300 kHz. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

2.4 LCD DISPLAY

It is an electronic display module. It is a 16 × 2 LCD display, a very basic module and is very commonly used in various devices and circuits. 16 × 2 LCD means it can display 16 characters per line and there are 2 lines.



Fig. 2.4: LCD Display

And has two registers namely, Command and Data. The command register stores the command instructions. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

Motors are high current and high voltage devices. So to maintain this and control the motors (direction) we use an H-bridge circuit. L293 is a dual H-bridge IC to control two motors. L293 is a bipolar motor driver IC. This is a high voltage, high current push pull four channel driver compatible to TTL logic levels and TTL drive inductive loads as motors.

2.5 DC MOTOR:

A direct current (DC) motor is a fairly simple electric motor that uses electricity and a magnetic field to produce torque which turns the motor. At its most simple, a DC motor requires two magnets of opposite polarity and an electric coil, which acts as an electromagnet.



Fig. 2.5: DC Motor

The repellent and attractive electromagnetic forces of the magnets provide the torque that causes the DC motor to turn. However, in embedded applications we use geared DC motors for better performance as they are easy to control and retain better outputs.

3. SOFTWARE DEVELOPMENT

i) CODING

Coding/debugging is in a high level language (such as C). A compiler for high level language helps to reduce production time.

ii) COMPILING

The compiling of the C program converts it into machine language file. This is the only language the microcontroller will understand, because it contains the original program code converted into a hexadecimal format.

iii) BURNING

Programming or burning a microcontroller means to transfer the program from the compiler to the memory of the microcontroller. A compiler is software which provides an environment to write, test and debug a program for the microcontroller. The program for a microcontroller is generally written in C or assembly language. Finally the compiler generates the hex file which contains the machine language instruction understandable by a microcontroller. It is the content of this hex file which is transferred to the memory of the microcontroller. Once a program is transferred or written in the memory of the microcontroller, it then works in accordance with the program. A programmer is a hardware device with dedicated software which reads the content of the hex file stored on the PC or the laptop and transfers it to the microcontroller to be burned. It reads the data of the hex file by connecting itself to the PC via a serial or USB cable and transfers the data to the memory of the microcontroller to be programmed in accordance with the protocols as described by the manufacturer in the datasheet.

4. CONCLUSIONS

The vision of this design and develop a control system based an intelligent electronically controlled automotive breaking system which is called as “Automatic Breaking System”. It is used for big networks where the large number of vehicles used like for bus station’s by using camera. By using camera we can get the online information. We can surely get the information about the vehicle condition. It is helpful to public sector and users. It is also avoids the traffic jams and protect to vehicle from accident.

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