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Automobile Braking System Control

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Abstract: - The braking system maintains a combination of the pneumatic brake and the electrical braking. This system is the major cause of the train noise, and disk brake shoe friction during braking. It causes the environmental pollution. Therefore, this paper presents a way to eliminate environmental pollution such as dust by using the fully electric brake system to zero speed as braking system.

Key Words— ***Environmental pollution, braking system, pneumatic brake, electrical braking.***

I. INTRODUCTION

Nowadays, the number of accidents is so high and uncertain. Accident will occur every time and everywhere and cause worst damage, serious injury and dead. These accidents are mostly cause by delay of the driver to hit the brake.

This project is designed to develop a new system that can solve this problem where drivers may not brake manually but the vehicles can stop automatically due to obstacles. Using ultrasonic as a ranging sensor, its function based on ultrasonic sensor. After transmission by transmitter, the wave can reflect when obstacle detected and received by receiver.

The Arduino board is used by creating and dumping the required C Program, which consists the PIC microcontroller in it. Then PIC (Programmable Interface (Controller) microcontroller is used to control the servo motor based on detection pulse information and the servo motor in turn automatically controls the braking of the car. Thus, this new system is designed to solve the problem. we will be able to brake manually exactly at the required time, but the vehicle can still stop automatically by sensing the obstacles to avoid an accident. The recent developments in the new generation of sensor rich, distributed autonomous control technology has had a profound effect on the design of modern automotive vehicles. In particular, the intelligence afforded by robust embedded microelectronics throughout the vehicle together with the communications network topologies have resulted in control systems which greatly enhance the vehicle performance covering aspects such as safety, passenger comfort and environmental impact, to name but a few. In addition, an improved understanding of vehicle performance can be gained from the development of software simulation techniques which employ a range of system dynamic models, with the aim of achieving improved vehicle control strategies.

II. VEHICLE BRAKING SIMULATION

The following model is part of a chassis simulation of a typical car which is currently under development to investigate the use of an overall distributed control system in vehicles.

A. Wheel/Chassis Dynamics

For this paper a single wheel model [1] is employed as shown in Figure 1.

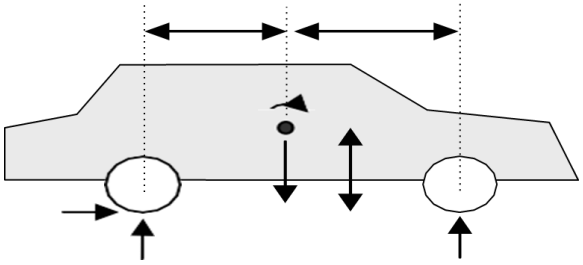

Fig.1. single wheel model

For the purposes of this paper the following assumptions are made:

- The overall braking force is distributed evenly around all four wheels.
- Each wheel experiences the same road conditions.
- The vehicles centre of gravity is mid-way between its wheelbase, that is $L_r = L_f$.
- The vehicle decelerates in a straight line from 100km/hr.

Under these conditions, the chassis will not experience pitch, roll and yaw forces.

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B. Braking system dynamics

The hydraulic braking system used in the braking simulation [2]. Note that the applied braking force, F, is normalized for ease of application.

The resulting brake subsystem model assumes non-laminar flow through the restriction.

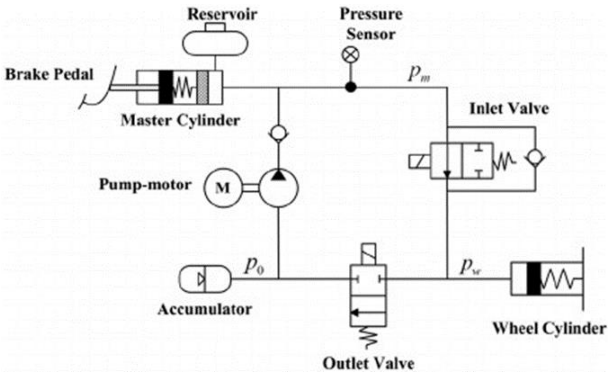

Fig.2. Block Diagram of Automatic Braking System Control

C. Need for Braking System

- When a safety factor of a vehicle is considered a primary factor that flashes in mind is its brakes or braking System. So a braking system is such a vital component that is necessarily required when a vehicle is considered.
- It reduces the kinetic energy of the vehicle in conditions when a vehicle has to slow down or also it has to be stopped.
- Thus making sure the vehicle and the passengers inside it are safe. Thus a braking system is always needed to ensure the safety of the drivers and passengers uncountable valued lives.

III. Components of Braking System

- Sharp Infrared Sensor
- Motor Driver L298N
- Tx-2B and Rx-2B Transmitter and Receiver Circuit
- Arduino UNO R3
- Servo Motor

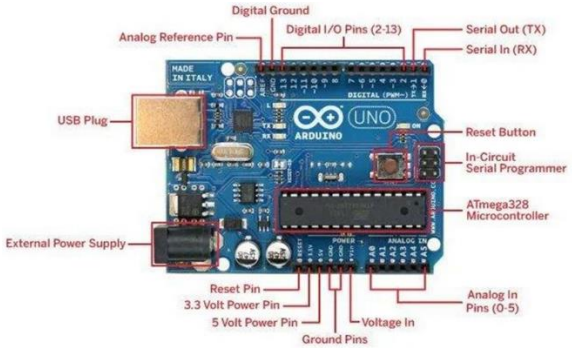

Fig.3. Arduino module

A. Ultrasonic transducers

Ultrasonic transducers are used to emit the ultrasonic wave with high frequency.

These transducers are operated by using electrical current. In this project 12V battery is used switch on the source.

Distance=Time x Speed of Sound divided by 2 Time = the time between when an ultrasonic wave is transmitted and when it is received you divide this number by 2 because the sound wave has to travel to the object and back.

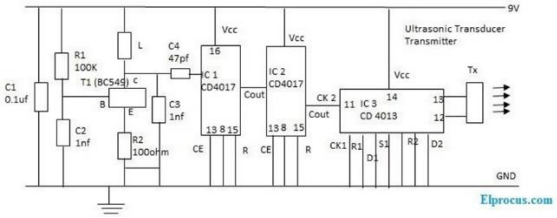

Fig.4. Ultrasonic Transducer Transmitter

IV. Conclusion

The Ultrasonic Braking System, if executed in auto it deflects heaps of mishaps and can spare human lives and property. Execution of such a propelled framework can be made mandatory like wearing of safety belts.

The following table outlines the results for the control schemes designed above for the normal road/tyre conditions illustrated as well as for a reduction in grip of 50%. All figures represent braking from 100km/hr under the assumptions detailed previously.

PI control has been shown to provide the best braking performance of the alternatives shown although it should be possible to equal or slightly better it by use of an equivalent surface from a suitably optimized fuzzy controller.

Table.1. Performance Figures for Various ABS Schemes

	Normal Road-Tyre Conditions		Wet road (50% Reduced Grip)	
ABS Controller	Distance (m)	Time (secs)	Distance (m)	Time (secs)
100% Braking	56.58	3.75	99.84	7.04
Bang-Bang Control	54.97	3.61	94.07	6.65
Relay + Prop band	52.32	3.32	93.16	6.59
P+I Control	52.21	3.31	90.53	6.36
Fuzzy Control	52.85	3.34	99.73	7.03

However, the effect of changing road conditions does have a considerable effect on controller performance as optimization of the PI controller for the reduced grip situation led to controller settings of Kc=4.2 and Ti =2.25 and a stopping distance of 86.56m. with the goal that mischance's can be deflected to some degree Our Infrared Braking System gives a look into the eventual fate of car wellbeing and the amount more propelled this individual framework can be for staying away from mischances and ensuring vehicle tenants when they are incorporated into one framework. The fate of car security is more than simply building up another innovation; it is moving the way to deal with wellbeing.

Ultrasonic Braking System approach speaks to a huge movement from the conventional way to deal with wellbeing, yet it is crucial to accomplishing the significant advantages.

V. ACKNOWLEDGEMENT

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