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Emergency Braking System

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ABSTRACT

The automobile as we know, it was not invented in a single day by a single inventor. The history of the automobile reflects an evolution that took place worldwide. It is estimated that over 100,000 patents created the modern automobile. However, we can point to the many firsts that occurred along the way. Several Italians recorded designs for wind driven vehicles. The first was Guido da Vigevano in 1335. Vaturio designed a similar vehicle, which was also never built. Later Leonardo da Vinci designed clockwork driven tricycle with tiller steering and a differential mechanism between the rear wheels. A Catholic priest named Father Ferdinand Verbiest has been said to have built a steam powered vehicle for the Chinese Empower Chien Lung in about 1678. Since James Watt didn't invent the steam engine until 1705 it is guessed that this was possibly a model vehicle powered by a mechanism like Hero's steam engine, a spinning wheel with jets on the periphery.

The first vehicle to move under its own power for which there is a record was designed by Nicholas Joseph Cugnot and constructed by M. Brezin in 1769. A second unit was built in 1770, which weighed 8000 pounds and had a top speed on 2 miles per hour and on the cobble stone streets of Paris this was probably as fast as anyone wanted to go it. The early steam powered vehicles were so heavy that they were only practical on a perfectly flat surface as strong as iron. A road thus made out of iron rails became the norm for the next hundred and twenty-five years. The vehicles got bigger and heavier and more powerful and as such they were eventually capable of pulling a train of many cars filled with freight and passengers. Many attempts were being made in England by the 1830's to develop a practical vehicle that didn't need rails. A series of accidents and propaganda from the established railroads caused a flurry of restrictive legislation to be passed and the development of the automobile bypassed England. Several commercial vehicles were built but they were more like trains without tracks.

The development of the internal combustion engine had to wait until a fuel was available to combust internally. Gunpowder was tried but didn't work out. Gunpowder carburetors are still hard to find. The first gas really did use gas. They used coal gas generated by heating coal in a pressure vessel or boiler. A Frenchman named Etienne Lenoir patented the first practical gas engine in Paris in 1860 and drove a car based on the design from Paris to Joinville in 1862. His one-half horsepower engine had a bore of 5 inches and a 24-inch stroke. It was big and heavy and turned 100 rpm. According to a survey of ASME International (American Society of Mechanical Engineers), the automobile is the greatest mechanical engineering achievement of the 20th century.

The automobile, airplane, Apollo, air conditioning and other technologies made major contributions to engineering progress and economic and social development in the last 100 years. The automobile also spurred transportation in the United States and provided a means of efficient and enjoyable travel for the nation's middle class.

Keywords:- : IR (Infrared) Sensor, Receiver, Pneumatic Cylinder, Solenoid Valve, Flow Control Valve and Obstacle, ABS-Antilock Braking System, ASME- American Society of Mechanical Engineers,

1. Introduction

Driving is a compulsory activity for most people. People use their car to move from one place to other place. The number of vehicle is increasing day by day. It is produced tacked tightly and risk to accident. Nowadays, the numbers of accident is so high and uncertainly. Accident will occurs every time and every where 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. This project is about a system that can control braking system for safety. Using ultrasonic as a ranging sensor, its function based on ultrasonic wave. After transmit by transmitter, the wave can reflect when obstacle detected and receive by receiver.

The main target for this project is, car cans automatically braking due to obstacles when the sensor senses the obstacles. The braking circuit function is to brake the car automatically after received signal from the sensor.

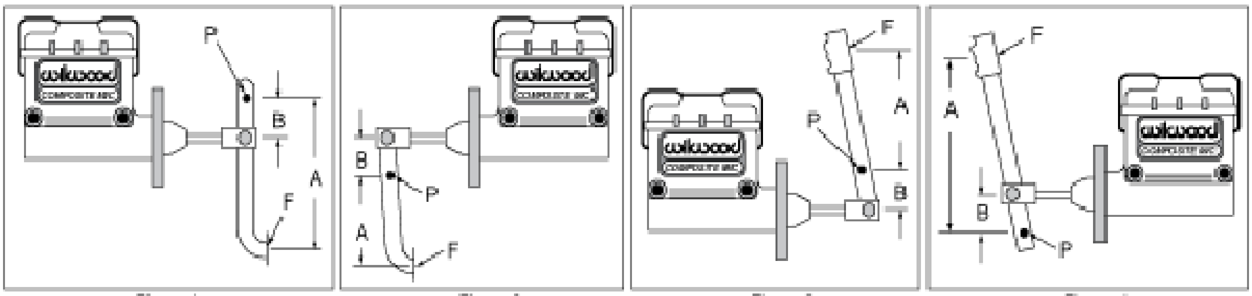
2. Formulation of the Problem

Two different approaches can be used to formulate the precision stopping problem. One approach is the trajectory following. A desired trajectory is synthesized according to the initial vehicle speed and position, and the final stop position. The controller is designed so that vehicle will follow the desired trajectory with appropriate brake command. The second approach is to dynamically synthesize a desired deceleration based on the vehicle’s speed and remaining distance to the designated stop location. Brake servo command is generated to follow the desired deceleration. Since the main purpose of this paper is to investigate the feasibility of precision stopping with pneumatic brake system, the more intuitive and direct approach-, the trajectory following approach, is adopted.

Measurement Principle/Effective Use of Ultrasonic Sensor: - Ultrasonic sensor transmits ultrasonic waves from its sensor head and again receives the ultrasonic waves reflected from an object. By measuring the length of time from the transmission to reception of the sonic wave, it detects the position of the object.

Power Brakes: - A braking system employing power braking uses the engine's power and/or the power of batteries to assist the driver in braking. Although conventional brakes generate enough force to regulate the speed of an automobile, power brakes further enhance this power by supplementing it from other sources (i.e. engine/batteries), thus causing highly efficient braking. Some common types of power brakes are: air suspended brakes, vacuum suspended brakes, hydraulic booster and electro-hydraulic power brakes. When you apply the brakes, brake fluid is forced, under pressure, into the wheel cylinder which, in turn, pushes the brake shoes into contact with the machined surface on the inside of the drum. When the pressure is released, return springs pull the shoes back to their rest position. As the brake linings wear, the shoes must travel a greater distance to reach the drum. When the distance reaches a certain point, a self-adjusting mechanism automatically reacts by adjusting the rest position of the shoes so that they are closer to the drum.

Calculating the Brake Pedal Ratio:



A = Distance from pivot point to middle of push / pull point

B = Distance from pivot to point of push on master cylinder

P = Pivot point

F = Force or push supplied by driver

Divide the length from the pivot point to the push rod (B) into the length from the pivot point to the centre of the foot pad (A).

Brake Pedal Ratio Calculation:

For a Actual Prototype .

(B) Length from pivot point to push rod = 55 mm

(A) Length from pivot point to centre of foot pad = 345mm

345 ÷ 55 = 6.5

Pedal ratio = 6.5:1

In general, if you have a pedal ratio of approximately 6.2:1 then it is likely that a 3/4 inch (0.750 inch or 19 mm) master cylinder will be close to the right size when combined with a front 4-piston calliper with piston sizes of 38mm and 42mm and a tire with a 24.4 inch outer diameter (such as a commonly used tire size 245/40R17). It is possible to calculate the master cylinder sizes with relative precision, but you will need the following data, in either metric or English units:

1. Static weight on the front axle.
2. Static weight on the rear axle.
3. Maximum deceleration rate expected (typically between 1.0 to 1.5g for sedan or sports cars, unit-less).

4. Centre of gravity height.
5. Wheelbase.
6. Tire rolling diameter (you can use the tire diameter).
7. Brake calliper piston sizes front and rear, converted to total piston area (piston area = diameter of each piston squared, then divided by 4, then multiplied by π, or 3.142)
8. Effective radius of the brakes front and rear, or the lever over which the pads apply their clamping force (approximately ½ of the rotor diameter minus ½ of the pad height, or the average of the inner and outer diameter of the swept portion of the brake rotor, will be relatively close).
9. Pad friction coefficient, front and rear (if you do not know, assume it is 0.5 for race friction and 0.4 for street friction, also unit-less).
10. Pedal ratio (as discussed previously).
11. Target driver foot effort at maximum brake output. For racing use this should be around 80 lbs. We are actually speaking of force here so we should use the correct convention and call it pound-force written as lbf. One lb by definition is equal to one lbf in the earth's gravitational field of one G. One lbf also equals 4.448 newtons (N) and 0.454 kgf. The same convention of mass versus mass in a gravitational field applies between kg and kgf. The reason for making this point will be made clear later in the context of driver leg input effort.

In all cases the result of the calculations below will need to be tested since the vehicle behaviour under braking is also affected by suspension design and set up, tire pressures, shock set up and spring used

3. Results and Discussion

Common Brake Problems:-

Spongy Pedal:

- Air – Bleed from the furthest bleed screw from the master cylinder and work in . Bleed screws up
- Calliper brackets not square to rotor causing calliper deflection
- Rubber brake lines deflecting
- Brake fluid too hot
- Pedal ratio too high
- Silicone brake fluid – highly compressible

Low Pedal – Have to pump the pedal to get it hard:

- Master cylinder too low causing fluid drain back to reservoir – install 2 lb. Residual pressure valve or move reservoir higher than calipers.
- Warped rotor causing piston knock back.
- Excessive rotor run-out causing piston knock back.
- Excessive piston retraction – install square seals.

Low Pedal – Won't Pump Up:

- Bad calliper seals, leaking.

- Leak in hydraulic system.
- Balance bar too far off centre.
- Badly worn pads.

Pedal Hard – Car Won't Stop:

- Master cylinder too large, too much volume.
- Pedal ratio too small – Insufficient pressure on master cylinder.
- Glazed rotors.
- Glazed pads.

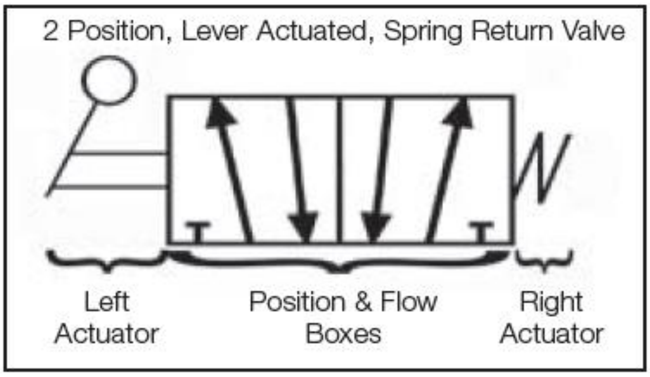
Selection Criteria for Pneumatic Control System:

The Selection of Pnumatic Control System is Carry out by Followinfg Factor

1. Stroke of Cylider
2. Force Needed to act.
3. Type of motion [Linear or Angular motion]
4. Speed of Travel Required.
5. Size Of Compresser Reqiuired.
6. Sensitivity of System
7. Safety and Reliability
8. Energy Cost

Directional air control valves-

Directional air control valves are the building blocks of pneumatic control. Symbols representing these valves provide a wealth of information about the valve it represents. Symbols show the methods of actuation, the number of positions, the flow paths and the number of ports. Here is a brief breakdown of how to read a symbol: Every symbol has three parts (see figure to right). The Left and Right Actuators are the pieces which cause the valve to shift from one position another. The Position and Flow Boxes indicate how the valve functions.



Every valve has at least two positions and each position has one or more flow paths. When the Lever is not activated, the Spring Actuator (right side) is in control of the valve; the box next to the actuator is the current flow path. When the Lever is actuated, the box next to the Lever is in control of the valve. Each position occurs when the attached actuator is in control of the valve (Box next to the actuator). A valve can only be in one "Position" at a given time. The number of boxes that makes up a valve symbol indicates the number of positions the valve has. Flow is indicated by the arrows in each box. These arrows represent the flow paths the valve has when it is in that position.

4. Conclusion

1.By dragging the front seat at opposite direction to Impact and increase the Distance And Time Of Direct Impact the death can be minimized and safety of vehicle also can improved, and also it can add the new feature to the car which will attract the customer who prefer safety while traveling.

2. The results of the simulations showed that by using an energy absorbing seating system, crash deceleration can be effectively attenuated and occupant injuries significantly reduced in comparison to conventional seating systems. In future, physical crash tests will still be required as the final certification method for approval of a particular crashworthy mechanical system. However during the development process the application of computer simulation methods as presented in this paper show that it is possible to reduce development costs.

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