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Brilliant Reverse Breaking System with air pressured Bumper

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Abstract:

Safety is the major concern in automobile industry, breaking system place a very important role in order to avoid maximum damage to vehicle and operatr. Modern technology helps us to have better options to overcome many problems which are usually occure during driving the vehicle. Compressed air or compressed inert gases are extensively employed in industrial systems. Cylinders, air motors, and other pneumatic equipment are powered by a centrally placed and electrically powered compressor. When a pneumatic system with manual or automatic solenoid valves offers a lower cost, more flexible, or safer alternative to electric motors and actuators, it is chosen. This article is an attempt ot introduce a reverse breaking system using air pressured bumper.

Keywords — **Reverse breaking, air compressor, Sensor, bumper.**

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I. INTRODUCTION

Compressed air is used in pneumatic systems in stationary installations such as factories because ambient air can be compressed to provide a long-term supply. In most cases, moisture is removed from the air, and a little amount of oil is supplied at the compressor to prevent corrosion and lubricate mechanical components. Users of factory-installed pneumatic power need not be concerned about toxic leaks because the gas is usually merely air. When supplied in cylinders can be used in smaller or stand-alone systems. Any compressed gas other than air, including nitrogen, which makes up 78 percent of air, is an asphyxiation hazard. Although compressed oxygen does not induce asphyxiation, it is not utilized in pneumatically powered devices since it is flammable, more expensive, and provides no performance advantage over air. Because containers designed to hold compressed carbon dioxide, such as soda stream canisters and fire extinguishers, are easily available, and the phase transition between liquid and gas allows for a larger volume of compressed gas to be obtained from a lighter container, pressurized carbon dioxide is widely used to power portable pneumatic equipment and small vehicles, such as Robot Wars machines and other hobbyist uses.

II. LITERATURE REVIEW

Pneumatics technology is important in the fields of automation, modern machine shops, and space robots. Automatic Pneumatic Bumper and Break Actuation before Collision aims to create and create a control system based on intelligent electronically controlled vehicle bumper activation and automatic braking. This project is made up of an infrared transmitter and a receiver. The impediment is detected by the infrared sensor. If an impediment is within 3-4 feet of the vehicle, a control signal is sent to the bumper activation system and the pneumatic braking system at the same time. The guy and car are produced using a pneumatic bumper and braking

mechanism. Only when the vehicle speed exceeds 30-40 km/h is this bumper and braking system activated. This vehicle speed is sensed by the proximity sensor and this signal is given to the control unit and pneumatic bumper and braking activation system [1]. From old-fashioned lumber works and coal mines to modern machine shops and space robotics, pneumatic technology has gained significant relevance in the sphere of workplace rationalization and automation. It is critical that technicians and engineers have a thorough understanding of pneumatic systems, air powered valves, and related accessories. The purpose is to design and build a control system based on "Intelligent Braking with Pneumatic Bumper," an intelligent electronically controlled car bumper activation system. The IR transmitter and receiver circuits, the Control Unit, the pneumatic bumper system, and the braking unit are all part of this system. The impediment is detected using the infrared sensor. The purpose of this system is based on intelligent electronically control automatic bumper and brake activation system known as “Intelligent braking with pneumatic bumper system”. As well as this system improve the response time of vehicle braking to keep safe distance between two vehicles [2]. VHDL designed and built the auto-braking system to maintain a safe space between two cars. For intelligent cars, it provides a pre-crash safety system. This module can use a sensor to determine the distance between the front vehicle and the driver's vehicle and force the brake system to activate if the driver does not reduce the vehicle's speed [3]. To reduce rear-end collisions, a performance index for approach and estrangement is presented that estimates the driver's state such as inattentive operation from the vehicle's behaviour as a result of the driver's visual cognition, judgement, and operation. The index is based on the idea that drivers detect approaching cars by changing the area of a preceding car on their retina. First, it is demonstrated that the suggested index can distinguish between safe driving behaviours of experimental results and micro data of traffic accidents with a rear-end collision as a hazard status. The index then indicates changes in the risk level, visual capabilities, and awareness of the drivers, according to the findings of basic laboratory trials using a joystick and an LCD system. At the phase plane of the suggested index and the headway distance, we infer that the drivers' deceleration behavior in moderate hazard levels can be well described [4]. A theory on how a motorist can visually manage his braking is provided. According to a mathematical analysis of the changing optic array at the driver's eye, the simplest type of visual information, which would be sufficient for managing brakes and also likely to be easily picked up by the driver, is information about time-to-collision, rather than distance, speed, or other variables. It is demonstrated how the driver might, in theory, use visual time-to-collision information to record when he is on a collision course, judge when to begin braking, and regulate his continued braking. The theory's implications for safe speeds and following distances are addressed, with ocular angular velocity detection thresholds taken into account, and some recommendations are provided [5]. In this work, an extended and retractable bumper (E/R bumper) is presented. The E/R bumper is designed to extend automatically in situations where there is a high risk of frontal impact, preparing the vehicle for a collision, then retract after the risk has passed. The E/R bumper was used to create a working display car as well as two experimental cars. These cars were designed with the help of analytical and nonlinear finite element models, which were used to estimate their crash performance in full, offset, and oblique impact testing. The experimental vehicles were smashed in a 56kph rigid barrier impact test and a 64kph 40 percent Offset Deformable Barrier impact test while the working demonstration vehicle was utilized to evaluate its control and operating sequences [6].

III. MATERIALS USED AND FABRICATION METHOD

For this work to finish, we have used various materials and electric parts to fabricate the physical model. Which includes Dc motor-12v, 60 rpm, Battery -12v, 7.5AH,Ultrasonic sensor, IR transmitter, IR receiver , Control Unit with Power supply, Solenoid Valve, Flow control Valve and Air Tank (Compressor) Pneumatic cylinder,Wheels,Relay-12v, Pneumatic cylinder, Compressor-12v, Solenoid valve, Connecting pipes , Collecting valves. For this work to finish we have used Arc welding for joining the materials, grinding helps us to get the fine finished surface by removing un wanted material, finally after assembled all the parts painting has been done to avoid losses due to erosion and corrosion

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IV. WORKING

Compressed air from the compressor is passed through a pipe attached to the solenoid valve with one input at a pressure of 5 to 7bar. The control timing unit is used to activate the solenoid valve. There are two outputs and one input on the solenoid valve. When the timing control unit is triggered, air enters the input and exits through the two outputs. The air pressure below the piston is greater than the pressure above the piston due to the high air pressure at the bottom of the piston. As a result, the piston rod rises upwards, raising the effort area, which is turned by the control unit. This power is transferred to the punch/rivet, which moves downwards as well. The purpose of the IR transmitter circuit is to send data if any obstacle is there in a path, the infra-red rays reflected. The receiver circuit that receives the reflected ultrasonic rays is known as the "IR receiver." the control circuit gets the control signal from the IR receiver circuit, which receives the reflected IR rays. The solenoid valve is activated by the control circuit. The principle of a solenoid valve's operation. The compressed air goes to the single acting pneumatic cylinder when the solenoid valve is triggered. Compressed air moves the piston rod by activating the pneumatic cylinder. The breaking arrangement is actuated as the piston travels forward. Because of the piston action, the breaking arrangement is employed to break the wheel gradually or suddenly. The “flow control valve” controls the breaking speed by altering the valve. In our project, we'll use one wheel as a model for this breaking arrangement. in our project, compressed air is extracted from a compressor. Compressed air is delivered to the flow control valve via a polyurethane tube.

Fig.1 Frame

Fig 2 Pneumatic absorber

Fig 3 Assembly of parts

V. CONCLUSIONS

This project work has given us a fantastic opportunity to put our limited knowledge to good use. While working on this project, we received a lot of practical experience with planning, purchasing, assembling, and machining. We believe that project work is an effective means of bridging the gap between institutions and industries. We are happy of the fact that we were able to finish the project on time and on budget. We are aware of the difficulty in maintaining tolerances and, more importantly, quality. We have performed to the best of our ability and skill, making the most of the available resources. Let us add a few more paragraphs on our impression project work to our last thoughts on our project work. It aids in understanding how to achieve low-cost automation. The use of pneumatics results in a smooth operation. They can be customised and developed according to the applications by employing more techniques.

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REFERENCES

[1] Srinivasa Chari.V, Dr.Venkatesh P.R, Dr.Prasanna Rao N.S, Adil Ahmed S "Automatic Pneumatic Bumper and Break Actuation Before Collision", International Research Journal of Engineering and Technology (IRJET), (2015).

[2] Dr. P. Poongodi, Mr. P. Dineshkumar, "Automatic Safety System for Automobile", International Journal of Advanced Information Science & Technology (IJAIST), (2012).

[3] Eung Soo Kim, "Fabricayion of Auto-Braking System for Pre-Crash Safety Using Sensor", International Journal Of Control & Automation, (2009).

[4] Takahiro Wada, "A Deceleration Control Method Of Automobile For Collision Avoidance Based on Driver Perceptual Risk", Department of Inteligent Mechanical System, Kagawa University, (2008).

[5] D. N. Lee "A Theory of Visual Control of Braking Based on Information about Time to Collision", Department of Psychology, University of Edinburgh, (1976).

[6] J. T. Wang, "An Extendable and Retractable Bumper", General Motors, United States, (2003).

[7] Jadhav N. D., Gulmire S.M., Ghutukade R.S., Gaikwad A.S., Prof.Fegade S.G. "Automatic Braking With Pneumatic Bumper System" IJSART Volume-1 Issue-5,PP (2015).

[8] Katore S.R., Kadlag S.C., Mane P.V., Pawar G.V., Prof. Londhe B.C., "Automatic Braking With Pneumatic Bumper System", International Journal Of Engineering, Education and Technology (IJEET), Volume-3, Issue-2 (2015).

[9] L. P. Maske Patil, Babar Akshay Laxman, Bangar Pranav, "Automatic Pneumatic Bumper and Break Actuation before Collision", Journal of Information, Knowledge & Research in Mechanical Engineering, Volume-4 Issue-2 (2017).

[10] Mr. Kushal V. Gawande, Mr. Bharat A Shende, Mr. Vipul B. Mesharam, "Automatic Pneumatic Braking System", Journal of Emerging and Technologies Innovative Research (JETIR), Volume-4, Issue-3 (2017).

