

AUTOMATIC PNEUMATIC BUMPER AND BREAK ACTUATION BEFORE COLLISION.

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ABSTRACT

The technology of pneumatics plays a major role in the field of automation and modern machine shops and space robots. The aim is to design and develop a control system based intelligent electronically controlled automotive bumper activation and automatic braking system is called AUTOMATIC PNEUMATIC BUMPER AND BREAK ACTUATION BEFORE COLLISION.

This project consists of IR transmitter and Receiver circuit, Control Unit, Pneumatic bumper system and pneumatic braking system. The IR sensor senses the obstacle. There is any obstacle closer to the vehicle (within 1-2 feet), the control signal is given to the bumper activation system and also pneumatic braking system simultaneously. The pneumatic bumper and braking system is used to product the man and vehicle. This bumper and braking activation system is only activated the vehicle speed above 30-40 km per hour. 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.

Keywords - Automatic Pneumatic Bumper System, IR Receiver, IR Transmitter, Electromechanical System, Solenoid Valve.

1.INTRODUCTION –

We have pleasure in introducing our project “AUTOMATIC PNEUMATIC BUMPER AND BREAK ACTUATION BEFOR COLLISION”. Which is fully equipped by IR sensors circuit and Pneumatic bumper and braking activation circuit? It is the project which has been fully equipped and designed for auto vehicles. The technology of pneumatics plays a major role in the field of automation and modern machine shops and space robots. The aim is to design and develop a control system based on intelligent electronically controlled automotive bumper activation system is called “automatic pneumatic bumper and break actuation before collision”. The project consists of IR transmitter and Receiver circuit, Control Unit, Pneumatic bumper system. The IR sensor senses the obstacle. There is any obstacle closer to the vehicle (within 1feet), the control signal is given to the bumper and break activation system. This bumper activation system is activated when the vehicle speed above 40-50 km per hour. The speed is sensed by the proximity sensor and this signal is transfer to the control unit and pneumatic bumper activation system.

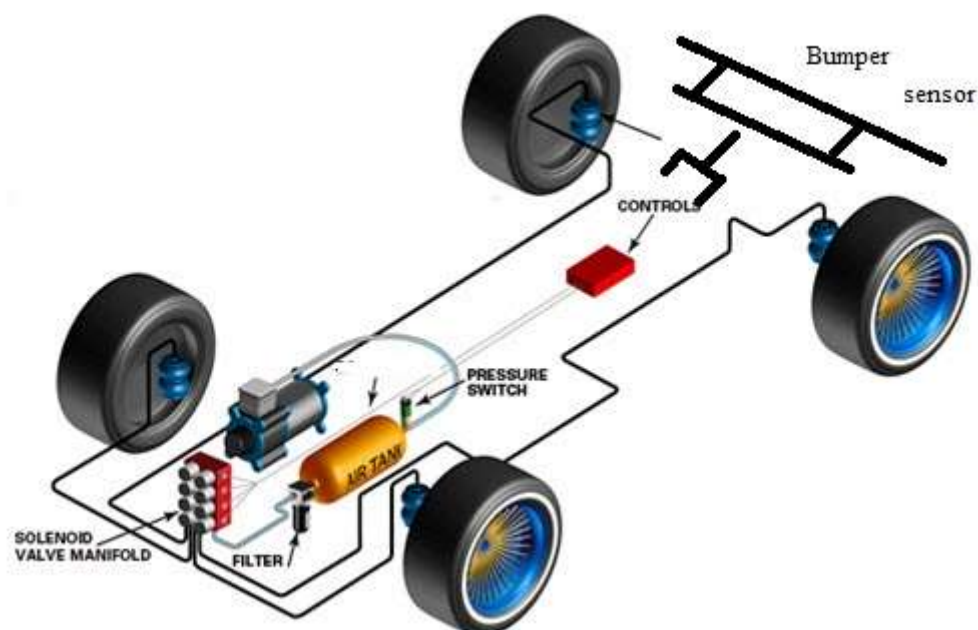


Fig.1. Automatic Pneumatic Bumper and Break Actuation Before Collision.

1.1 Pneumatics

Pneumatic is a branch of engineering that makes use of gas or pressurized air. Pneumatic systems used in industry are commonly powered by compressed air or compressed inert gases. A centrally located and electrically powered compressor powers cylinders, air motors, and other pneumatic devices. When the pneumatic system is being adopted for the first time, however, it will indeed be necessary to deal with the question of compressed air supply.

1.2 IR Sensor

An infrared sensor is an electronic instrument that is used to sense certain characteristics of its surroundings. It does this by either emitting or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion. An IR sensor can measure the heat of an object as well as detect the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations.

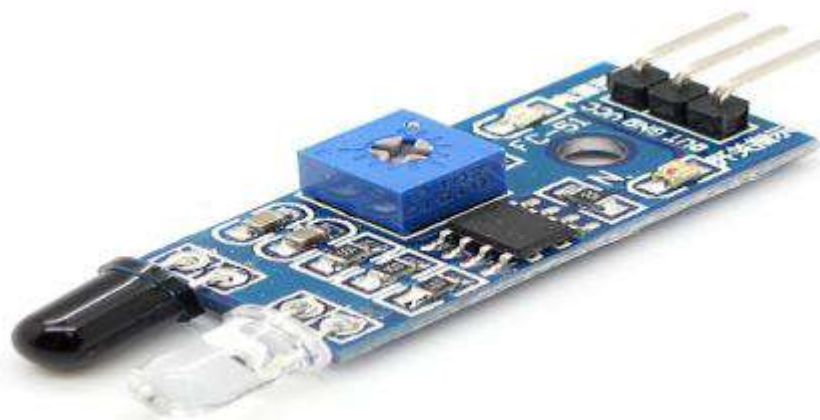


Fig.1.2.1. IR Sensor.

The IR transmitting circuit is used in this project because it is readily available and also have the perfect sensing range as needed. These are the same sensors that are used in all TV remotes, AC remotes and other electrical devices. IR transmitter sends 42 kHz (frequency can be adjusted) carrier under 555 timer controls. The transmitted signal gets reflected by the obstacle and the IR receiver circuit receives the signal which passes the control signal to the control unit. The control unit activates the pneumatic breaking system by which brakes are applied automatically and also the E/R bumper gets actuated.

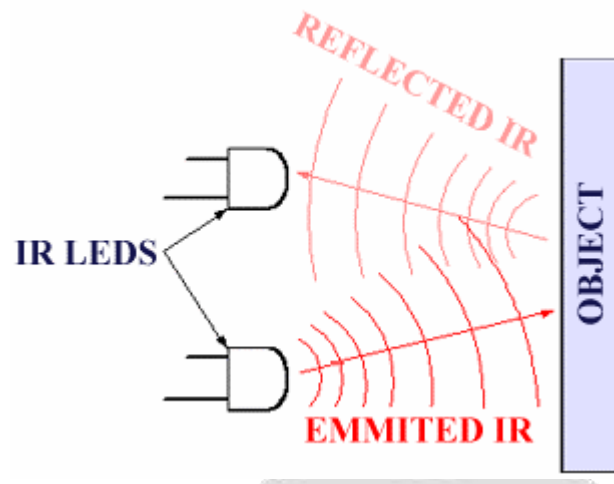


Fig.1.2.2. Working of IR Sensor.

2.OBJECTIVES -

The future of any industry is more than just developing new technology. It is integrating the approach towards achieving safety. Impact Reducing System approach represents considerable shift from the traditional approach to safety, by considering safety in terms of, Firstly avoiding the possibility of accidents, and secondly, protecting occupants when a crash is unavoidable, we can prevent more accidents, save more lives, decrease material damage to vehicles and reduce medical costs.

Following are the main objectives of Impact Reduction System with Pneumatic Bumpers:

- To ensure the braking of vehicle in time.
- To increase the crashing distance during accident.
- To increase the safety during pre-crash.
- To increase external safety to vehicle body.
- To decrease the level of passenger injury by use of external vehicle safety device.
- To reduce the requirement of internal safety devices like air bags.

3.COMPONENTS –

- 1) Pneumatic single acting cylinder
- 2) Solenoid valve
- 3) Flow control valve
- 4) IR sensor
- 5) Wheel and brake arrangement
- 6) PU connector
- 7) Reducer
- 8) Hose
- 9) Collar
- 10) Stand
- 11) Single phase induction motor.

4.EXPERIMENTAL PROCEDURE -

As this system is used at the time of emergency during work. In normal travelling of vehicle this system can be switched of with the help of a switch and it will not affect the normal working of the vehicle.

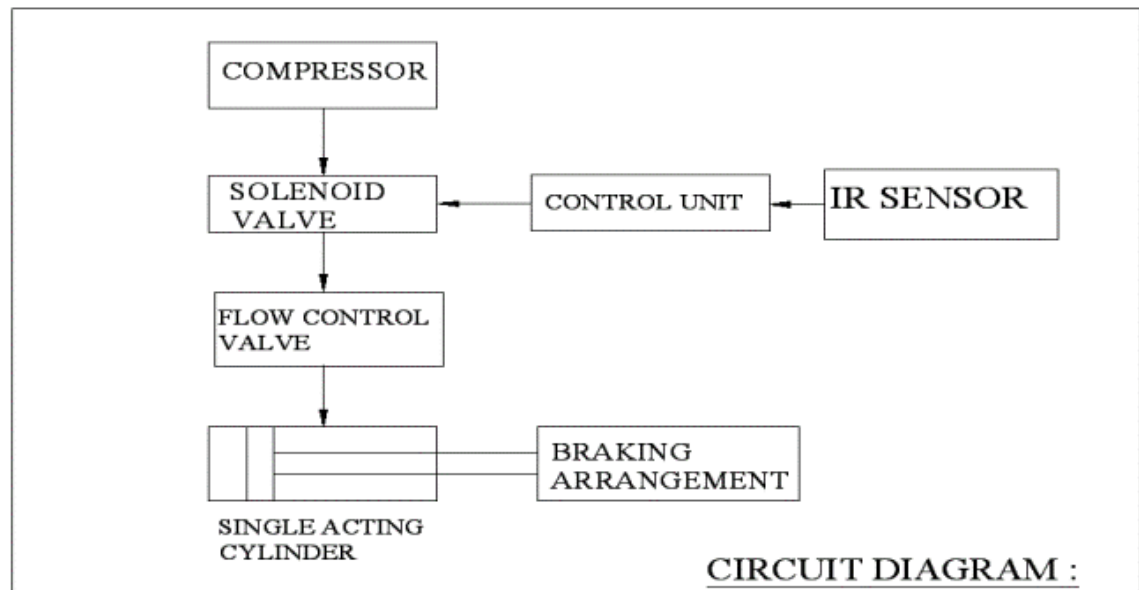


Fig.4.Circuit Diagram.

When any obstacle, human, animal or vehicle comes in front of the vehicle then the installed infrared sensor senses the obstacle. The range of distance between the vehicle and obstacle is variable. This range is varied according to the density of vehicles or humans on road. The received signal by IR sensor is provided to the control unit. When any obstacle, humans, animals or vehicle is coming in front of the vehicle then the installed infrared sensor senses that obstacle. The range of distance between the vehicle and obstacle is variable. This range is varied according to the density of vehicles or humans on road. The received signal by IR sensor is provided to the control unit. The control unit then activates the Solenoid Valve which will allow the flow of compressed air through it. Compressed air is provided as an Input to the Solenoid Valve which has two Outputs both connected to the Double Acting Pneumatic Cylinder.

This pneumatic force of the compressed air through the Solenoid Valve is transferred to the Bumper System. The pneumatic force provides forward motion to the Bumper and it also retracts the bumper slowly reducing the impact. Hence, when the external body is kept safe, there will be no chance of internal damage.

5. APPLICATION –

1. This system may be applicable in all types of light vehicles like cars, Rickshaws, Tempos.
2. This system also successfully installed in the heavy vehicles like buses, trucks, trailers, etc.
3. Industrial application.

6.ADVANTAGES -

1. It able to Increase the sureness in braking system.
2. Braking system able to give fast response.
3. System able to increase the pre-crash safety.
4. System able to provide more safety to the passengers.
5. System plays an important role to save human
6. Life in road accidents.
7. It is easy to make.
8. The system has worked fully air operated.

7.DISADVANTAGES -

1. System has few limitations in densely traffic road.
2. System has no provision to prevent and cure the accidents from rear side of vehicle.
3. Hard and thick materials cannot be riveted.
4. Due to the linkages there will be frictional losses.
5. Maintenance will be more due to the number of moving parts.

8.CONCLUSION -

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between institution and industries. We are proud that we have completed the work with the limited time successfully. The PNEUMATIC BUMPER FOR FOUR-WHEELER is working with satisfactory conditions. We are able to understand the difficulties in maintaining the tolerances and also quality. We have done to our ability and skill making maximum use of available facilities. In conclusion remarks of our project work, let us add a few more lines about our impression project work. Thus, we have developed an “PNEUMATIC BUMPER FOR FOUR-WHEELER” which helps to know how to achieve low cost automation. The application of pneumatics produces smooth operation. By using more techniques, they can be modified and developed according to the applications.

9.REFERENCES –

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