

# DESIGN AND FABRICATION OF PNEUMATIC BUMPER FOR FOUR WHEELER

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**Abstract** - The technology of pneumatics has gained tremendous importance in the field of workplace rationalization and automation. It is therefore important that technicians and engineers should have a good knowledge of pneumatic system, air operated valves and accessories. The aim is to design and develop a control system based on an intelligent electronically controlled automotive bumper activation system is called "PNEUMATIC BUMPER FOR FOUR WHEELER". This system consists of IR transmitter and Receiver circuit, Control Unit, Pneumatic bumper system. The IR sensor is used to detect the obstacle. There is any obstacle closer to the vehicle (within 4 feet), the control signal is given to the bumper activation system. The pneumatic bumper system is used to protect the man and vehicle. This bumper activation system is only activated when the vehicle speed is above 40-50 km per hour. This vehicle speed is sensed by the proximity sensor and this signal is given to the control unit and pneumatic bumper activation system.

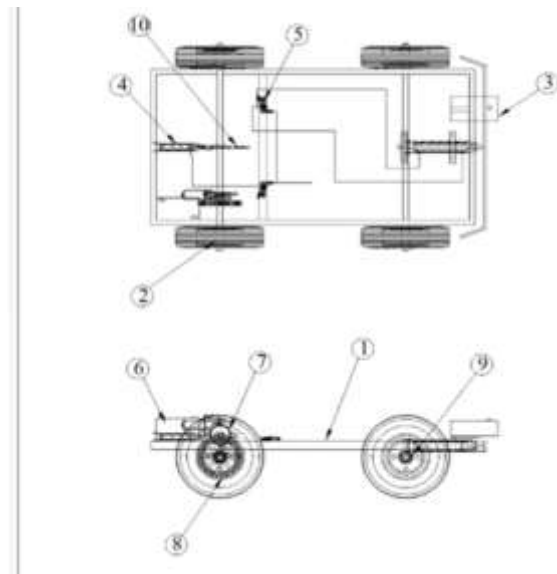
**Key Words:** pneumatic, proximity sensor.

## 1. INTRODUCTION

We have pleasure in introducing our new project "PNEUMATIC BUMPER FOR FOUR WHEELER", which is fully equipped by IR sensors circuit and Pneumatic bumper activation circuit. It is a genuine project which is fully equipped and designed for Automobile vehicles. This forms an integral part of best quality. This product underwent strenuous test in our Automobile vehicles and it is good.

After the accident occurs, there is no any provision to minimize the damages of vehicles. In currently used vehicles generally bumpers used are of rigid types. These bumpers have specific capacity and when the range of the accidental force is very high then the bumpers are fails and these force transferred towards the passengers. So this system never reduces the damage of both vehicle and passengers. To overcome these unwanted effects design the Automatic Pneumatic Bumpers is important.

## 1.1 2D DRAWING



## 1.2. PNEUMATIC CYLINDER

Pneumatic cylinders (sometimes known as air cylinders) are mechanical devices which use the power of compressed gas to produce a force in a reciprocating linear motion.

Like pneumatic cylinders, something forces a piston to move in the desired direction. The piston is a disc or cylinder, and the piston rod transfers the force it develops to the object to be moved. Engineers sometimes prefer to use pneumatics because they are quieter, cleaner, and do not require large amounts of space for fluid storage. Pneumatic cylinders are designed for a variety of services. Pneumatic cylinders transform the flow of pressured fluid into a push or pull of the piston rod since our system uses double acting cylinders we shall see some details about them.

Double acting cylinders are in one in which fluid force can be applied to the movable element in two directions. The force exerted by the compressed air moves the piston in two directions in a double acting cylinder. They are used particularly. The piston is required to perform work not only on the advance movement but also on the return.

In principle, the stroke length is unlimited, although bucking and bending must be considered before we select a particular size of piston diameter, rod length and stroke length. The main component of any pneumatic system is the cylinder, which receives air under pressure and the pressurized air helps to move the piston to and fro. The force acting on the piston will be equal to the product of the pressure of air and the area of the cylinder.



**SOLENOID VALVE**

The directional valve is one of the important parts of a pneumatic system. Commonly known as DCV, this valve is used to control the direction of air flow in the pneumatic system.

This valve was selected for speedy operation and to reduce the manual effort and also for the modification of the machine into automatic machine by means of using a solenoid valve. A solenoid is an electrical device that converts electrical energy into straight line motion and force.

Solenoids may be push type or pull type. The push type solenoid is one in which the plunger is pushed when the solenoid is energized electrically. The pull type solenoid is one in which the plunger is pulled when the solenoid is energized.

**2. WORKING OF 5/2 DOUBLE ACTING SOLENOID VALVE:**

The 5/2-way double solenoid valve with push-in fittings is bolted onto a function plate which is equipped with a P port and silencer. The two electrical connections are equipped with safety connectors. The unit is mounted on the profile plate using a snap-lock system with a blue lever (mounting

variant "A"). The solenoid valve is reversed when voltage is applied to the solenoid coil (1 4) and brought back into its initial position (1 2) by a return spring when the signal is removed. The valve is equipped with a manual override. The solenoid coil is characterized by very low power consumption and low heat generation. The electrical connection incorporates protection against incorrect polarity for the LED and a protective circuit.

The control valve is used to control the flow direction is called cut off valve or solenoid valve. This solenoid cut off valve is controlled by the emergency push button. The solenoid valve consists of electromagnetic coil, stem and spring. The air enters to the pneumatic double acting solenoid valve when the push button is in ON position.



**IR SENSOR UNIT**

The IR transmitter and IR receiver circuit is used to sense the obstacle. It is fixed to the back side of the frame stand with a suitable arrangement. The pneumatic cylinder is controlled by the flow control valve, single acting solenoid valve and control unit.

**AT NORMAL CONDITION:**

The IR transmitter sensor is transmitting the infrared rays with the help of 555 IC timer circuit. These infrared rays are received by the IR receiver sensor. The Transistor T1, T2 and T3 are used as an amplifier section. At normal condition Transistor T5 is OFF condition. At that time relay is OFF, so that the vehicle running continuously.

**AT OBSTACLE CONDITION:**

At Obstacle conditions the IR transmitter and IR receiver, the resistance across the Transmitter and receiver is high due to the non-conductivity of the IR waves. So the output of transistor T5 goes from OFF condition to ON stage. In that time the relay is ON position. In that time, the solenoid valve is on so that the vehicle stops.

**DC MOTOR**

An electric motor is a machine which converts electrical energy to mechanical energy. Its action is based on

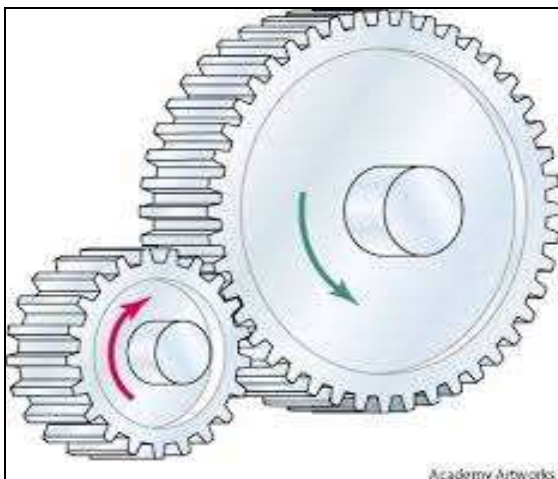
the principle that when a current-carrying conductor is placed in a magnetic field, it experiences a magnetic force whose direction is given by Fleming's left hand rule.

When a motor is in operation, it develops torque. This torque can produce mechanical rotation. DC motors are also like generators classified into shunt wound or series wound or compound wound motors.

**SPUR GEAR**

The spur gears, which are designed to transmit motion and power between parallel shafts, are the most economical gears in the power transmission industry.

Spur gears or straight-cut gears are the simplest type of gear. They consist of a cylinder or disk with teeth projecting radially. Though the teeth are not straight-sided (but usually of special form to achieve a constant drive ratio, mainly involute but less commonly cycloidal), the edge of each tooth is straight and aligned parallel to the axis of rotation. These gears mesh together correctly only if fitted to parallel shafts.



**PROJECT OUTCOME**



Irjet Template sample paragraph .Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

**Table -1: LIST OF COMPONENTS**

SL.NO.	ITEM/COMPONENT
1	Frame
2	IR Sensor
3	Pneumatic cylinder
4	Solenoid valve
5	D.C motor
6	Spur Gear
7	Battery

**3. CONCLUSIONS**

. Behind the designing of this system, our main aim is to improve the prevention technique of accidents and also reducing the hazard from accidents like damage of vehicle, injury of humans, etc. We observed that our work is able to achieve all the objectives which are necessary.

There is lot of scope for future development in vehicle. The technology of pneumatics has gained tremendous importance in the field of workplace rationalization and automation from old-fashioned timber works and coal mines to modern machine shops and space robots. It is therefore important that technicians and engineers should have a good knowledge of pneumatic system, air operated valves and accessories. The aim is to design and develop a control system based an intelligently electronically controlled automotive bumper activation system is called "Automatic Bumper System for Four Wheelers". This system is consists of IR transmitter and Receiver circuit, Control Unit, Pneumatic bumper system. The IR sensor is used to detect the obstacle. There is any obstacle closer to the vehicle (within 4 feet) the control signal is given to the bumper activation system.

**ACKNOWLEDGEMENT (Optional)**

The authors can acknowledge any person/authorities in this section. This is not mandatory.

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