

## “PNEUMATIC BUMPER AND BRAKING SYSTEM”

Mr. Sagar B. Sonawale<sup>1</sup>, Mr. Praful J. Sirsat<sup>2</sup>, Mr. Yash G. Awale<sup>3</sup>, Mr. Shubham V. Khedkar<sup>4</sup> & PROF. S. S. SHIRSATH<sup>5</sup>

<sup>1,2,3&4</sup>Department of Mechanical Engineering Pune District Education Association's College of Engineering, Manjari (Bk), Pune. [2019-2020] Maharashtra, India.

<sup>5</sup> PROF Department of Mechanical Engineering Pune District Education Association's College of Engineering, Manjari (Bk), Pune. [2019-2020] Maharashtra, India.

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**Abstract** - In today's world automation is increasing day by day which includes Pneumatic technology which had gained tremendous importance from old age & coal mining to modern machines like heavy machinery's & even in space robot's. To surf along with the study or market research one should must have knowledge in pneumatic system

The main course of this project is to study on pneumatics' and to relate the topic in the project. In that case we designed and fabricated Intelligent electronically controlled automotive bumper activation called "PNEUMATIC BUMPER & BRAKING SYSTEM". This system has a ARDUINO UNO as a micro controller, IR transmitter & Receiver circuit & Pneumatic actuators used as braking & bumper system.

Now a day's accident is a huge problem especially in INDIA due to improper construction of road and tracks. To overcome this problem this project helps in minimizing the accidents & greatest damage to the person if accident takes place

**Key Words:** Pneumatic, Bumper, Braking system, Arduino Uno, IR transmitter, Receiver & Pneumatic actuator,

### 1. INTRODUCTION

Today India is the most vital under developed country within the world. India is the largest country within the use of varied sorts of vehicles. Because the available resources to run these vehicles like quality of roads, and unavailability of latest technologies in vehicles are the main causes for accidents to happen. The percentage of peoples who are dying because of vehicle accidents is additionally very large as compared to the opposite causes of death. Though there are different causes for these accidents but proper technology of braking system and technology to scale back the damage during accident are mainly effects on the accident rates. So today implementation of proper braking system to stop the accidents and also this technique will reduce the damage is must for vehicles. To realize this technique modification goal, we design this Automatic Braking. It's the project which has been fully equipped and designed for auto vehicles.

### 1.1 Selection of Pneumatic System

The word 'pneuma' means breather wind came from Greek. The word pneumatics related as study of air relative to the flow and its phenomena springs from the word pneuma. Today pneumatics is mainly understood as the application of air as a working medium, in industry especially for driving and controlling of machines and equipment. Pneumatics has a few considerable time used for completing the only mechanical tasks in additional recent times pneumatic has played a more important role within the development of pneumatic technology for automation.

Mechanization is broadly defined because the replacement of manual effort by mechanical power. Pneumatic is a Technology is a medium for low cost mechanization particularly for sequential (or) repetitive operations. Many factories and plants have already got a compressed gas system, which is capable of providing the facility (or) energy requirements and therefore the system & although equally pneumatic control systems could also be economic and may be advantageously applied to other sorts of power & the most advantage of an all pneumatic system are usually economic and ease the latter reducing maintenance to a coffee level.

### 2. PROBLEM STATEMENT

In conventional vehicles there are many different mechanisms involved for operating braking system like hydraulic, pneumatic, air, mechanical, etc. But from all these braking mechanisms they receive signal or input power directly from the driving force so it becomes totally manual operated. When the driver figures the obstacle or any vehicle in front of his driving vehicle, he gets irritated or becomes mazy. Due to this the driver fails to give the proper input to braking system and proper working does not occur. Also the driving force might not ready to pay the complete attention during night travelling so there are many chances to accidents. So this technique never reduces the damage of both vehicle and passengers. To overcome these unwanted effects, we have to design the Automatic Braking and bumper System.

### 3. OBJECTIVES

Automatic Braking System with Pneumatic Bumpers which has following objectives:

- To increase the sureness of braking Application on a exacta time when applied.
- To conveniently maintain or increase the response time of braking system.
- To improve the pre-crash safety by using the pneumatic actuator for bumper.
- To reduce the passenger’s awareness regarding the accidents.
- To minimize the requirement or use of internal safety devices like air bags.

### 4. PROPOSED SYSTEM

The project includes both mechanical and Electronics, which is fairly called as the Mechatronics theme. The upcoming generation is full of Automation there is no word as manual so we need to develop a system which is fully automatic.

Now a day’s vehicle accidents are the major problem. This breaking system used an innovative project for the purpose of preventing accidents happens in the restricted roadways. To overcome this problem, we are going to develop a system which is helpful for the reduction of road accidents. This project fully equipped and designed for auto vehicles. The technology of pneumatics and hydraulic plays a vital role in the field of automation as well as modern machine shops and space robots.

### 5. PROPOSED SYSTEM WORKING

This would be a pleas-full in introducing our new project called “PNEUMATIC BUMPER AND BREAKING SYSTEM”. The system has a ARDUINO UNO which acts as microcontroller, IR Receiver & transmitter, Pneumatic actuators for bumper as well as braking unit, solenoid valve and pressure control valve.

As the obstacle arises in front of vehicle IR Receiver & transmitters are used to control any motioned device’s wirelessly by means of a remote when the IR senses, it modulates IR pulses and converts them into the electrical signal latterly it is received in the control unit at the same time actuators are operated for bumper and braking system through solenoid valve air as working medium from compressor.

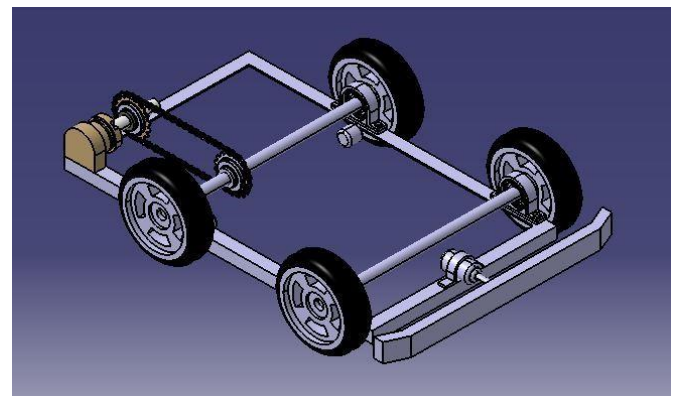


Fig. 5.1 3D Cad Model of Project

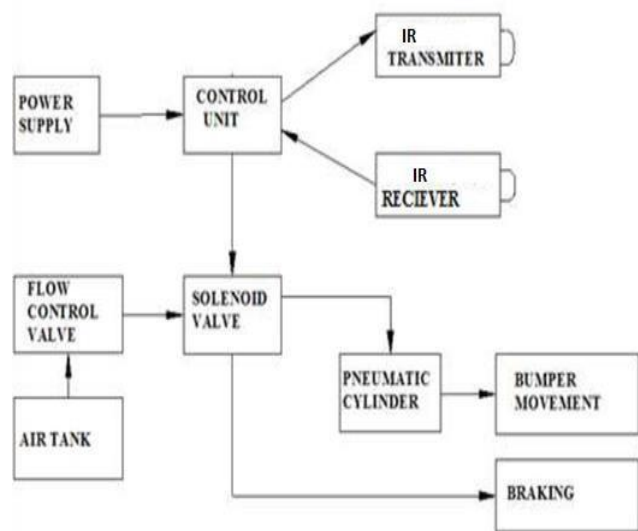


Fig 5.2 Proposed block diagram of project

### 6. COMPONENT DESCRIPTION

#### 6.1 Pneumatic Actuator

Pneumatic actuators or control valve converts energy ex. (air pressure) into mechanical work which may be liner or rotary depending upon the actuator type. It mainly consists of piston or diaphragm which develops the motive power it keeps the air in the upper portion of the actuator cylinder allowing the working fluid to force the piston forward & backward



Fig 6.1: Pneumatic actuator

### 6.2 Solenoid valve

Solenoid valves are used to control the direction of the flow of working medium the actuator is a double acting type cylinder those a solenoid valve is require to equally distribute the medium to each of the stage correctly hence solenoid valves are operated through electrical signal therefore the flow can be switched ON/OFF any time electromechanically.



Fig 6.2 Solenoid valve

### 6.3 ARDUINO UNO

Hear ARDUION UNO is a heart of the source used as a main controlling unit for actuating the bumper and braking unit. Based on ATmega328 it has 14 digital In/Op pins, in which 6 can be used for PWM outputs, 6 analog inputs

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-9V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) (0.5 KB used by boot loader)
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

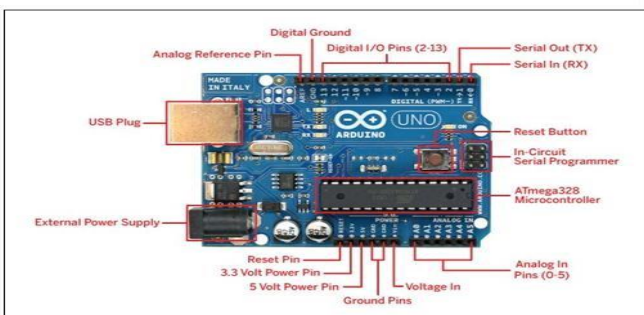


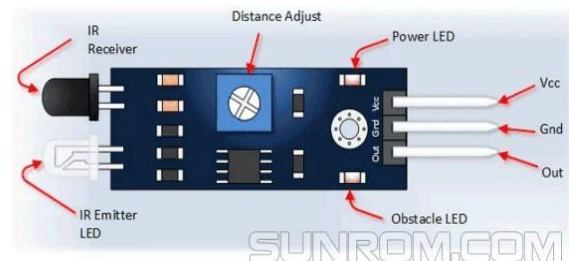
Fig 6.3 ARDUINO UNO

### 6.4 IR Receiver & Transmitter

IR Receiver & Transmitter are used to control any device wirelessly means via remote, it stimulates and modulates IR pluses and converts to electrical signals.

#### Features

- IR transmitter
- Ambient light protected IR receiver
- 3 pin easy interface connectors
- Indicator LED & Power LED
- Distance 2cm to 30cm
- Can differentiate between dark and light colors
- Active Low on object detection
- 3.3 to 5V operation



Pin, Control Indicator	Description
Vcc	3.3 to 5 Vdc Supply Input
Gnd	Ground Input
Out	Output that goes low when obstacle is in range
Power LED	Illuminates when power is applied
Obstacle LED	Illuminates when obstacle is detected
Distance Adjust	Adjust detection distance. CCW decreases distance. CW increases distance.
IR Emitter	Infrared emitter LED
IR Receiver	Infrared receiver that receives signal transmitted by Infrared emitter.

Fig 6.4 IR

## 7. CONCLUSIONS

The main aim of our project was to study the pneumatics and to reconstruct the automobile vehicle mainly to make use of the pneumatic system, so the project "PNEUMATIC BUMPER & BRAKING SYSTEM" has been made. As mentioned throughout the experiment automation is the power for the future generation pneumatics plays vital role in the project, all the objective was observed and recorded as per the trial run carried out at the end & each of the objectives has been satisfied the goal orientation. By adopting pneumatic actuator in bumper and braking system it has been improved the prevention technique of accidents and also reducing the hazard from accidents like damage of vehicle, injury of humans, etc.

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