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# Automatic Braking System

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*Abstract:*

*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 air is compressed in an air compressor and from the compressor plant the flow medium is transmitted to the pneumatic cylinder through a well laid pipe line system. To maintain optimum efficiency of pneumatic system, it is of vital importance that pressure drop between generation and consumption of compressed air is kept very low.*

*The aim is to design and develop a control system based an intelligent electronically controlled automotive braking system is called "Automatic Braking System". This Braking system is consists of IR transmitter and Receiver circuit, Control Unit, Pneumatic breaking system. The IR sensor is used to detect the obstacle. There is any obstacle in the path, the IR sensor senses the obstacle and giving the control signal to the breaking system. The pneumatic breaking system is used to break the system.*

*Keywords: IR Sensor, Obstacle, Braking system, Compressed air*

## 1. Introduction

Road accident is most unwanted thing that happens to road user. Sometimes this accident proves to be fatal. The major source of car accident is human error. These accidents are mostly caused by delay of the driver to press the brakes. The basic approach of this paper is to design a system which will prevent such accidents by continuously keeping the record of the distance between two vehicles. In IBS, ultrasonic sensor senses imminent collision with another vehicle, person or obstacle and the microprocessor in the system activate the brakes and it will slow down the vehicle or bring it to stop if needed. This IBS has to be work with ABS (antilock braking system) equipped in vehicle in order to increase control over vehicle while emergency braking. The primary objective of this paper is to develop a safety car braking system using IR sensor and to design a vehicle with less human attention to the driving.

## 2. Components and description

The fabrication of the intelligent braking system involves the following components which does its purpose effectively. The need of the component in our braking system and a brief summary of each component are given below.

### 2.1 Wheel Arrangement

A simple wheel and braking arrangement is fixed to the frame stand. Near the brake drum, the pneumatic cylinder piston is fixed. This wheel arrangement is just a setup for showing the successful working of our project. But the real implementation can be done in the automobile and the brakes can be applied to all the four wheels.

### 2.2 Pneumatic Cylinder

Mechanization is broadly defined as the replacement of manual effort by mechanical power. Pneumatics is an attractive medium for low cost mechanization particularly for sequential or repetitive operations. Many factories and plants already have a compressed air system, which is capable of providing both the power or energy requirements and the control system.

### 2.3 Double acting cylinder

The cylinder is a double acting cylinder one, which means that the air pressure operates alternatively (forward and backward). The air from the compressor is passed through the regulator which controls the pressure to required amount by adjusting its knob. A pressure gauge is attached to the regulator for showing the line pressure.

Then the compressed air is passed through the directional control valve for supplying the air alternatively to either sides of the cylinder. Two hoses take the output of the directional control valve and they are attached to two ends of the cylinder by means of connectors. One of the outputs from the directional

control valve is taken to the flow control valve from taken to the cylinder.

An air cylinder is an operative device in which the state input energy of compressed air i.e. pneumatic power is converted in to mechanical output power, by reducing the pressure of the air to that of the atmosphere.

### 2.4 Single acting pneumatic cylinder

A single-acting cylinder in a reciprocating engine is a cylinder in which the working fluid acts on one side of the piston only. A single-acting cylinder relies on the load, springs, other cylinders, or the momentum of a flywheel, to push the piston back in the other direction. Single-acting cylinders are found in most kinds of reciprocating engine. They are almost universal in internal combustion engines (e.g. petrol and diesel engines) and are also used in many external combustion engines such as Stirling engines and some steam engines. They are also found in pumps and hydraulic rams.

### 2.5 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. The directional valve does this by changing the position of its internal movable parts.

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.

### 2.6 IR Sensor

An infrared sensor is a type of photoelectric beam system used as an electronic alarm. It is designed to alert the user to an intruder's presence by transmitting infrared light beams across an area, where these beams may be obstructed. They are often used in military installations and other facilities of restricted access. Infrared sensors are connected to a control unit via low-voltage wiring or a narrowband RF signal which is used to interact with a response device. In some cases, the sensors are linked directly to a facility's central command computer. If an intruder breaks the beams, an alert is raised and facility personnel are notified. There are two main types of infrared sensor: a stationary version where the beams are transmitted in a single position, and a patterned version where the beams continually change position so as to dissuade a potential intruder from attempting to pass through them.

### 2.7 Frame

This is made of mild steel material. The whole parts are mounted on this frame structure with the suitable arrangement. Boring of bearing sizes and open bores done in one setting so as to align the bearings properly while assembling. Provisions are made to cover the bearings with grease.

### 2.8 Ac Motor

An AC motor is an electric motor driven by an alternating current (AC). The AC motor commonly consists of two basic parts, an outside stationary stator having coils supplied with alternating current to produce a rotating magnetic field, and an inside rotor attached to the output shaft producing a second rotating magnetic field. The rotor magnetic field may be produced by permanent magnets, reluctance saliency, or DC or AC electrical windings.

Less commonly, linear AC motors operate on similar principles as rotating motors but have their stationary and moving parts arranged in a straight line configuration, producing linear motion instead of rotation.

### 2.9 Pulley

A pulley is a wheel on an axle or shaft that is designed to support movement and change of direction of a cable or belt along its circumference. Pulleys are used in a variety of ways to lift loads, apply forces, and to transmit power. In nautical contexts, the assembly of wheel, axle and supporting shell is referred to as a "block." A pulley may also be called a sheave or drum and may have a groove between two flanges around it

The drive element of a pulley systemcan be a rope, cable, belt, or chain that runs over the pulley inside the groove. Hero of Alexandria identified the pulley as one of six simple machines used to lift weights. Pulleys are assembled to form a block and tackle in order to provide mechanical advantage to apply large forces. Pulleys are also assembled as part of belt and chain drives in order to transmit power from one rotating shaft to another.

### 3.0 Belt drive

A belt is a loop of flexible material used to mechanically link two or more rotating shafts, most often parallel. Belts may be used as a source of motion, to transmit power efficiently or to track relative movement. Belts are looped over pulleys and may have a twist between the pulleys and the shafts need not be parallel. In a two pulley system, the belt can either drive the pulleys normally in one direction

(the same if on parallel shafts) or the belt may be crossed, so that the direction of the driven shaft is reversed (the opposite direction to the driver if on parallel shafts). As a source of motion, a conveyor belt is one application where the belt is adapted to continuously carry a load between two points. A conveyor belt is the carrying medium of a belt conveyor system (often shortened to belt conveyor). A belt conveyor system is one of many types of conveyor systems. A belt conveyor system consists of two or more pulleys (sometimes referred to as drums), with an endless loop of carrying medium—the conveyor belt—that rotates about them. One or both of the pulleys are powered, moving the belt and the material on the belt forward. The powered pulley is called the drive pulley while the unpowered pulley is called the idler pulley. There are two main industrial classes of belt conveyors; Those in general material handling such as those moving boxes along inside a factory and bulk material handling such as those used to transport large volumes of resources and agricultural materials, such as grain, salt, coal.

## 4. Working Principle

The IR Transmitter circuit is to transmit the Infra-Red rays. If any obstacle is there in a path, the Infra-Red rays reflected. This reflected Infra-Red rays are received by the receiver circuit is called "IR RECEIVER". The IR receiver circuit receives the reflected IR rays and giving the control signal to the control circuit. The control circuit is used to activate the solenoid valve. If the solenoid valve is activated, the compressed air passes to the Double Acting Pneumatic Cylinder. The compressed air activate the pneumatic cylinder and moves the piston rod. If the piston moves forward, then the breaking arrangement activated. The ac motor and a pulley with belt drive arrangement used for the movement of the wheel. The braking arrangement is used to brake the wheel gradually or suddenly due to the piston movement. The braking speed is varied by adjusting the valve is called "FLOW CONTROL VALVE". In our project, we have to apply this braking arrangement in one wheel as a model. The compressed air drawn from the compressor in our project. The compressed air flow through the Polyurethane tube to the flow control valve.

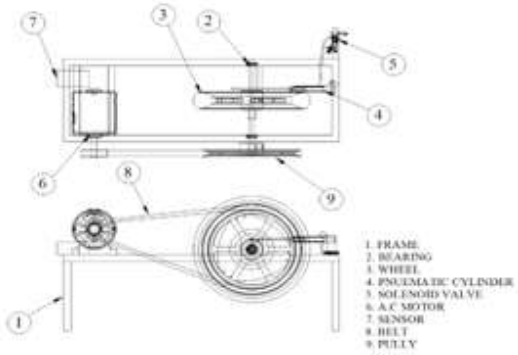


Fig.1– 2D Diagram

## 5. 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 the institution and the industries.

We are proud that we have completed the work with the limited time successfully. The Automatic Braking System is working with satisfactory conditions. We can able to understand the difficulties in maintaining the tolerances and also the 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 a "Automatic Braking System"which helps to design a robot. In this project, we have combined the mechanisms of robotic and monitoring systems using electronic control units which actually moves and records the instants of the soil report and feeds it back to the control unit.

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