AUTOMATIC BRAKING SYSTEM USING IR SENSOR

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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 aim is to design and develop a control system based an intelligent electronically controlled system called "eye sensor braking system". This system consists Control Unitsystem and braking unit. The IR sensor is used to measure and control eye blink.This project involves measure and controls the eye blink using IR sensor. The IR transmitter is used to transmit theinfrared rays in our eyes. The IR receiver is used to receivethe reflected infrared rays from our eyes. If the eyes areclosed it means the output of IR receiver is high otherwisethe IR receiver output is low. This to know the eye isclosing or opening position of the eyes. This output isgiven to logic circuit to indicate the final output i.e. alarm and the control signal is given to the braking unit. Now a day vehicle accident is the major problem. This breaking system is an innovative project for the purpose of preventing accidents that happens in the restricted roadways. The purpose of this system is based on intelligent electronically brake activation system known as “eye sensor braking”.

Index Terms:IR Sensor, Pneumatic System, Logic Circuit, Braking System.

I. INTRODUCTION

Today India is the most important under developed country in the world. India is the largest country in the use of various types of vehicles. As the available resources to run these vehicles like quality of roads, and unavailability of new technologies in vehicles are causes for accidents. The number of peoples which are dead during the vehicle accidents is also very large as compared to the other causes of death. Though there are different causes for these accidents but proper technology of braking system and technology to reduce the damage during accident are mainly effects on the accident rates. Today implementation of proper braking system to prevent the accidents. To achieve this system modification goal, we design this Automatic Braking. It is the project which has been fully equipped and designed for auto vehicles.
The aim is to design and develop a control system based on intelligent electronically controlled automotive braking system is called “eye sensor braking system”. The project consists of IR transmitter and Receiver circuit, Control Unit. The IR sensor measure and controls the eye blink. If eye blink count is low then alarm will be on and brake will be applied.

II. BLOCK DIAGRAM AND MODULES DESCRIPTION

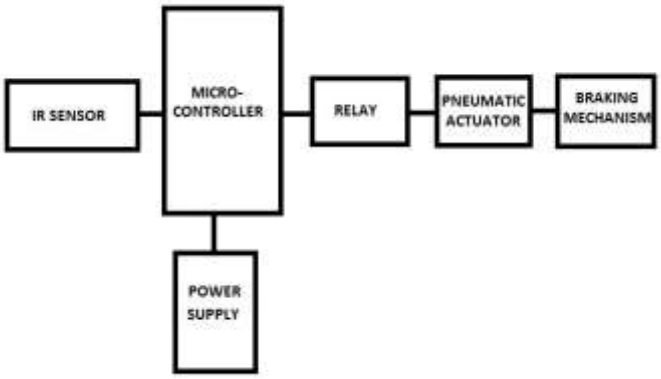

Fig.1. Block Diagram

A. Modules and Description

1.Infrared Sensor
There is a wide range of sensor technologies available for vehicle detectors. There are two types of infrared (IR) detectors, active and passive. Active infrared sensors operate by transmitting energy from either a light emitting diode (LED) or a laser diode. An LED is used for a non-imaging active IR detector, and a laser diode is used for an imaging active IR detector. In both types of detectors the LED or

laser diode illuminates the target, and the reflected energy is focused onto a detector consisting of a pixel or an array of pixels. The measured data is then processed using various signal-processing algorithms to extract the desired information. Active IR detectors provide count, presence, speed, and occupancy data in both night and day operation. The laser diode type can also be used for vehicle classification because it provides vehicle profile and shape data. A passive infrared system detects energy emitted by objects in the field of view and may use signal-processing algorithms to extract the desired information. It does not emit any energy of its own for the purposes of detection. Passive infrared systems can detect presence, occupancy, and count. Some of the advantages of infrared detectors are that they can be operated during both day and night, and they can be mounted in both side and overhead configurations. Disadvantages are that infrared detectors can be sensitive to inclement weather conditions and ambient light. The choice of detector materials and construction of the system, as well as sophisticated signal processing algorithms, can compensate for advantages.

Fig.2. IR Sensor

2. Arduino Uno

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip which is very cheap and start over again.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform.

Fig.3.Arduino Uno

3. Relay

What is a Relay

It's a electrical device that functions something like a wired remote control switch. Instead of having the switch you push/flip/whatever do the work of supplying power to whatever you wanted it to, you have it control are lay which then does the real on/off switching work. A mechanical relay does this through the use of an electromagnet that is only "on" when there's power running through it - that pulls a set of spring loaded contacts to make or break the connection and achieve the on-off effect. This is called the "coil" or trigger wire - the other wire coming out of the coil is connected to ground. Whenever you apply power to the other coil wire (the trigger), the relay is on. As soon as power to this trigger is turned off, the relay turns off. Simple, huh? There are also "solid state" relays that achieve the same effect through transistors. Either one functions the same way, the solid state stuff just has no moving parts to wear out, but they tend to be more expensive and not as readily available since the regular mechanical ones are inexpensive and readily available as very high quality, durable units.

Why is this useful?

For one big reason - some devices use a lot of power and that means large wires and heavy duty contacts inside all of the switches and connectors are needed. And you want to use as little wire (in length/distance) as possible. It's more expensive and heavier that smaller low-power wires and it's harder to work with. If the wire develops a short, it's a much bigger problem - and the longer the wire involved, the more chances you have for something to go wrong. Additionally, heavy-duty switches are large, cumbersome, and generally have a very poor "feel" to them. By "feel", I mean thetactile sensation you get from using the switch - is it a smooth silky operation with a nice delicate "click" to tell you what's happening, or is it more like Igor straining to flip a massive and cumbersome switch to turn on the power to bring Dr. Frankenstein's creature to life? You get the idea. It's easier and cheaper to make a low power switch in the quality you would expect in a fine automobile. And it will last longer. That's a good thing, A relay alleviates this by using a single relatively small and low power wire to

control the on-off of electrical flow.You mount the relay near the device it controls, and run a simple large power wire to the relay. Then you run a small wire back to the switch. The switch you flip just supplies power to the relay coil and functions as a trigger - if the coil has power, the magnet energizes and the relay contacts move to make (or break - it can work both ways) the high power connection to your device.

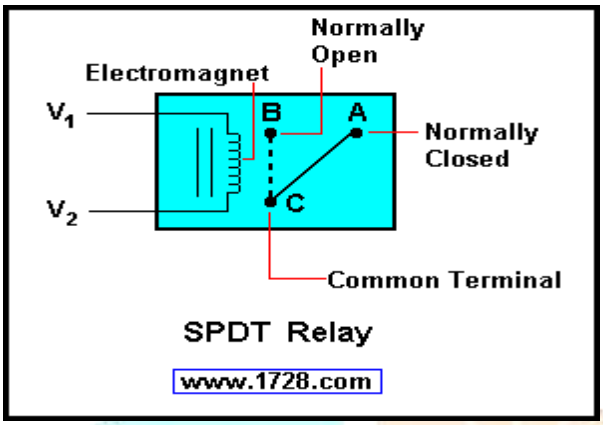

Fig.4. Relay

4. Double ActingPneumatic Cylinder

Pneumatic cylinder (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 hydraulic 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.

The double-acting cylinder requires compressed air for every direction of movement. On this type of cylinder, the force both the advancing and retracting direction is built up using compressed air. The simplest way of actuating a double-acting cylinder is by using a 5/2 valve.

Advantages:

- Force builds up in both directions of movement
- Constant force (dependent on stroke)
- Strokes of several metres are possible

Disadvantages:

- Every movement uses compressed air
- No defined position in the event of compressed air failure

Fig.5.Double Acting Pneumatic Cylinder

5. 5/2 Solenoid Valve

Directional control valves are one of the most fundamental parts in hydraulic machinery as well and pneumatic machinery. They allow fluid flow into different paths from one or more sources. They usually consist of a spool inside a cylinder which is mechanically or electrically controlled. The movement of the spool restricts or permits the flow, thus it controls the fluid flow.

Directional control valves can be classified according to:

- number of ports
- number of positions
- actuating methods
- type of spool.

Example: A 5/2 directional control valve would have five ports and two spool positions.

Fig.6. 5/2 Direction Control Solenoid Valve

6. Pipes and Hoses

The basic function of pneumatic tubing and hose is to convey pressurized air to actuators, valves, tools and other devices. But there are countless types and sizes of tubing and hose on the market, so engineers should consider a number of important factors to select the right one for a given task.

Start with construction. Tubing for air applications may be extruded of a single material or reinforced internally, typically with textile fibers, for higher strength. Pneumatic hose generally consists of an inner tube, one or more layers of reinforcing braided or spiral-wound fiber, and an outer protective cover. In broad terms, hose is more rugged than tubing but costs more.

Thermoplastic tubing is made from several common materials. But manufacturers offer countless variations of polymer formulations to suit specific needs. Typical tubing materials used in pneumatic applications include: Polyurethane tubing is strong, flexible, kink and abrasion resistant, and it withstands contact with fuels and oils. It's commonly used in pneumatic actuation and logic systems, robotics and vacuum equipment, and in a variety of semiconductor manufacturing, medical and laboratory applications.

Nylon tubing is tough, light and dimensionally stable. It can be formulated for higher-pressure pneumatics.

Polyethylene tubing is often used in low-pressure pneumatics and pneumatic controls. It has wide resistance to chemicals and solvents, good flexibility and relatively low cost.

Polyvinyl chloride (PVC) tubing is light and generally more flexible than nylon and polyethylene, offers good chemical resistance and can be repeatedly sterilized. It is suitable for low-pressure medical applications.

Polypropylene tubing can be formulated for food-contact applications, resists chemical attack and withstands UV radiation in outdoor applications.

Fig.7. Pneumatic Hoses and Tubes

7. Chain Drive

Chain drives consist of an endless series of chain links that mesh with toothed sprockets. Chain sprockets are locked to the shafts of the driver and driven machinery. Chain drives represent a form of flexible gearing. The chain acts like an endless gear rack, while the sprockets are similar to pinion gears.

Chain drives provide a positive form of power transmission. The links of the chain mesh with the teeth of the sprockets and this action maintains a positive speed ratio between the driver and driven sprockets.

Advantages

- Chain drives, unlike belt drives, do not slip or creep.
- There is no power loss due to slippage; therefore, chain drives are more efficient than belt drives.
- Chain drives are more compact than belt drives. A chain drive, for a given capacity, is narrower than a belt, and the sprockets are smaller in diameter than the belt sheaves.
- Chain drives are more practical for slow speed drives.
- Chains can operate effectively at high temperatures.

Disadvantages

- Chain drives cannot be used where the drive must slip.
- Chain drives cannot accept much misalignment.
- Chain drives usually require frequent lubrication.
- Chain drives are noisy and can cause vibration within the machine.
- Chain drives do not have load capacities or service life characteristics equal to those of gear drives.

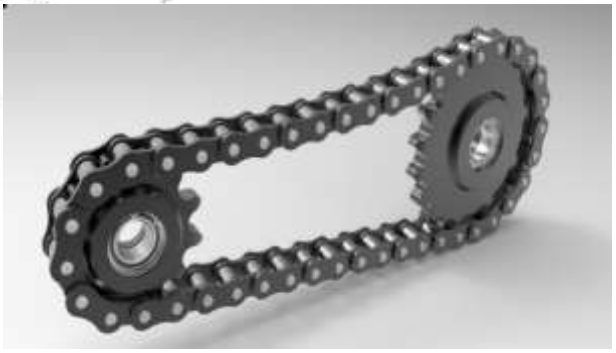

Fig.8. Chain Drive

8. Bearing

A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by

controlling the vectors of normal forces that bear on the moving parts. Many bearings also facilitate the desired motion as much as possible, such as by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts.

The term "bearing" is derived from the verb "to bear". A bearing being a machine element that allows one part to bear (i.e., to support) another. The simplest bearings are bearing surfaces, cut or formed into a part, with varying degrees of control over the form, size, roughness and location of the surface. Other bearings are separate devices installed into a machine or machine part. The most sophisticated bearings for the most demanding applications are very precise devices; their manufacture requires some of the highest standards of current technology.

Rolling-element bearings utilize balls (ball bearings) or cylindrical rollers (roller or “needle” bearings). These elements are contained with bearing rings or “races”, where they facilitate motion with little resistance to sliding. Ball bearings, the most common type, can accommodate both radial and axial loads.

Fig.9. Ball Bearing

9. Brake

A brake is a mechanical device that inhibits motion by absorbing energy from a moving system. It is used for slowing or stopping a moving vehicle, wheel, axle, or to prevent its motion, most often accomplished by means of friction.

Frictional brakes are most common and can be divided broadly into "shoe" or "pad" brakes, using an explicit wear surface, and hydrodynamic brakes, such as parachutes, which use friction in a working fluid and do not explicitly wear. Typically the term "friction brake" is used to mean pad/shoe brakes and excludes hydrodynamic brakes, even though hydrodynamic brakes use friction. Friction (pad/shoe) brakes are often rotating devices with a stationary pad and a rotating wear surface. Common configurations include shoes that contract to rub on the outside of a rotating drum, such as a band brake; a rotating drum with shoes that expand to rub the inside of a drum, commonly called a "drum brake", although other drum configurations are possible; and pads that pinch a rotating disc, commonly called a "disc brake". Other brake configurations are used, but less often.

A drum brake is a vehicle brake in which the friction is caused by a set of brake shoes that press against the inner surface of a rotating drum. The drum is connected to the rotating roadwheel hub.

Drum brakes generally can be found on older car and truck models. However, because of their low production cost, drum brake setups are also installed on the rear of some low-cost newer vehicles. Compared to modern disc brakes, drum brakes wear out faster due to their tendency to overheat.

Fig.10. Drum Brake

III. RESULTS

Fig.11. Electronic Circuit

Fig.12. Side View 1

Fig.13. Side View 2

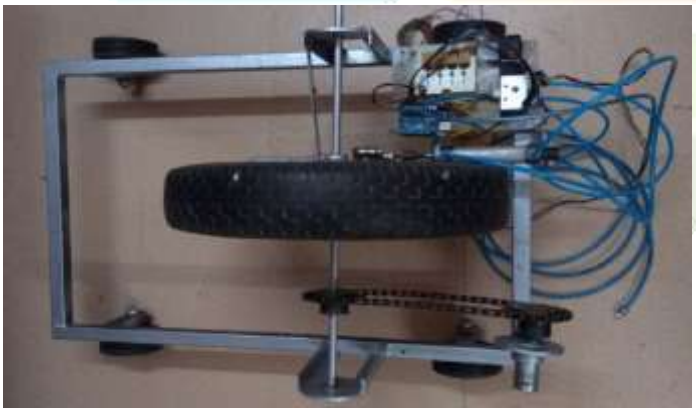

Fig.14. Complete Project

IV. CONCLUSION AND FUTURE SCOPE

A. CONCLUSION

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.

Initial cost of cars with air bags is always high. Usually air bags are given to high end cars. By implementing this project we can reduce cost of high end cars by giving similar kind of safety. Air bags are helpful to provide internal safety to people sitting in vehicle, whereas in our project we will be giving internal plus external safety to car from damage.

Thus we will reduce initial cost of cars and also provide better safety.

B. FUTURE SCOPE

In addition to the braking system, an additional module can be developed for controlling the direction of the vehicle.

We can automatically park the car by first using Automatic braking system, which will slow down the car and simultaneously will turn on the parking lights of the car and will detect the parking space and will automatically park the car preventing from accident.

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