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DESIGN AND FABRICATION OF INTELLIGENT BUMPER AND BRAKING SYSTEM

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Abstract: In this new generation automation is the one of the increasing technologies which includes day by day work from home appliances to space research. In that we are going to study the pneumatic technology its benefits new application to the world of science. Pneumatic has gained a tremendous impotence in today's habitats from coal mine old age to modern machines like machineries etc. To go with current scenario, one should must have the knowledge in pneumatic technology. The main aim of this project is to know about the pneumatics future gadgets can be made use of it. Like ours intelligent Pneumatic bumper and braking system. This system works as a automatic brake applier via object detection with bumper activation for secondary safety purpose.

Keywords: Automation. Intelligent. Bumper. Braking and Object detection.

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I INTRODUCTION

Because of road accidents death and serious injuries are taking place each and every second through all over world. Today India is one of the growing sectors in industries but poor in civil construction as accident takes place each and every second also the roadways which are constructed are demolished soon for drainage purposes. So, because of lack of negligence most of the accident are happened of road failure.

Because of growing industries here Transportation has become a requirement for delivering the goods and retaking it and also it is one of the major problems for where accident takes place in a hurry. Because of heavy overweighted load and fast driving tragedy is the major cause. All though there may be a lack of failure from Man Machine and Material but proper technology of braking and bumper activation can eliminate the accidents caused due to harsh driving and signal jump.

Accidents due to negligence

II PROBLEM STATEMENT

1. Major accident caused due to harsh and fast driving.
2. Serious injuries are taking place.
3. Atmosphere loss consideration blasting and dangerous gases release after accident.
4. Drowsiness of driver while driving a vehicle can lead to accident.
5. Due to night dark vision improper viewing of road terrains
6. From all of the above problem we can come out with a simple solution is our project Intelligent Bumper and braking system.

III OBJECTIVES

1. To limit the accident taking place because of lack negligence.
2. To Design and construct a automatic bumper and braking activation system for accident prevention.
3. To create a 3D conceptual design using CATIA v Soft.
4. To study about the material component and raw materials required for constructing the experimental model.
5. Finally, to purchase the required Materials and components by making a market survey of required sizes capacity and range.
6. After purchasing assemble the components by constructing a required support and working setup and programming it to the working operation.
7. Last but not least test and observe the created setup.

IV SCOPE

1. This is a combined from project of Mechanical and electronics engineering.
2. So the upcoming world is a new era which will have future gadgets full of automations.
3. This study can lead to a new dimension for braking and bumper activation systems
4. This project can be implemented in all the vehicle from car to heavy machinery.
5. This scope can also include a future estimation of accident prevention for human safety

V METHODOLOGY

1. The methodology begins with the construction of a four wheeled prototype modal having a DIY wheel in all its side.
2. At the back wheel we will mount a wiper motor because of its torque and included gears in it for the motion of prototype modal.
3. Hear ARDUINO Uno is used as a microcontroller
4. Pneumatic actuators are used to apply the brake and activate the bumper.

5. Solenoid valve is used to direction the compressed air from the compressor cylinder to actuator.
6. Hear the programming is done to control the valve via Arduino uno.
7. Battery source is used to supply the current.

VI ORGANIZATION OF DISSERTATION

1. We have started our project work intelligent pneumatic bumper and braking system by reading several research paper from the IEEE journal. and came with the idea.
2. From it we have imagined a3D conceptual modal and created in the CATIA soft.
3. We have done some calculation of pneumatic specification and other components ranges and capacity's
4. After knowing the components, we will purchase it from the market store
5. Assemble it
6. Finally test and observe the working.

VII LITERATURE REVIEW

By Dinesh Mohan road accidents in India

The number of vehicles registered in India is shown in Table 1. These data show that the total number of vehicles increased from 37 million in 1997 to 73 million in 2004. This represents an annual average growth rate of about 11% for cars and motorized two-wheelers and 7% for trucks and buses.

Table 1 Motor vehicle registration in India

Year	MTW*	Cars/Jeeps	Trucks	Buses	Others**	Total
1997	25,729 (69)***	4,672 (13)	2,343 (6)	484 (1.1)	4,104 (11)	37,332 (100)
2004	51,922 (71)	9,451 (13)	3,749 (5)	768 (1.3)	6,828 (09)	72,718 (100)
Growth/year (%)	10.6	10.6	6.9	6.8	7.5	10.0

Table 3 Road traffic fatalities in India

Year	Fatalities	Population (million)	Fatalities/million persons
1997	77,000	955	81
1998	79,900	971	82
1999	82,000	987	83
2000	78,900	1,002	79
2001	80,900	1,027	79
2002	84,059	1,051	80
2003	84,430	1,068	79
2004	91,376	1,086	84
2005	98,254	1,103	89
2006	105,725	1,120	94
2007	114,590	1,136	101

Number vehicle registered day to day

However, these numbers are probably overestimating as personal vehicle owners register their vehicles and pay the road tax once when they buy the vehicle and are not required to pay an annual tax. Because of this, a large number of vehicles remain on the official record even when they are not in use any more

B.Praveen kumar, K.Mahendrakan

The drowsiness is identified by the eye blink closure and blinking frequency through infrared sensor worn by driver by means of spectacles frame. The alcohol consumption is also verified during the starting process of the vehicle using alcohol detector. If the driver is drunk then the buzzer indicates and the vehicle doesn't allow the driver to start the vehicle.

VIII PROPOSED SYSTEM

Proposed system consists of Arduino uno which works as a brin of this project the program of actuating bumper and auto brake application if object is detected is feed into it. It has a double acting pneumatic actuator with a solenoid valve to control the direction of flow into the cylinder. A battery is used as a source for current supply to both motors and Arduino a prototype four-wheeler is constructed and all the test are conducted on it

1. **Components required**
   A. Frame 25*25*3 mm l plate or 25*25 square hollowed rod.
   B. Double acting pneumatic actuators 2-3 No.
   C. Solenoid valve for each actuator.
   D. Battery 12 V
   E. Arduino Uno
   F. Motor DC or Wiper for wheel
   G. Bumper fabricate
   H. If wiper motor is used chain and sprockets are required.
   I. If DC dummy shaft and motor drives for front wheels.
   J. Compressor for sure.
   K. Ultrasonic sensor or ir sensor.

Working

The sensor is fitted on top of the frame this sensor activates when any of the object confronts at its sight and at the same time pneumatic actuators are activated to apply brakes and to stroke the bumper forward. All the system is took care to work as per the requirement.

Specifications
1. Motor
Motor selection for wheels
   Given
   Diameter for wheel=170mm
   Weight of wheel with assembly is =6kg
   Torque required for one motor

Torque=force*radius of wheel
=6*9.81*85
=5003.1Nmm
=5 Nm

2. Frame

Material used –mild steel, square pipe
Area=1*1inch=25.4*25.4=645.16mm2
Length of link=20 inch=508 mm
Weight of project=15 kg= 15*9.81 =147.15 N

3. Ir sensor

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 colours
Active Low on object detection
3.3 to 5V operation

4. Arduino Uno
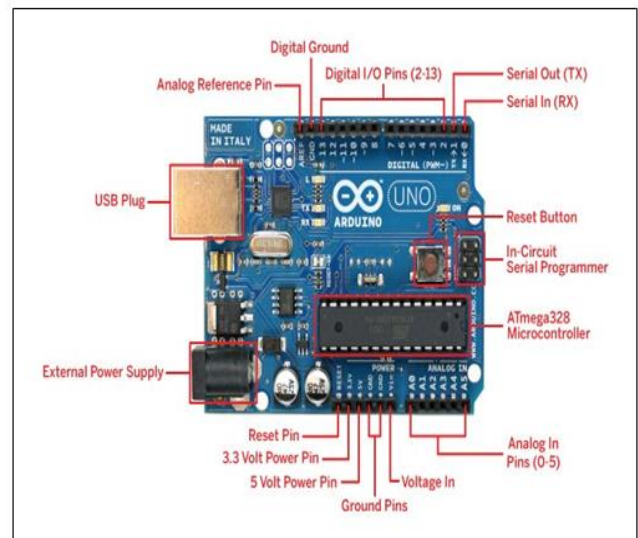
Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-9V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA

Flash Memory	32 KB (ATmega328) (0.5 KB used by boot loader)
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

IX CATIA
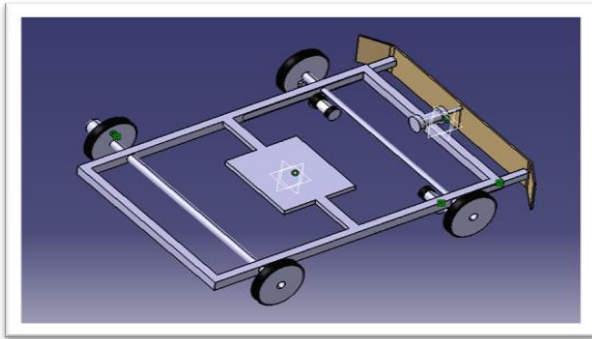
CATIA v5

Advantages

- Minimizes death rate by preventing road accidents
- Reduces critical damage of vehicle with the use Bumper system
- Installation of automatic braking system prevents accidents even if driver is out of visualization
- Fully Constructed & automated system
- Simple in design
- Use of modern technology focuses on future implementation of ideology.

Applications

Commonly braking & bumper system is used in most of the vehicles

- Trucks
- Lorry's
- Car's
- Auto rickshaw etc.

X COST ESTIMATION

- Pneumatic double acting actuator = 900= 3600
- 5/2 Solenoid valve= 945 *3= 2835 rs
- Structural steel = 70rs/kg = 15-20 kg = 1200- 1400
- Battery = 750 -1000 rs
- Fabrication = approx. = 3500- 4500 rs
- Transportation = 15000 -2000 rs
- Electronics components = 2000 rs
- Total = 15,835rs approx.

XI POSSIBLE OUTCOMES

- The main course of the project is to Design and fabricate the intelligent bumper & braking system to study whether the satisfactory model prepared by our team modulates the following reasons
- To conduct & study the experiment, to know whether the system applies brake if any obstacle passes through the driving vehicle.

- To conduct & study whether the system actuates the pneumatic double acting cylinder to stimulate even if accident occurs, by pushing the bumper system forward.
- To design & analyze bumper system to know how much force it can sustain to prevent damage from vehicle even after accidents (theoretical testing in ANSYS software).

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