

RETRACTABLE BARRIER SYSTEM FOR PREVENTING ACCIDENT UNDER THE WHEELS OF VEHICLE

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Abstract— Accident is giving painful causality to human life. Large number of accidents occurs due to heavy vehicle and there are least chance to survive person to live when accident happen on front wheel of heavy vehicle. Retractable barrier system gives protection to driver to avoid body injuries. The system will operate by sensors and spring and roller mechanism and protect human body drag into front wheels of human body. Its gives to chance to avoid major causalities happen in accidents.

Keywords: Infrared Sensors, Spring Mechanism

1. INTRODUCTION

In Daily life many people, follow to traffic and road safety. Many people die in road accidents. Traffic rules are to be followed by people themselves, but what can do to minimize the number of deaths that happen due to accidents from heavy vehicles. Some heavy vehicles have more ground clearance than usual vehicles and its give chance to drag small vehicles and chance to rolled front wheels on human body. That gives lifetime imparity to parts of human body and sometime chance to sudden death of human.

2. COMMERCIAL VEHICLE LAYOUT

As in these layouts of commercial truck notice that the gap between the fronts of bumper to the tire. We all know about Advanced driver-assistance systems, which is primarily focus on collision avoidance technology, lane departure warning etc. but especially in our India our commercial vehicles are not equipped with that level safety systems. This system provides braking to stop the vehicle but if opposite vehicle does not stop then It will collide in our vehicle and if its light motor vehicle or two-wheeler then serious injury to reduce injury if our Commercial vehicle were equipped with the retractable barrier system then not only less injury, but it stops the person from crushing under the tires

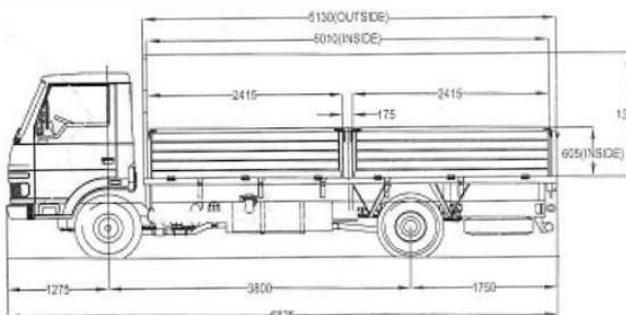


Figure Commercial vehicle layout

3. RETRACTABLE BARRIER SYSTEM

Retractable barrier system is attached to front side of heavy vehicles. System is working based on sensors, electronic circuit and spring and roller mechanism. System response plays very crucial role whenever incident happen.

Basic Layout of Retractable barrier system

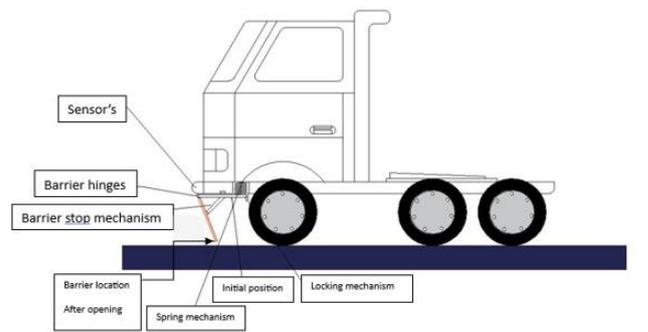


Figure Retractable barrier system layout

As seen in layout, this system attaches to chassis of front side of vehicle. It is completely closed condition by spring forces at initial stage. Barrier hinges provide to open mechanism and stay it at ground condition when its requirements. Sensors basically senses distance between front sides of vehicle and other opposite vehicle. There is Barrier stop mechanism which is drag on ground surface and protect human body to not dragging in front wheels of vehicle.

4. COMPONENTS OF SYSTEM

I. Infrared Sensors:

Infrared sensors basically work on IR radiation. IR transmitter omitted IR radiation that impact on object and received by IR Receiver within given range. Vehicle will be sensed by sensors at predefined range it generates signal for operating barrier mechanism.

II Barrier Hinge Mechanism:

Barrier Hinge mechanism consists by simple hinge which is supported by roller and spring. Whenever mechanism operated, Barrier comes down and drag on ground surface

hinge support to barrier to resist force by ground and take some position of barrier.

III Barrier stop pad:

Barrier Stop pad is cover both front wheel of vehicle. When Mechanism operated pad come down and slide and drag on ground surface. It is also giving protection to opposite driver side to not drag and crush down of body parts. It's closed in initial condition by spring forces and operated by rollers

IV Barrier locking mechanism.

Barrier locking mechanism consist of rollers, spring and latch locking. Rollers helps to easy access to sliding barrier and reduce friction to open barrier when its operated. Spring is compressed position when barrier in closed position in mechanism and its give spring back forces to barrier to open out quickly as sudden requirement. Latch lock is having wedge shape lock with easy operation done.

V Circuit for operating mechanism

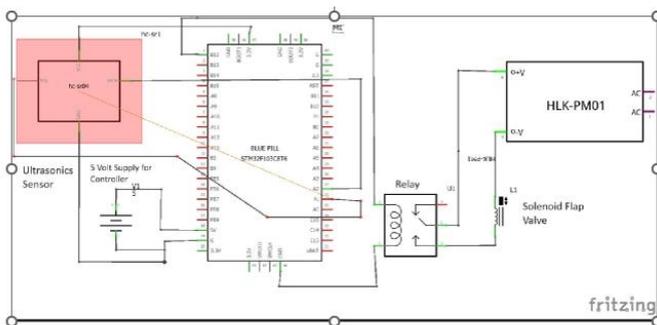


Figure Connection in circuit diagram

STM32 Microcontroller unit used to connect to all other components and processing all input and output signal to operate mechanism. Its inputs connect to sensors and output connect battery and solenoid flap valve with relay. When sensor is sense object at within range it generate signal which transmit to microcontroller. Microcontroller are processing signal and give other signal to solenoid flap valve to operate mechanism by using power of battery.

5. FUNCTION OF RETRACTABLE BARRIER SYSTEM

Sensors are sensing object within working range and generate signal and sent to microprocessor unit. Microprocessor unit processing on signal and generate output signal sent to solenoid flap valve and battery. Solenoid flap valve operates with use power from battery and flap in wedge section. This

wedge section is support to barrier in closed position. When Wedge section come in position barrier come down position due to spring forces. Barrier continuous slide down on ground surface and drag with vehicle motion. Barrier is covering the driver and its vehicle in front of wheels and protect human body parts from major causalities.

Simultaneously, a locking stick engages, firmly securing the plate fixer in its extended position, ensuring it remains deployed until the danger has passed. This locking mechanism maintains the protective shield in place until it's manually reset after use. Once the threat has been averted or the vehicle has moved clear of the obstruction, the plate fixer can be manually retracted to its initial position, either by the driver or an automated reset function.

This system operates as a proactive safety measure, utilizing sensors, a deployable plate fixer, spring mechanism, locking stick, and a manual reset mechanism to swiftly respond to potential collisions and protect vulnerable individuals or animals from being crushed by commercial vehicles.

6. EXPERIMENTATION ON MECHANISM

There are many trials and error face out to operate barrier mechanism. There is most problem facing that spring have greatest force than rollers, so barrier is not easily operated.

Different type spring gauge uses with different no latch locks used to operate mechanism smoothly. Higher value gauge spring use with latch lock is not useful to operate mechanism because spring force suppress over to others and latch lock does not work properly.

After some trial and errors combination of two different values gauge of spring and one latch lock give successfully result to operate barrier mechanism.

7. CONCLUSION

Retractable Barrier System, which will be useful for commercial vehicle industry where road safety is needed during transportation of goods. It Provide critical safety concerns by leveraging technology to prevent human and animal fatalities caused by collisions with commercial vehicles.