

A Hitech Low Cost Night Glow Scratch Resistant Low Power Boom Barrier System



Technology

KEYWORDS : : Boom Barrier, Safety, Access Control.

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ABSTRACT

Boom Barriers and associated technology is not new to any technical person or for a common man. But as they say "the biggest room in the world is room for improvement", there is a vast scope in redefining the product considering increasing demand and power issues. This paper proposes new technology for development of low weight, foam based, telescopic aluminium boom. The paper also proposes low power electro mechanical system developed with li-poly pocket sized 12 volt DC drive and worm gear design for controlling boom barrier system up to 4 - 6 meters. The paper also discusses about use of ultrasound sensor instead of conventional infra red line cutting technology for detecting obstacle.

Introduction

Boom Barriers and Road Security Blocks are two major accessories that are taken into consideration only when we meet a sudden accident or any environmental damage due to natural calamities or the absence of accident prevention security technique. Hiring a security personal instead of an Automatic Security Gate is a recursive cost along with main drawback of manual monitoring which is prone to errors. A human security personal can cause mistakes due to tiredness, ill health, carelessness and more. But an Access Control Security Automatic Boom Barrier never causes any mistakes or disorders relating with human disabilities.

The market provides range of Boom Barriers; some are designed with steel or even high quality wood with aesthetic touch. All though these system provide security and add to first impression for every visitor, these systems are costly. The more affordable Boom Barriers are made with Aluminum.

Literature Survey

There are various technologies for an automatic boom barrier.

1. Electro-mechanical system, which is widely used due to its reliability. This electro-mechanical device comes with 24V / 12 V DC drive unit which can run continuously without generating heat, so electro-mechanical boom barriers can be operated continuously and in an intensive duty cycle.
2. Electro – mechanical System; Operated with 230 v AC supply. The system uses bidirectional induction motor with relay or PLC control.
3. Pure Mechanical system. The barrier or gate control system are operated with gearbox and handle or lever.

Irrespective of various other options, most commonly used systems are electromechanical system operated with DC or AC supply. The main design issue is the gear box and power supply. All other features like remote control, RF tag readers, IR beam detectors, Cameras are part of electrical system.

To operate a Boom Barrier, any of the following technique can be used.

-  Push Button
-  Remote Control
-  RFID Tags / RFID Reader
-  Loop Detectors
-  Any third party access control device

The main areas where Boom Barriers are commonly installed are Level crossings, drawbridges, parking facilities, checkpoints and entrances to restricted areas or toll booths.

The proposed design

The proposed design can be divided in 3 parts.

1. The mechanical system
2. The electrical drive
3. Electronic accessories

1] The Mechanical System

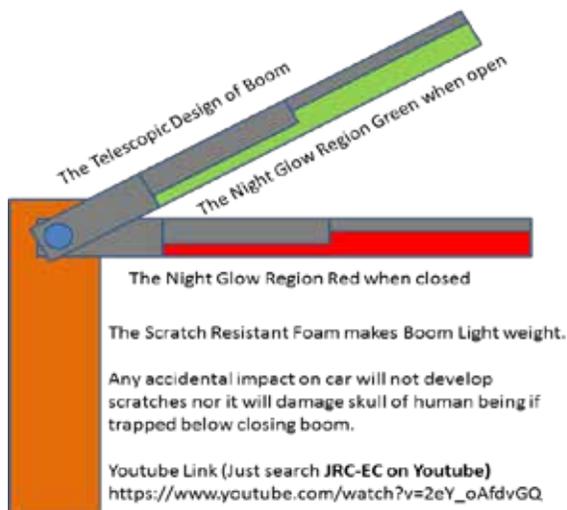
In our proposed design we are using simple worm and pinion gear. The 24 mm worm and pinion with 30 teeth is used to lift a cantilever load of 6 KG. The load is a specially designed Boom. This boom is outcome of our joint research.

We can also fit a conventional boom weighing up to 12 KG and bar length of 4 mtr.

A 60 RPM motor raises Boom to 90 deg vertical position in 3.5 seconds. And a DC motor of 120 RMP will just take 1.75 sec to lift the Boom.



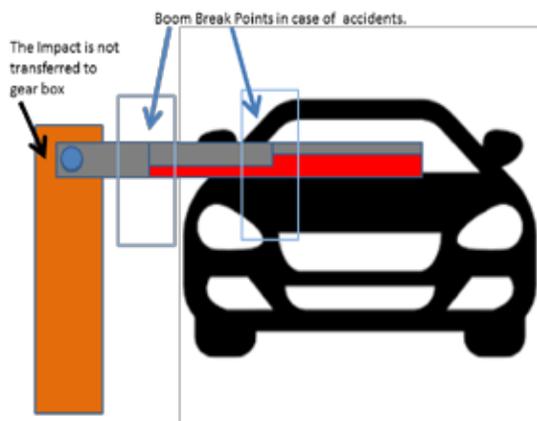
The low cost Night glow Telescopic Boom is another special feature of our system.



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Visit youtube url or type "JRC-EC" in search option of Youtube.

The telescopic design ensures that very low to almost zero impact is transferred to gear box and panel, in case of any vehicular collision. The telescopic bar brakes from the joint and the system is protected against any vehicular collision with Boom.



2] The electrical drive.

We have developed both types of electrical controls.

- a. 230 Volt bidirectional AC drive. This drive uses 0.5 HP 4 wire AC induction motor. This is interfaced with gearbox or worm and pinion mechanism using pulley drive.
- b. 12 Volt DC drive. This drive is directly coupled to worm and pinion mechanism.

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3] Electronic accessories

Both drive mechanism are directly controlled through bidirectional switches or through microcontroller systems.

Switch operated barriers come under manual operated category where as microcontroller operated system comes under smart system category.

We can integrate Bar Code Scanner, IR beam detector, RFID card readers, Ultra sound sensors and cameras with microcontroller based system.

Conclusion

The complete research of this project is concentrated around three important factors.

- 1. Making Boom Light weight and should add to aesthetic looks of the place.
- 2. The system should be low cost so that it can be implemented by everyone for safety purpose. Safety parameters and its importance is not only limited to rich section but it is equally necessary for every small industry, all residential premises, schools, colleges and hospitals.
- 3. The system should cause minimum or zero damage to vehicle and to system itself under the accidental impacts by vehicles.

REFERENCE

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