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# Design of Rocker Bogie with Gun Firing Control Mechanism

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**Abstract:** *The need to develop a highly stable suspension system capable of operating in multi terrains surface while keeping all the wheels in contact with the ground. The design has a mechanism that can transvers terrain where the left and right rockers individually climb different obstacle. In order to go an obstacles, the front wheels are forced against the obstacles by the rear wheels. The paper emphasizes and focuses about the “ Area under surveillance “ continuously at extreme conditions like very low temperature ,high attitude pressure, unique color, low power supply, long range distance coverage and manually controlled weapon system which insure the safety. In the modal, the device consist a cameras as a sensor for the purpose of monitoring the area under surveillance and sending images to the screen .If the area under surveillance is occupied by unknown person, then a camera capture the image and forward to the screen . This model continuously monitors the “Area under surveillance”. The motive of this project to build a ground surveillance rover with reliable mechanism for security and surveillance.*

**Keywords:** *Rocker bogie, Surveillance, Security.*

## I. INTRODUCTION

The rocker bogie system, which has specifically designed for space exploration vehicles have deep history embedded in its development. The term ‘rocker’ describes the rocking aspect of the larger links present each of the suspension system and balance the bogie as this rocker are connect to each other and vehicles chassis through a selectively modified differential. As accordance with the motion to maintain center of gravity of entire vehicle, when one rocker moves upward, the other goes down. The chassis plays vital role to maintain the average pitch angles of both rocker by allowing both rocker to moves as per the situation. As per the acute design, one end of a rocker is fitted with a drive wheel and the other end is pivoted to a bogie which provides required motion and degree of freedom.

When the building a robot you would like it to be as simple as possible. In most cases you would never need a suspension system but there were several instances when a suspension system cannot be avoided. The term “Bogie” refers to the links that have a drive wheel at each end .bogie were commonly used as load wheel in the tracks of army tank as idler distributing the load over the terrains. Bogie were also quite commonly used on the trailers of semi-trailer trucks. Both application now prefer trailing arm suspensions. The rocker bogie design has no springs or stub axles for each wheel, allowing the rover to climb over obstacles, such as rocks, as with any suspension system, the tilt stability is limited by the height of the center of gravity.

Secure border is one of the greater responsibilities of one’s nation which is done by the soldiers but still soldiers are human beings and they have limitations also which can cause a hole in security especially this happens in areas of high altitude pressure and low temperature. This system not only detects but also provides a video-coverage of the secret area. It is also provide with manually firing methods which must be used to locate and fire at the target .Hence, Hundreds of kilometer of the borders, which would have otherwise required hundreds of personnel, can be monitored with less effort in this system, with only a few personnel As thermal camera are used for viewing, this system is immune to changes in suitable conditions, and therefore, is equally suited for operation during the night.

This mechanism will be online with the server. The gun is continuously pointing in the direction of intruder further depending on range (distance from the gun) (fixed range in the proposed model) the gun can be activated and a laser pointer will be switched on depicting on shooting the target. The model proposed here prototype of rocker bogie with gun firing mechanism and gun control to eliminate and thread or any unwanted activity in border area.

## II. LITERATURE REVIEW

The concept of our research work is to create rocker bogie drive system based on those of NASA. NASA developed the rocker bogie suspension system for their rovers and was implemented in the Mars Pathfinder’s and Sojourner rover. The rocker bogie suspension system passively keeps all six wheels on the robots in contact with the ground even on uneven surfaces. This creates for great traction and maneuverability. The rocker bogie suspension system which was currently NASA’S approved design for wheeled mobile robots, mainly because it had capabilities to deal with obstacles and because it uniformly distributes the payload over its 6 wheels at all times. It also can be used for other purposes to operate in rough roads and to climb the steps. It was having lots of advantages but one of the major disadvantages is the rotation of the mechanism when and where is required. The

rotation can be possible by providing individual motors to individual wheels which causes arises in cost and complicity in design. Here an attempts was made to modify the existing design by incorporating a gear type steering mechanism which will be operated by a single motor which simplifies the design as well as total cost and operating cost of the mechanism. In this research, our endeavor is to transfer these major advantages embedded with the rocker bogie system into conventional vehicles in order to remove discomfort and complexities present in conventional suspension system in general and suspension system of heavy vehicles in particular.

With the concept of rocker bogie, we wanted to create this complete model of rocker bogie with gun firing mechanism, in which we used two different ideas of gun system and rocker bogie mechanism. From ages it has been the idea of humans to achieve the ultimate in security and make his loved ones and loved things secure. The ideas and desire that prompted him to make the boundaries and secure them too from all unseen and unknown sources. Therefore, it has been always necessary to maintain a huge people to guard and invoke alarms in case of emergencies. To this, we suggest a mechanism observing the area under surveillance which employ image processing in which a camera will be continuously monitoring for observing the area.

### III. BLOCK DIAGRAMS

The system block diagrams have been described for the base station with remote control, the rocker bogie and the gun firing mechanism as shown in Figure 1, Figure 2.

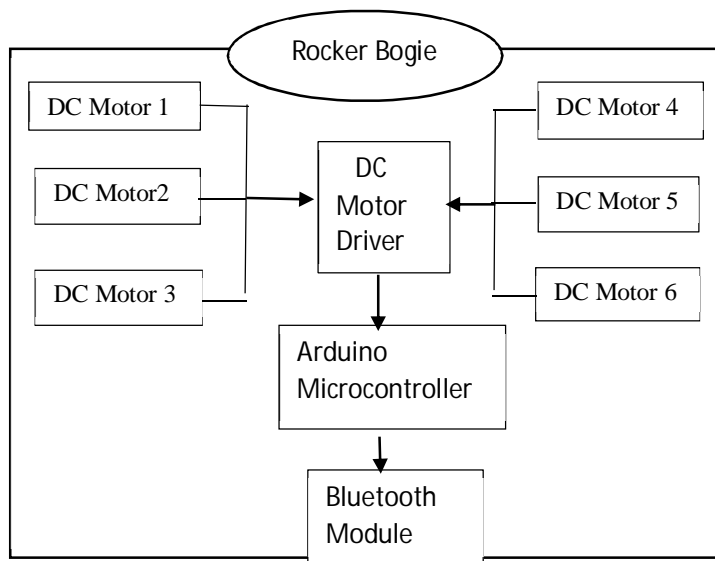


Fig.1: Block Diagram of Rocker Bogie

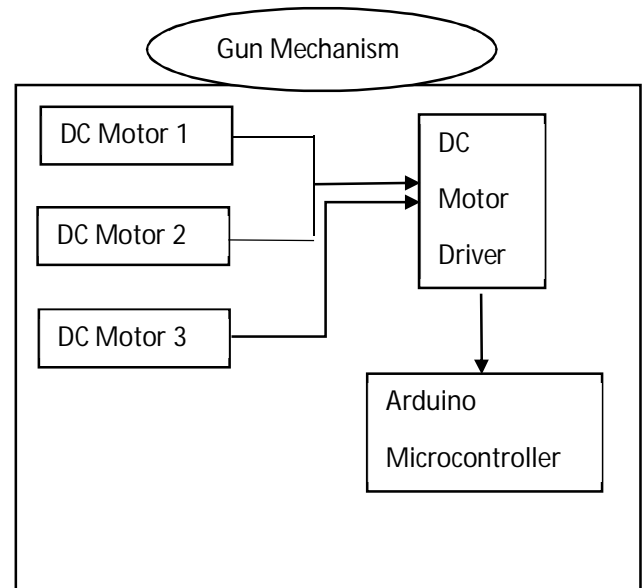


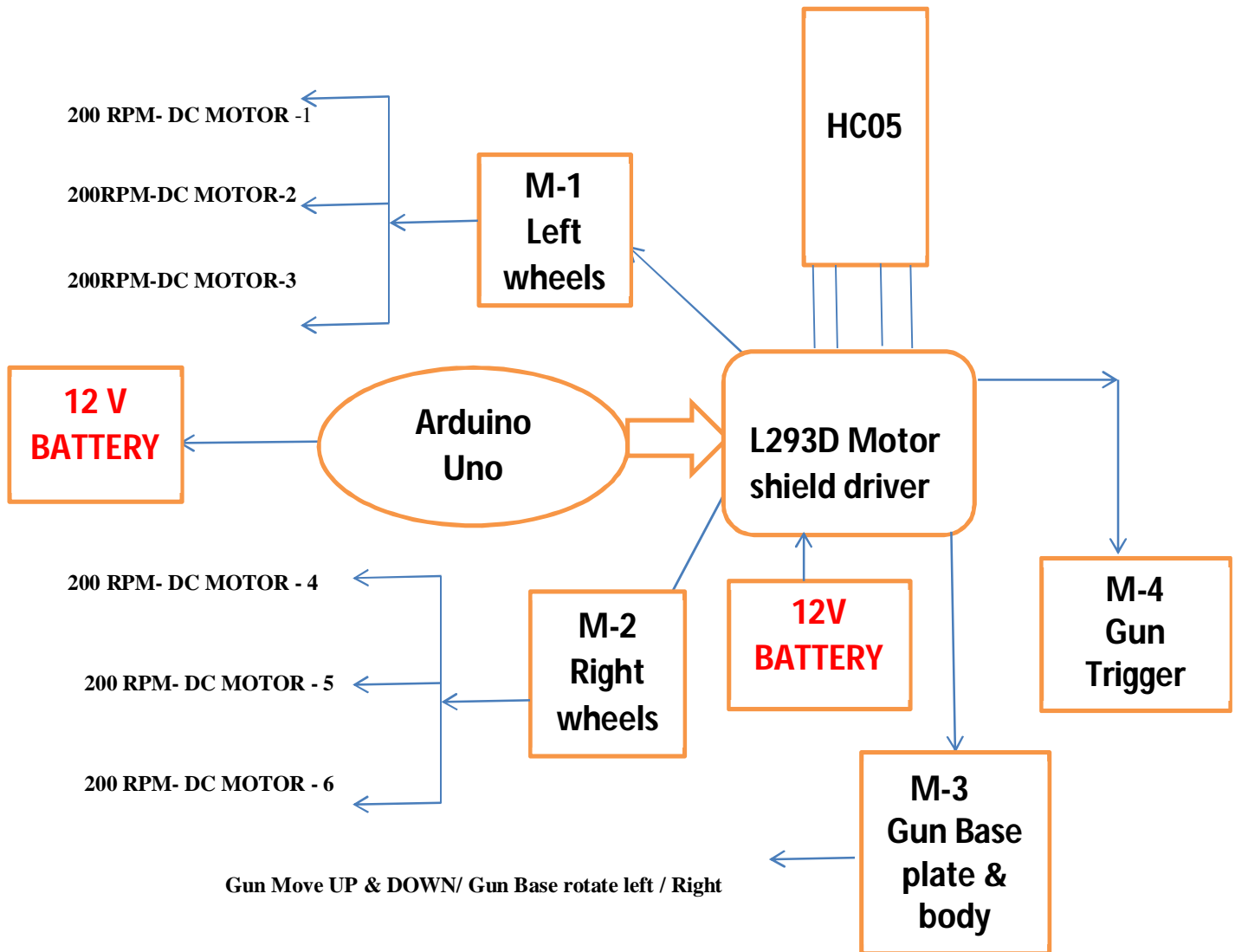
Fig.2: Block Diagram of gun firing mechanism

#### A. Description of Arduino Uno with L293d motor shield driver with HC05 Bluetooth module:

- 1) There are three main components to drive this project Arduino Uno kit, L293D Motor driver shield & HC05 Bluetooth module.
- 2) Other component Mobile software (MIT app inverter) and android smartphone.
- 3) DC motors 200 RPM.
- 4) 12 volt DC Battery.
- 5) Toy gun used as a prototype to show how to use.
- 6) Arduino Uno kit is connected with L293D Motor driver shield.
- 7) L293D is fitted on Arduino Uno kit in upper side.
- 8) HC05 Bluetooth module is connected on L293D Motor driver shield.
- 9) HC05 module Rx is connected to "0" pin of L293D driver and TX is connected to "1" pin of L293D driver.
- 10) HC05 module +5v is connected to servo1 (+VE) of L293D driver board and GND is connected to servo1 (-ve) L293D driver board.
- 11) Left side boggy motors is connected to M1 pin and right side boggy motors is connected to M2 pin.
- 12) M1 pin and M2 pin is in L293d motor driver shield.

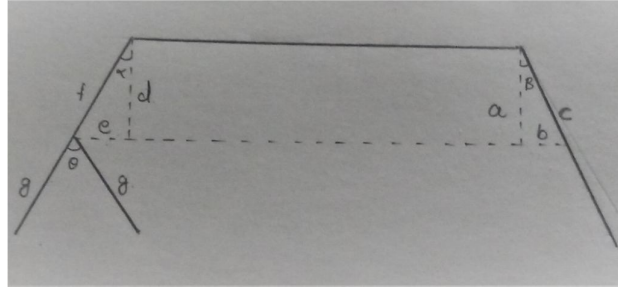
- 13) Base of toy gun and gun body (DC motor) is connected in M3 pin L293D driver.
- 14) Gun trigger (DC motor) is connected to M4 pin L293D driver.
- 15) Then create a program of Arduino Uno kit.
- 16) When program is done upload in Arduino Uno kit.
- 17) Before uploading program disconnect power supply of Arduino Uno kit.
- 18) Then upload program in Arduino Uno kit.
- 19) Finally connect 12 battery to Arduino Uno kit and given power supply to L293D driver board by 12V battery.
- 20) Connect android smartphone to HC05 Bluetooth module.
- 21) Run that projects.

*B. Complete Block Diagram of Arduino Uno*



*C. Rocker Bogie design*

For  $\theta = 90^\circ$ ,  $\alpha = 45^\circ$ , and  $\beta = 45^\circ$ . The length of side 'g' is equal.



#### IV. ROCKER BOGIE WITH WEAPON CONTROL SYSTEM

In the recent past, there has been a lot of interest in developing car gun control to perform a variety of challenging tasks ranging from military defense, surveillance, etc. with the rocker bogie can overcome the object like rock, equipment etc. these systems are not only used in civilian areas but also in military and naval ship application. This paper stresses on camera detection to observe the real object image. The camera describing the process of conversion of image to the phone screen.

In this research paper, it was emphasized that the recording taken by the camera will appear on the phone screen and the person who is controlling all the things from behind or who is controlling the gun system and the bogie should be alerted. The image or recording that will be taken by the camera from the area or surveillance area will be used as an input signal for the soldiers. The gun and camera rotate 360 degrees and the bogie and gun control according to the camera recordings and by remote control and by any soldier from military. This paper stresses on targeting the target in hidden areas where humans can't survive in that environment. The efficiency of targeting the target is greater in hidden areas with night vision. The recording of the camera is used as a proof for security or as evidence. Now day's fully automatic guns are also available so this can also be used in this project or prototype. The rocker bogie balances the gun firing system or targeting the target in uneven areas also.

#### V. OBJECTIVE

- A. To balance in uneven surfaces for targeting the target.
- B. To minimize manpower for security in surveillance area.
- C. To improve efficiency of operations.

#### VI. FUTURE SCOPE

- A. This project will be used for weather monitoring.
- B. This can also be used for surveillance purpose due to the presence of IR Camera.
- C. Rocker bogie can also be used in industries for carrying the goods from one floor to another floor and to detect the smoke in the industry.
- D. This project will be used for security purpose.

#### VII. CONCLUSION

This work shows how the project system works on different surfaces and in different conditions. By assuming accurate dimensions for climbing the obstacles, accurately dimensioned rocker can climb the obstacles with great stability. The design and manufactured model can climb the angle up to  $45^{\circ}$ . Also we tested for the camera with gun system mounted on rocker bogie system and satisfactory performance obtains during this test camera and gun system rotated around  $360^{\circ}$ . During climbing test for length 200mm (8inch) system can climb of normal stairs height. This paper is designed to save the boundaries at extreme conditions, where human intervention is very difficult and save the precious lives of our soldiers. In this mechanism, the gun will be continuously pointing the target or in the direction of the intruder. Also depending on the range (i.e. the distance from the gun) the gun can be activated and laser pointer shooting the targets. Concerned with the threats to the nation at the border with enemies in blasting the base camp, weapons, machinery and lot of warfare materials of high cost. This model is built in such a way that it is going to acquire the data by a high resolution camera and process, and then makes a firing. As per the proposed model, we have successfully studied the design of rocker bogie with gun firing control mechanism using Bluetooth & Arduino technology, which can climb the obstacles, rough surfaces and for security purpose in border or at surveillance areas.

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