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WIRELESS NETWORKS SUPPORTING UNMANNED GROUND VEHICLE

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ABSTRACT

The essential to advance a highly stable interruption system accomplished of functioning in multi exteriors while care all the wheels in contact with the ground. The design has a mechanism that can traverse terrains where the left and right rockers individually climb different obstacles. It is also done to sustain a tilt of over 500 without tipping over the sideways. In order to go over an obstacle, the front wheels are forced against the obstacle by rear wheels. The rotation of the front wheels then lifts the front of the vehicle up and over the obstacle. The rocker bogie suspension mechanism its currently favored design for wheeled mobile robots mainly because it has robust Capabilities to deal with obstacles and because it uniformly distributes the pay load over its 6 wheels at all time. Even though it has many advantages when dealing with obstacles, there is one major shortcoming which is its low average speed of operation making the rocker bogie system not suitable for situations where high speed travel over hard flat surfaces is needed to cover large areas in short periods of time, mainly due to stability problems. Our purpose is to increase the stability of the rocker bogie system by expanding its support polygon making it more stable and adaptable while moving at high speed but keeping its original robustness against obstacles

KEYWORDS: Rocker, Bogie, Suspension, Terrain and Rover, Networking, Vehicle.

1. INTRODUCTION

The need to develop a highly stable suspension system capable of operating in multi surfaces while keeping all the wheels in contact with the ground. The design has a mechanism that can traverse terrains where the left and right rockers individually climb different obstacles. It is also done to sustain a tilt of over 500 without tipping over the sideways. In order to go over an obstacle, the front wheels are forced against the obstacle by rear wheels.

The rotation of the front wheels then lifts the front of the vehicle up and over the obstacle. The rocker bogie suspension mechanism its currently favoured design for wheeled mobile robots mainly because it has robust Capabilities to deal with obstacles and because it uniformly distributes the pay load over its 6 wheels at all time. Even though it has many advantages when dealing with obstacles, there is one major shortcoming which is its low average sped of operation making the rocker bogie system not suitable for situations where high speed travel over hard flat surfaces is needed to cover large areas in short periods of time, mainly due to stability problems.

Our purpose is to increase the stability of the rocker bogie system by expanding its support polygon making it more stable and adaptable while moving at high speed but keeping its original robustness against obstacles.

PRESENT SITUATION OF ROCKER BOGIE SUSPENSION

The Rocker bogie suspension system design has become a proven mobility application known for its superior vehicle stability and obstacle climbing capability also stair climbing. In this system Rocker bogie is the suspension system which is used by bell crank mechanism. The research paper deals with the designing and modeling of stair climbing robot based on the well known rocker bogie mechanism. The concept of our research work is to create a rocker bogie drive system. We developed the rocker bogie suspension system for their rovers and was implemented in the Mars Pathfinders and Sojourner rover. The rocker bogie suspension system passively keeps all six wheels on the robot in contact with the ground even on uneven surfaces.

This creates for great traction and maneuverability. The rocker bogie suspension mechanism which was currently approved design for wheeled mobile robots, mainly because it had study or resilient 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

OBJECTIVES

There were three main objectives to our project:

- Build a test platform from inexpensive materials capable of accurately and repeatably testing different rover suspension systems.
- Design and build three different rover suspension systems each using the same motors and wheels.

Analyses results and refine our rover designs to find optimal geometric properties of the rover.

We initially proposed to build a test platform capable of accurately and repeatable testing the performance of three lunar rover suspension designs. We also intended to design and build three different suspension designs and subsequently test them.

We have refined our proposal to focus on optimizing the geometry of a singular suspension system mounted to a test track. Testing considered of comparing the speed and power consumption as related to distance as the rover travels over the test course of various geometry of the suspension. In addition to this test, we hoped to investigate further characteristics of our design such as the influence of extra mass, finding an optimal torque for the motors, or possibly even intelligent control of each individual motors current. Unfortunately, this was not completed due to the time of consideration.

2. MATERIALS AND METHODS

In 3D PC designs, 3D displaying is the way toward building up a scientific portrayal of any surface of a protest in three measurements by means of particular programming. The item is known as 3D demonstrate. Somebody who works with 3D models might be alluded to as a 3D craftsman. It can be shown as a two-dimensional picture through a procedure called 3D rendering or utilised as a part of a PC re-enactment of physical marvels. The model can likewise be physically made utilizing 3D printing gadgets. Models might be made consequently or physically. The manual displaying procedure of getting ready geometric information for 3D PC designs is like plastic expressions, for example, chiselling. 3D displaying programming is a class of 3D PC illustrations programming used to create 3D models. Singular projects of this class are called displaying applications or modellers

3D MODELLING

Fig. 1: PVC pipe Assembled model

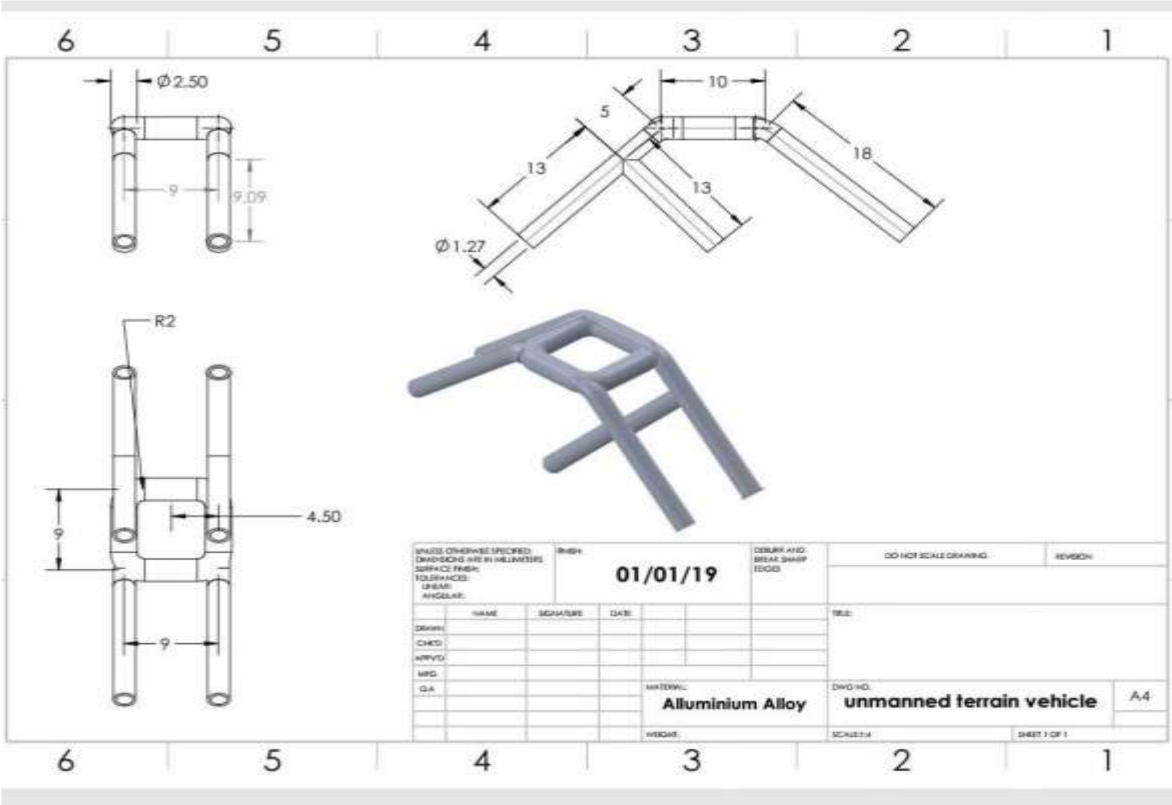

Fig. 2: Modelling In Solidworks 5.1 Calculation

Velocity of Wheel:

$$V=\frac{\pi DN}{60}$$

Here V=Velocity of wheel in m/s; D=Diameter of wheel in m; N=Speed in r.p.m

We know that

D=125 mm

N=45 r.p.m

$$V=\frac{\pi(125)(45)}{60}$$

$$= 294.52 \text{ mm/s}$$

$$= 0.294 \text{ m/s}$$

Calculation of angle climbing

Calculation of angle climbing

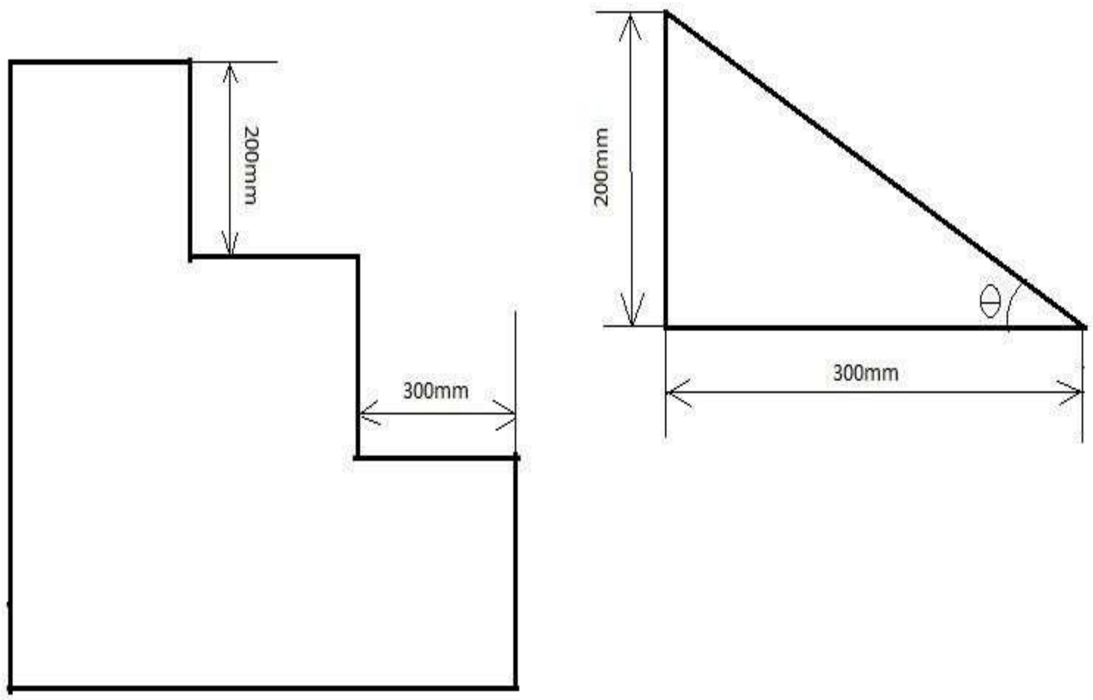

Fig. 3: Centre stage stairs

$\tan\theta = \frac{y}{x}$

$\Theta=\tan^{-1}\frac{y}{x}$

$\Theta=\tan^{-1}(\frac{20}{30})$

$\Theta=33.69^{0}$

PERFORMANCE AT DIFFERENT CONDITIONS

As per the ground level experimentation by rocker bogie manufactured; tested found that the performance satisfactory below are the results are as shown in figures below

Fig. 4: Rocker bogie at uneven surface

Fig. 5: rocker bogie climbing stairs

Fig. 6: Rocker bogie at inclined surface

3. CONCLUSION

This work shows how rocker bogie system works on different surfaces. As per the different weight acting on link determines torque applied on it. By assuming accurate stair dimensions, accurately dimensioned rocker bogie can climb the stair with great stability. The design and manufactured model can climb the angle up to 45 degrees. Also we tested for the Web Cam with AV recording mounted on rocker bogie system and found satisfactory performance obtains during this test camera has rotated around 360°. During stair climbing test for length less than 375 mm (15 inch) system cannot climb the stair. It can be possible to develop new models of rocker bogie which can climb the stairs having low lengths.

3.1 FUTURE SCOPE OF WORK

From the beginning, this project was intended to be an empirical and experimental approach to testing the rocker bogies geometry based energy consumption and not to rely too heavily on analytical methods to make predictions of performance. If desired, this could be done in future work. That is, we could derive the analytical representation of our experiment and corroborate these projects results with the calculated results. This would further validate the recommendations of this report. The projects slight aversion to an analytical approach is for main reasons. Firstly, the mathematics required to model such a multi linkage coupled device is at least at a graduate level and has only been done by one group we could find thus it would not be entirely reliable for us to base derivation off of their approach. Secondly, during previous lab and project courses we found that unless you completely isolate one variable in a very control way, the analytical expectation can be quite different from the experimental results. Instead, by just doing the experiment as control as possible and measuring the final outcome we do not have to consider the effect of, for example, the coefficient of fiction between sand – paper treaded wheels and a carpet underlay.

By doing this project empirically we are able to avoid all of the complicated contributing factors, and instead focus on a few main geometric parameters and their overall influence on the consumption of energy of our rover.

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