

Designing of Self-Balancing Hover Board Using DC Series Motor

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Abstract: The self-balancing board called Hover board is a personal transporter consisting of two motorized wheels connected to a pair of articulated pads on which the rider places their feet. This will reduce pollution from vehicles and make transportation much more easy and fun. This will also reduce the amount of vehicles sold and also fuel used. The rider controls the speed by leaning forwards or backwards. It is compact in size, less weight and maintenance free.

IndexTerms - Hover board, DC Series Motor performance.

I. INTRODUCTION

A Hover board is almost same as skateboard but it makes use of two motorized wheels instead of being depending only on the mainstream wheel. The Hover boards are also known as self-balancing scooters that work with the help of rechargeable batteries. There are so many big brands that are manufacturing Hover boards but while buying a new product, buyers need to compare few features to choose the best. Below we have highlighted 5 essential features to choose Hover boards in the competitive market

Type of Hover board

There are generally two major types of Hover boards:

1. Air Wheel
2. Board

Both are operated with similar technology but their appearance and type of control make them different from each other. The Board is same as a skateboard but it is ridden in horizontal motion with wheels on each side and hinge in the middle. The Air Wheels are difficult to use as they are same as unicycles that are found in a circus.

Wheel Size

Wheel size of Hover board is essential as it has a direct connection with stability on different surfaces. The general size of Hover boards uses to be somewhere around 6.5 to 7 inches; whereas the larger ones can be around 8-10 inches. The Air Wheels on the other side have bigger wheels that can be 11 to 14 inches and they provide better control on uneven grounds.

Hoverboard4sale.com carry 2 main sizes of Wheels, 6.5" and 8.5", with 6.5" wheel size, you can find a LED wheel, and regular.

Maximum Weight and Duration

Weight carrying capacity of a Hover board is also one of the essential features to be considered while making a purchase. In general, they can carry 150 -250 lb eight at max, but children can use the Hover boards with lesser weight capacity as well.

Most of the Hove board on the market runs about 1-3 hours, but it depends on road condition and rider's weight.

Quality

How can we forget to discuss this important factor when we have to buy Hover board as a gift? There is no point in compromising quality over price. The best Hover boards make use of standards and they come with user manuals. One thing you should pay attention is the UL2272 label.

Every Hover board you purchase on our website come with 30 days hassle free return. And 1 year limited warranty. If you ever run into a problem or concern, please feel free to contact our customer support team, or chat with us online.

Speed and Climbing feature

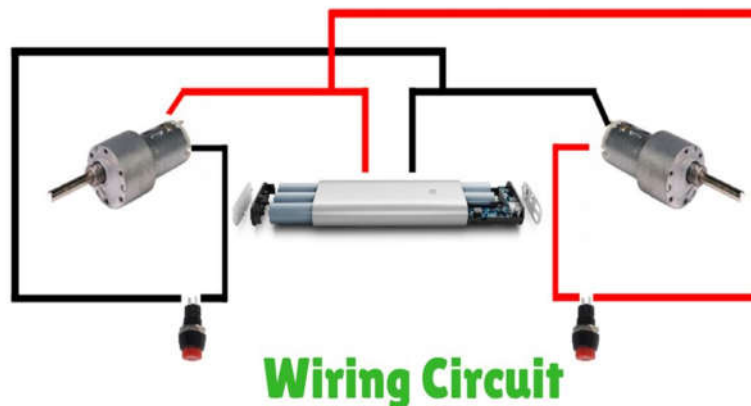
Best speed of Hover boards can range somewhere between 2 and 10 miles/hour. However, the speed also depends upon battery power of your Hover board. Also, in case if an overweight person tries to ride a Hover board, the speed will again slow down.

Also, some people like to use these trendy toys to function as a skateboard. All-terrain type is what we recommend, check out this off-road series.

A Number of tips for using Hover board correctly:

1. It is important to calibrate your Hover board before using it.
2. Prefer to wear helmet and knee pads while riding your Hover board.
3. Step properly and maintain balance.
4. While riding your Hover board, look straight.

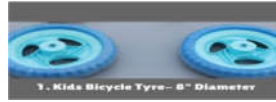
II.BLOCK DIAGRAM & COMPONENTS



The wiring has consists three main parts. They are motors, battery and push buttons. The motor has two terminals one end connected to one end of the battery and the other connected through push button. And the same way other end is connected. When we press push button it forms a closed path, then the motors will starts rotating .We don't press the button it will not rotate He wheels of the hover board house the electric motors themselves. They also contain a tilt and speed sensor. This detects the rpm (revolutions per minute) of the individual wheel, and sends it to the gyroscope and speed control boards, located inside the main body, right next to the wheels.

COMPONENTS AND ITS DESCRIPTION

- 60 rpm DC Motor (12V) - 2 NOS
- Battery-12V
- Tyre of Bicycle (Diameter = 8") - 2 NOS
- Castor Rotating Wheel (2" Diameter) - 2 NOS
- Push Switch- 2 NOS
- Wooden Ply 15 mm thick
- Connector
- Wood Glue
- Screws and Nuts
- Clamps
- PVC Pipe. (All are 1" Diameter)
 - "T" Pipe - 4 NOS
 - Elbow Pipe (90 Degree) - 4 NOS
 - Straight Pipe- 9 NOS



III.DC MOTORS

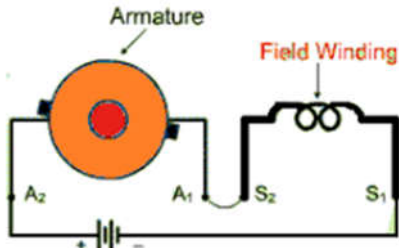
A **DC motor** is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC Motors possible in many applications.

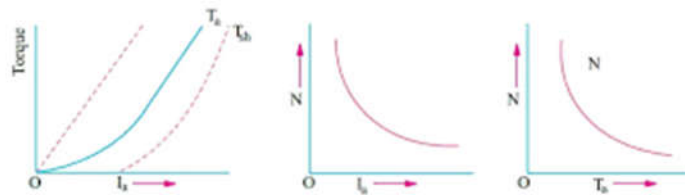
A series DC motor connects the armature and field windings in series with a common D.C. power source. The motor speed varies as a non-linear function of load torque and armature

current; current is common to both the stator and rotor yielding current squared behaviour. A series motor has very high starting torque and is commonly used for starting high inertia loads, such as trains, elevators or hoists. This speed/torque characteristic is useful in applications such as dragline excavators, where the digging tool moves rapidly when unloaded but slowly when carrying a heavy load.

A series motor should never be started at no load. With no mechanical load on the series motor, the current is low, the counter-Electro motive force produced by the field winding is weak, and so the armature must turn faster to produce sufficient counter-EMF to balance the supply voltage. The motor can be damaged by over speed. This is called a runaway condition.



Field winding with thicker diameter & fewer turns.



Characteristics of DC Series Motor

IV.METHODOLOGY

The concept involved two separate motorized devices, one for each foot. The Motors of Hover Board is Powered By a 12V DC Battery. The Motors Used in Hover Board are High Torque DC Motors. The Wheels of the Hover Board house the electric motors themselves. It Has two push switches at each end. If left switch is pushed on that then left side motor will be on and the left wheel will rotate so we can move in right side. If right switch is pushed on that then right side motor will be on and the right wheel will rotate so we can move in left side. These two switches are generally used for turning the Hover board either left or Right. If both the switches are pushed on at a time then both the motor rotates and the Hover Board moves Forward.

V.RESULT





VI. REFERENCES

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