International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 10 Issue 6 ǁ 2022 ǁ PP. 1074-1076

Electric Hoverboard with Handle

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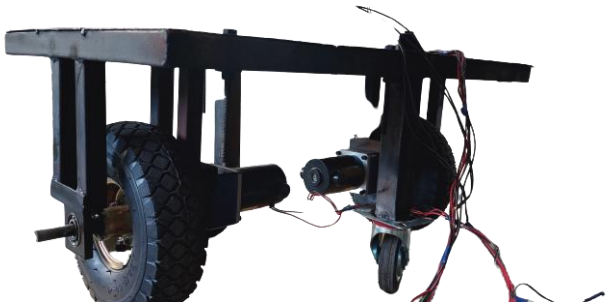
Abstract:
A hoverboard is a self-balancing personal transporter consisting of two motorized wheels with a typical gyroscopic-stabilized system. Emissions from internal combustion vehicles are on the rise every day. Urban vehicular traffic has increased tremendously over the years. Traffic congestion leads to higher vehicle emissions and lower ambient air quality. There can be no immediate solution to this issue, but another solution for conventional personal transport is Hoverboard. So the hoverboards are becoming more popular day by day. But the complex electronics like accelerometer and gyroscope make it too expensive. This project involves the design, analysis, and fabrication of an electric three-wheeled hovercraft. The system moves back and forth using the DPDT switch. A small wheel is used to balance the vehicle such that a gyroscope is not needed for balancing purposes. This project work aims to build a low-cost and efficient Hoverboard.
Keywords: *Self-balancing, DPDT Switch, low cost,*

Date of Submission: 05-06-2022 Date of acceptance: 20-06-2022

I. Introduction:

Hoverboards are two-wheeled, electric, portable devices that are also commonly known as self-balancing scooters. Originally, the term hoverboard referred to a levitating device made popular by 1980's film culture. Not quite the stuff of Back to the Future, hoverboards, as they have come to be known, are the latest craze in self-propelled mobility. Typically, these devices function like powered skateboards and consist of a platform for the rider, situated between two wheels and powered by large lithium-ion batteries.



The main purpose was to design and construct a fully functional two wheeled balancing vehicle which can be used as a means of transportation for a single person. It should be driven by natural movements; forward and backwards motion should be achieved by leaning forwards and backwards. Turning should be achieved by tilting the handlebar sideways. To provide untethered operation the vehicles' energy source was designed to be a battery. One of the goals was to implement easy recharging of this battery.

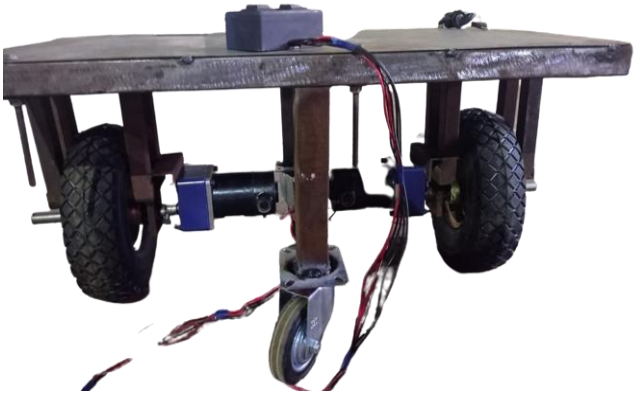
II. Methodology

The Direct Current (DC) 48 volt motor for its higher efficiency and reliability, smaller and lighter, better speed versus torque characteristics, longer life . The motor is inbuilt with a regenerative braking system and a hall sensor. The hall sensor is used to measure the speed of the vehicle. The regenerative braking system used for braking and regenerating the power wasted while braking.

The controller is used to control and monitor the whole system. It will govern the battery charging and discharging, acceleration, braking, etc., of the vehicle. The controller chose had the following processor 24

Volts . It had the following parts Main control chip, Power supply, Input of hall signal, Governor, Circuit of driving motor. Current detection, Brake circuit, helping function, checking of voltage supply.

Design of Electric Hoverboard With Handle

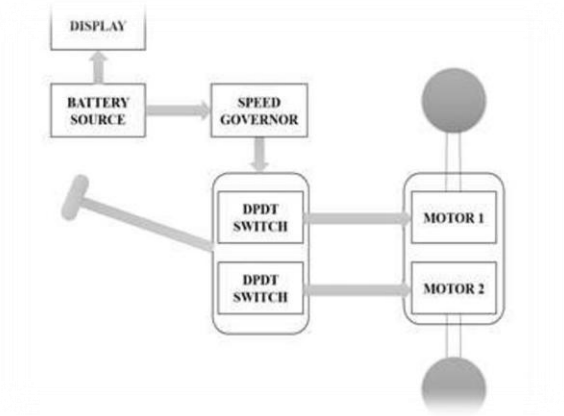


Literature Summary

- The available methods for personal mobility were learned such as Kick scooter, Segway, Hover boards, Stand on scooters, Unicycle. There are rules and regulation for them followed in other countries.
- Currently the biggest disadvantage of EMCs is their higher price. Higher price could be compensated by lower operational costs.
- The Socio technical transition proves that the people are changing towards electric personal transporters.
- Many factors like the Demographic data, Health status, Mobility habits, Attitudes about Mobility scooters, Life quality were studied. Nearly 88% people were found normal with the Mobility scooters.
- The feasibility of implementing it in the market were analyzed.

PURPOSE OF STUDY:

The main purpose was to design and construct a fully functional two wheeled balancing vehicle which can be used as a means of transportation for a single person. It should be driven by natural movements; forward and backwards motion should be achieved by leaning forwards and backwards. Turning should be achieved by tilting the handlebar sideways. To provide untethered operation the vehicles' energy source was designed to be a battery. One of the goals was to implement easy recharging of this battery.



Component used

Table 1: Component used

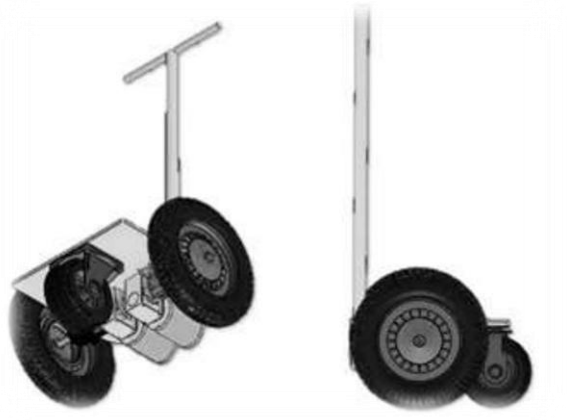
Componets	Specifications	Quantity	Cost
Steel rod	9ft /16 gauge /340	1	3000/-
Tyre	4.10/3.50-4 30psi	2	3500/-
Metal sheet	4/3	1	1200-/-

Motor	Model : DC motor 12v 60 watt	2	12000/-
Controller	DC motor controller with male/female cable	1	1800/-
Convertor	Model : 6v/12v/24v	1	1500/-
Controller kit	Set	1	2500-/-

Total – 25,500

HOVERBOARD DESIGN AND WORKING

The three-wheeled hoverboard is designed based on the fundamentals of machine design. After carrying out the required machining operations, the motors, bearings, drive wheels, swivel wheel, and springs are mounted onto the footplate. Then after mounting the components under the footplate, the handle is fixed on top of the footplate. Two DPDT switches are placed in the handle to control the direction of the hoverboard, and a speed governor is placed in the handle to adjust the speed of the motor. A display is added to the handle to check the battery level. After making the circuit wiring and connecting the electronics, the assembly of the segway is shown in the figure.



All the switches and the controls of the motors which kept at the handle to operate are connected with wires. The wheel motors have two different switches for each wheel so that for turning of each motor is controlled. When both the switches are pressed forward the segway will move forward. If the rider wants to turn left the right wheel motor switch will be used to turn towards the left. If the rider wants to turn right the left wheel motor switch will be used to turn towards the right. The speed governor will help to control the speed of the hoverboard**.**

III. CONCLUSION

Personal electric vehicles are technically possible now. The price of a personal electric vehicle that is available on the market is very higher for its range, it uses cutting-edge technologies which has increased the price. In this project, fabrication methods are changed. For balancing purposes a gyroscope sensor is used in the hoverboards available on the market, but in this project, a support wheel is used to balance the vehicle. The charging time is higher in this project because a strong battery is preferable to lower the cost. Thus, the feasibility of a personal electric vehicle depends on reducing the cost and making it available for every person and in every place.

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