

DESIGN AND FABRICATION OF FAIL-SAFE SEGWAY PERSONAL TRANSPORTER

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Abstract: *The main aim of this paper is design and fabrication of fail-safe Segway human transporter (HT). This Segway having a two wheeled self- balancing vehicle, this segway is used for a single human persons for the transportation. This Segway is an intelligent two wheeled vehicle and Segway is eco-friendly type of transportation which causes no pollution within the college campus. . Segway use only on flat position, this segway having the supporting wheels. Segway is a stand-up transportation vehicle, This Segway is mainly rechargeable batteries that batteries are converts the electrical energy into the mechanical energy. Segway is a simple drive mechanism. Segway increases the goods transportation and public transportation. The main purpose of this Segway is to aware the people about segway transportation and useful vehicle.*

Keywords: *Segway, no pollution, personal transporter, fabrication, more safety, self -balancing.*

1. INTRODUCTION

Segway was introduced in the year 2001 by Dean Kamen. Segway vehicle is a one type of transportation stand-up vehicle ,it is the one type of the vehicle. The segway is a great creative innovation and this segway is also a environment friendly. Dean Kamen introduce self –balancing human transporter segway. The main concept of this project is to design and fabrication of the fail-safe Segway personal transporter , DC motor in the Segway helps as control the speed and avoid ,to reduce the small accidents in transportation . The main concept of this project work is to design and fabrication a functional two wheeled self-balancing vehicle it can be used as a transportation for the single human person. In this project for more safety extra wheels are added. It is two wheeled and self-balancing and battery powered electronic vehicle, this segway maintains own and self balancing that of its passenger. This Segway is making with a stationary T-Shaped and speed control shaft fixed into a platform fitted on the two parallel wheels. This segway device does not have brakes and accelerator, but handgrip is used for making turns in segway.

2. EXISTED SEGWAY MODEL

This Segway mainly having two wheels, frame, battery, motor .this Segway is carrying capacity is 60 to 70 kg. This Segway is manually operated. This Segway not having braking system.Base plate is made with iron due to high strength. In this segway power is transfer between the wheels and the motor for movement and motion. This Segway is Dc motor fitted on the rod and batteries are mounted on the base frame plate. The main problem in this Segway is ,balancing is less and safety is less and does not have breaking system.



Fig 1.Existed Segway model

3. DESIGN AND PRO-E MODEL

Segway model is developed by PRO-E software. Pro/ENGINEER is 3D CAD/CAE feature based solid model software. It is one of the applications to providing the assembly modeling, solid modeling, any Orthographic 2D views, finite element method analysis, parametric and the direct modelings. This Segway developed in PRO-E by using creo 3.0 version. In this Segway PRO-E software mainly Extrude, Revolve, Sweep, Helical Sweep, Hole, Round are used. Assembling of the Segway model as shown in Fig 2.

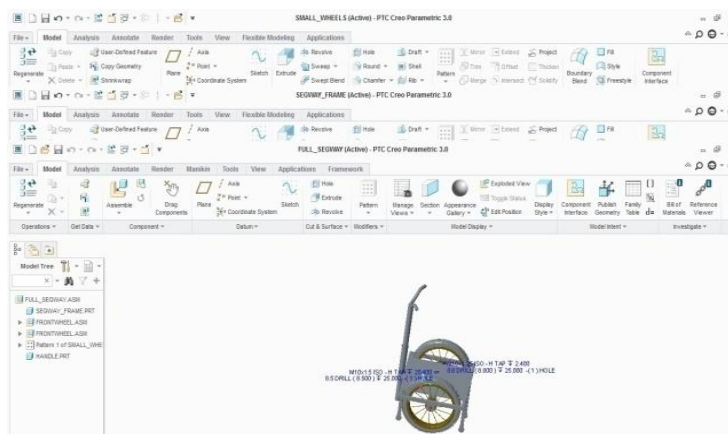


Fig 2. Segway model

segway design model main parts are the base frame, wheels, handles and small wheels. Assembling of the all components by using Pro-E software. Solid model of the segway as shown in the above figure. Pro-E software gives 3D model clearly and this software is required the less time for assembling and easy to assembly the different individual parts.

4. MODIFIED SEGWAY MODEL

Modified Segway model is shown in Fig 3. It contains base plate, wheels, handles, Dc motor and the batteries. Dc motor is fitted on the base frame plate and batteries are also fitted on the base frame plate. This Segway is making with a T-shape control shaft fitted into a base frame fit on the parallel two wheels. This device is not having brakes and accelerator, but it is a handgrip for making different turns in segway. It is the only vehicle able to turn in different places just like a human person, because its wheels are turns in different directions. This Segway is faster than the human walkers more than three times. Segway emphasis creating light weight and low cost system. Their low costs make them affordable and light weight make them portable in anywhere. The drive mechanism is main important part of the any automobile. In this segway charged to the drive motor for drive mechanism includes one DC motor, two rechargeable batteries. In this segway one type of drive is wheel drive and In segway two wheels are working as a driving wheels. Segway power is transfer from the motors to the wheels independently and separately.



Fig 3. Modified Segway model

Segway is developed by the PRO-E software. In this modified Segway model extra wheels are added for more supporting and two handles are used. This Segway carrying capacity 120 to 140 kg. This Segway operated by manually no skilled persons are required and this Segway used in rough and smooth surfaces.

4.1 FRAME

In Segway frame is the most important part. The detailed view of the frame of modified Segway model is shown in Fig 3. The Segway wheels as shown in this base frame. Dc motor is fitted on the base frame plate.



Fig 4. Frame of the modified Segway model

The frame is most important component of the segway. The top part of the frame holds the handle and throttle. The frame also have a set of small wheels that will be placed at the front end of the segway and the back end of the segway it uses the avoid the bend and for more balancing, avoid the small accidents, this small wheels are added to the segway increases the safety. On the top and upper side of segway the frame steel pipe is added to provide the platform for standing on the frame.

4.2 DC MOTOR

In Segway Dc motor is one of the important component. In this Segway type of Dc “shunt motor “is used and DC motors works the input of the type of brushless Dc motor is current by voltage and DC motor output is torque. In Dc motor Shunt motor is one type, it is a constant speed motor and the speed is almost constant and from the no load to the full load. Loads are driven at a number of speeds and the any one of the constant Brushless Dc motors. Brushless Dc motors are different uses they are reliable is more, efficient is more, and noisy is less. The recent times many vehicles uses the type of brushless Dc motors. Brushless Dc motors are used in most of the present modern devices. Brushless Dc motor efficiency is 85-90%. Brushless DC motors are suitable for the different applications high speed, another application of the DC motor is control and better speed



Fig 5. 24V Dc motor

Brushless 24V Dc motor is used for speed controller and the advantage of brushless motor is efficiency is high.. Brushless motors are correct and exact perfect motors for the applications of running the vehicles at the high speed like brushless blowers and power tools. 24V Dc motor is used for power supply. Dc motor is fitted on the frame as shown in Fig 3. Dc motor brushless motor capacity is 24V. Two batteries 12V batteries are used in this segway.

4.3 THROTTLE

The function of Throttle is controls the speed. It is commonly maintain in a motor cycle's for gripping to control the throttle , but it is sometimes acts as a bicycle gearshift. Throttle diagram is shown in fig 5.



Fig 6. Throttle

4.4 SPEED CONTROLER

Speed control is an electric circuit and speed control is change the speed of the electric motor, speed controller acts as a dynamic brake. These are frequently used on the vehicles controlled vehicles which are electrically powered, change the most frequently used for motors brushless motors are basically providing an electronically produced low voltage sources of energy for the motors in 3-phase electronic power . The electronic speed control system acts as a remote control and applications of the vehicles are in Electronic cars and Electronic bicycles. Speed controller as shown in Fig 6.



Fig 7. Speed controller

4.5 WHEELS

wheel is a circular component that is used for the rotation .wheels are one of the main parts of the segway for running the vehicles and Wheels allows the heavy object vehicles and to moved one place to another place easily movement of the vehicle transportation with supporting a load involving labours in vehicles and machines.



Fig 8. Wheels

In many different vehicles wheels are used. They are used for moving vehicles and transportation. In this Segway two wheels are used and another supporting wheels are added for more supporting purpose. Wheels are used in many different ways in different vehicles. Wheels as shown in Fig 7.

4.6 CHAIN DRIVE

Chain drive is mainly transmitting the mechanical power from the one place to another place. Chain drive is used as power transfer to the wheels of the vehicles, mainly in bicycles and motor cycles. Chain drive is also used in many different vehicles and many different machines.



Fig 10.chain drive

Transfer the power by a roller chain is known as the chain drive or the transmission chain. Chain drives mainly having the chain links like endless series that are mesh with the toothed sprockets. Chain toothed sprockets are locked to the shaft of the driven and the driver machinery. Chain drives are explains a form of a flexible gearing system. The chain drive acts as similar to endless gear rack and similarly sprockets acts as pinion gears. Chain drives provides a power transmission in the form of positive.

5. RESULT

The desired objective of Segway is more safety and low cost and no pollution self-balancing two wheeler has been obtained.

6. CONCLUSION

This segway project is Design and fabrication of the two wheeler fail-safe Segway is done. The attempt to change the existing design model Segway was successfully completed. This segway project was implemented with an idea to find an effective solution to Segway transportation problem. The main object of this segway is not having pollution within the college campus and easy to handle.

7. REFERENCES

1. http://en.wikipedia.org/Segway_PT , December,2014.
2. Reilly, R., and Andrlle, S. *Forces and Factors that Require Consideration of New Paradigms. In TCRB Report No. 55, TRB, Transit Cooperative Research Program, Washington, D.C. 1999, pp.4-17.*
3. Cervero, R. *Walk-and-Ride: Factors Influencing Pedestrian Access to Transit. Journal of Public Transportation, Volume 3, No. 4, 2001. pp. 1-25.*
4. Koopman, John, "Dashing new device for delivering mail Postal Service tries scooters on S.F.hills",Jul.16,2002. <http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2002/07/16/BA232425.DTL> Accessed Jul.24, 2002.
5. Meyer, Caroline, "Rolling right along. Scooter meets few obstacles but safety issues grow", Apr.25,2002.<http://www.washingtonpost.com/ac2/wpdyn?pagename=article&node=&contentId=A47006-2002Apr25> Accessed Jun.21, 2002.
6. Segway LLC, <http://www.segway.com> Accessed May. 29, 2002.
7. Moore, Bill, "EV World's first test drive of the Segway personal mobility machine", Jul. 24, 2002. <http://www.evworld.com/databases/storybuilder.cfm?storyid=358> Accessed Jul. 24, 2002.
8. RONGFANG (RACHEL) LIU and Rohini Parthasarathy "Segway Human Transporter (HT): Potential Opportunities and Challenges for Transportation Systems" Submitted to Transportation Research Record, November 2002.