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Research Article

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Fabrication of Four Wheel Segway with Handle

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Abstract Segway is the type of transportation product which can stand, balance and can move in the direction which we want. It is two wheel self balansing robot. Our objective is to prepare a Segway at low cost and high efficient and without using complex and electronics parts such as microcontroller, gyroscope. We aim at producing a fully operational Segway with a compact design which caters for shock absorption on rough terrains and includes an improved control system. This electric Segway, works on the principles of inverted pendulum, the rider will lean in the direction it wants the vehicle to move.

Keywords segway; inverted pendulum; accelerometer; gyroscope

Introduction

In this project, "Fabrication of Four Wheel Segway with Handle" robot has been built as a part of the course applied control and mechanical and electronics fusion. The goal of this project to everyone know about the Segway how is too manufactured or fabrication and how is the working system of the Segway and another one is the how is to ride and balance of the Segway robot. The project aimed at making a four wheeled and one small wheel balancing electric vehicle. A potentiometer and electric motors in the base of the device keep the vehicle right and left. By using switch and circuit board and electric supply go forward and go backward direction easily with the help of perfect balancing. The vehicle has electric motors powered by dry batteries. It balances with the help of small wheel there is no used of Microcontroller, gyroscope and any type of sensors. The rider accelerates or decelerates by using push up switch go forward and backwards in the direction he or she wishes to travel. Steering is providing by simply self-balance and operated two motors with the help of switches. Steering handle is providing speed indicator and also battery power indicator.

Also, Segway brings out four wheeled self-balancing robotic platform which is called Robotics Mobility Platform (RMP). Moreover, human scaled robots exist. Some of them are driven by an operator while rests are driven autonomously. As a transporter system, it is driven semi-autonomously by the driver on it. The driver determines the speed and direction of movement of the vehicle by leaning forward and backward. Most of the transporters are combined of standing base and handlebar which make the driver feel comfortable. Also, steering mechanism is generally mounted on the handlebar. However, the vehicle in only consists of a standing base. Steering is provided by shifting center of gravity (COG) of driver. The study discusses the system both as a transporter and as a robotic platform which carries goods.

Literature Review

The Segway PT (HT) is originally a two-wheeled, self balancing vehicle by Segway Inc. that was invented by Dean Kamen and released in 2001. HT is an abbreviation for "human transporter", while PT, a term that is used generally for small electric portable transport devices, stands for "personal transporter",. The rider can use Segway to travel across mid-range distances in urban areas. four wheel self balancing human carrier is based on the principle of Segway that knows when, where and how you want to move, by detecting the change in weight. To balance the vehicle, it controls the motors' speed and drives the wheels at just the right speed, hence the rider moves in the direction that it leans. The self-balancing two wheel human carrier is a pollution free, eco-friendly mode of transport, which is an intelligent vehicle that allows the rider to accelerate, brake and steer the vehicle using gyroscopic and accelerometer sensors to detect the motion of rider. We need to measure the angle to balance the vehicle, but the angle acquired by the sensors, the accelerometer as well as the gyroscope both built-in in the IMU (Inertial Measurement Unit) Digital Combo Board, have some level of noise in them. This problem can be solved by means of fusion techniques like the Kalman filter or the complementary filter, which allows an acceptable estimation based on noisy and biased measurements from different sensors like accelerometers and gyroscopes

Four-wheeled, self-balancing systems are studied in many different concepts. They can be considered as robotic platform or as electric vehicle/transporter. Researchers focus on various issues besides the main problem stability. Segway Human Transporter (HT), which is invented by Dean Kamen, is known as the first two-wheeled, self-balancing system in the literature. Flexibility, safety and performance are important due to being commercial product.

Principle Components

Segway chassis

Chassis is made up of aluminium section and four aluminium bars is used to make the frame. To make the chassis to balanced, four aluminium bars of equal weight are used. It is engaged firmly with the help of aluminium welding. Aluminium welding is used to connect all the bars. Wheels are attached to the middle of frame in order to withstand the load capacity. Handle is also made up of same aluminium material to which DPDT switch is fixed.

Figure 1: Segway Chassis

Motors

Motor is fixing with the chassis through screwed bolt and it is the main source of power with is to drive the vehicle. There are two motors, each for one wheel.

Each motor is driven by a separate 12v battery.

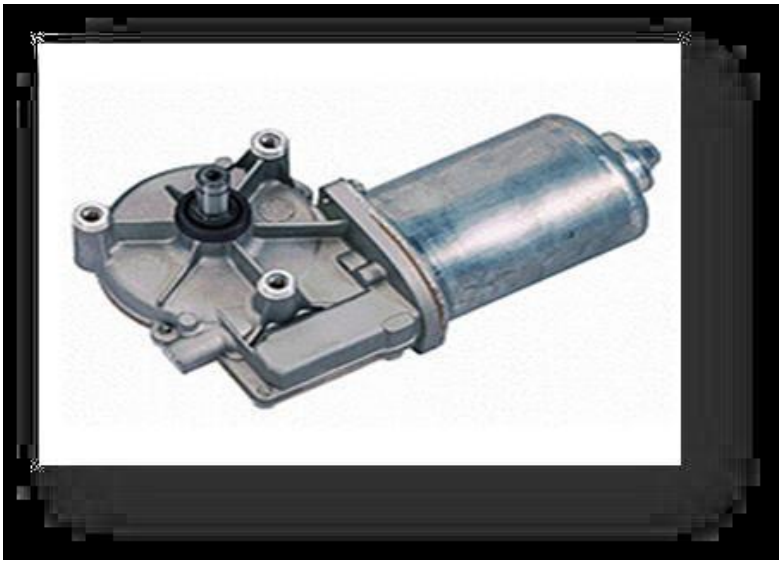

Figure 2: Motor used in project

Battery

Battery is a main power source. Two 12V DC batteries are used in Mechanical Segway. Each battery connected with each motor. Battery supplies power to each motor to run the wheels. Battery is rechargeable in both ways electric socket and solar plates.

Figure 3: Battery used in project

DPDT (Double Pole Double Throw) Switch

Double Pole Double Throw (DPDT) switch is used to guide for the direction of rotation of motor shaft, by operating the switch the direction of vehicle can be controlled. Connecting wires are used to connect switch with motor.

Figure 4: DPDT (Double Pole Double Throw) Switch

Figure 5: Fabricated Model of Segway

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Conclusion

The Aim of this project is to fabricate a four wheel safe segway with handle at low cost, this research is to design and fabricate a pollution free, electric self-balancing vehicle mechanical structure of Segway is successfully designed and implemented on a two wheel self-balancing vehicle and an intelligent control system is implemented.

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