

# ELECTRIC SCOOTER SEGWAY

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**Abstract** - In today's world, the infrastructure of College and Industries are becoming insanely large so if one has to travel or visit from one place to another he has to walk a long distance and sometimes it becomes very hasty and inconvenient. Sometimes after too much travelling on campus, it causes strain and pain in the body. So to travel these distances a two-wheeled electric scooter like Segway was introduced. But, these scooters are very costly as they start from ₹ 50,000. Another problem with that vehicle is that they are difficult to handle when we drive the first time. So in alternate to this product, we developed whole newly designed product and this is Reliable, Eco-friendly, a Compact vehicle to travel easily. Its utilities are college campus, Airports, Industries, Recreational Parks, Sanctuaries, Museums, Palaces, Villas etc. So our project is on design and fabrication of two-wheel vehicle and also its a multipurpose utility vehicle. The concept of the model taken from children's scooter bicycle. The complete body looks like a scooter bicycle in which platform is provided for standing and driving the electric powered scooter. This product is a battery powered and motor-driven vehicle. The scooter is intended to use in indoors areas as well as in outdoor areas, hence eradicating pollution like petrol engines.

**Key Words:** Battery, EV, Electric scooter, Electric bike, Lead acid, Lithium-ion, Electric Motor, Brushless DC, AC motor, DC motor.

## 1.0 INTRODUCTION:

### 1.1 Environmental Cause:

Today if any product is developed or about to develop, then the main concern for engineers is the consequences that the

product brings on the environment. But this is an obligation for automotive industry. Now people's awareness on environmental protection is getting higher and higher. Traditional fossil fuels are gradually withdrawing from people's lives. The use of electric energy is becoming more and more extensive. Motor-cycles are traditional fossil fuel vehicles. So thus, all the companies investing billions in the research and development for reducing carbon footprints, how-ever many companies have already released and some other companies about to release their electric vehicles in-to the market with-in few years.

### 1.2 Urbanization:

And the other problem that most of the cities globally facing is traffic congestions as population increasing rapidly. According to reports about 1.3 million people move in to cities every week, the world population expands by 83 million per year and by 2040, 65% population lives in cities. There is an increase in Metropolitan Cities which indirectly lead in increase in pollution. In whole, both pollution and traffic congestions, challenges the people living in urban areas.

### 1.3 Micro-Mobility:

As a solution to this, Micro-Mobility or lastmile transportation came in-to-existence with an idea of using electric bikes, electric kick scooters etc. Micro-Mobility is nothing but a transportation, if the travelling is less than 5 miles. On an average American's lost 97 hours in traffic its costs \$87B, that is Rs 106,431 per driver. This trend of micro-mobility has started almost all countries. But how ever only few countries using the electric kick scooters for micro-mobility. In U.S roughly 60% trips

are 5 Miles or less. In India roughly 66% trips are 5 Kilometer's or less.

#### 1.4 Sharing-System:

Sharing system is the main aspect in the micro-mobility, which involves sharing the vehicle when needed using the app provided. Many start-ups making billions using this idea and providing sharing service to the people in urban areas. The core of this graduation project is to design a new type of electric vehicle. It has a smaller size than a bicycle. More environmentally friendly than motorcycles.

#### 1.5 Purpose

So, the Micro-Mobility especially electric scooter changes the phase of the most polluted and populated cities and can bring comfortable, enjoyable life style in the urban areas. However, according to our view present electric kick scooters needs to be improved by customizing the design.

#### 1.6 Aim:

The thesis mainly designs a new type of electrical kick-scooter. Both the mechanical structure and electrical control system is different from the existed scooters in the market. And make targeted improvements. In this process, experimental data are collected and processed. Make the results in this thesis more accurate and reliable. Provide powerful data support for possible automated production. Make the products safe and reliable. Developing the electrical kick scooter with all the required features and also adding the other features like adjustable handle, foldable seat, enlarged deck width near the seat, optimized battery capacity, motor power etc.

#### 1.7 Method:

Initially we have made the list of top best-selling electrical kick-scooters from China, Europe, India. Then we have short-listed, chose best and optimized features, specifications for our product. However those are mandatory features, specifications but we have our unique features and specifications which puts our product apart from all.

## 2.0 DESIGN

### 2.1 The Mechanical Structure Of Electric Kick-Bike:

The shape design of the mechanical structure refers to the shape design of the four-wheel skateboard. The design of the main pedal is approximately elliptical. The design reference of the pedal size refers to the pedal size of MI electric bike of BTH laboratory. Under the central principle of pursuing the most comfortable driving experience, try our best to reduce the pedal area. Save manufacturing materials and reduce the weight of electric kick-bike. Let electric kick-bike can quickly accelerate to the maximum driving speed. Meet the requirements of electric kick-bike for frequent parking and starting in the city streets. The picture below shows the complete electric kick-bike. The shape of the electric kick-bike after complete assembly. This new type of electric kick-bike mechanical structure is characterized by foldable seats. Customers can fold their seats when they drive in a standing position. Customer standing pedals are flat. It does not affect customer driving an electric kick-bike.

Electric Bike/Scooter is nothing but a micro-mobility utility vehicle, which is used to travel for smaller distances and it also convenient in some situations where other options are not feasible. Initially as the name suggests this bike is by manual power that is through successive backward kicks by the person on the road which makes it to move forward. Later the manual power is replaced by electric power in which bike moves using the motors.

### 2.2 Environment:

Electric Scooter is a product that combines traditional scooter with modern electric drive and control technology. Electric kick-bike originated in Germany developed in Europe. Generally speaking, the electric kick-bike is a kind of skateboard product which is powered by battery and driven by motor and can't be ridden by human.

**2.3 Dept & Width:**

Average method to determine wheel size. Diameter of 12” and Thickness of 2”.

**2.5 According to formula:**

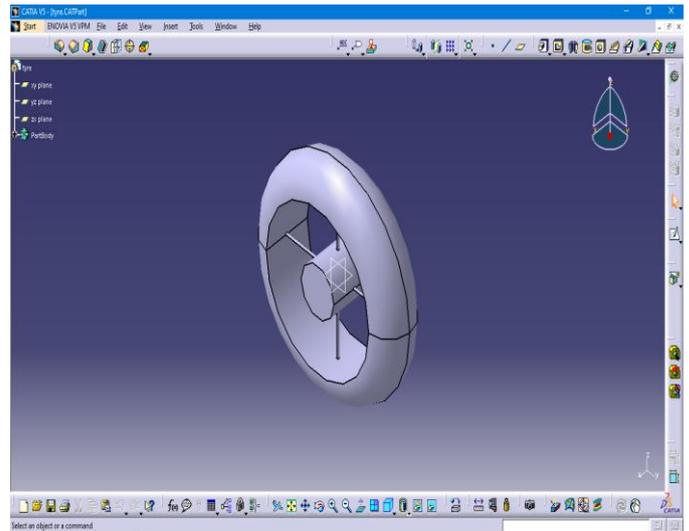
$$T1=(A*H) *cp/A$$

T1: Charging time

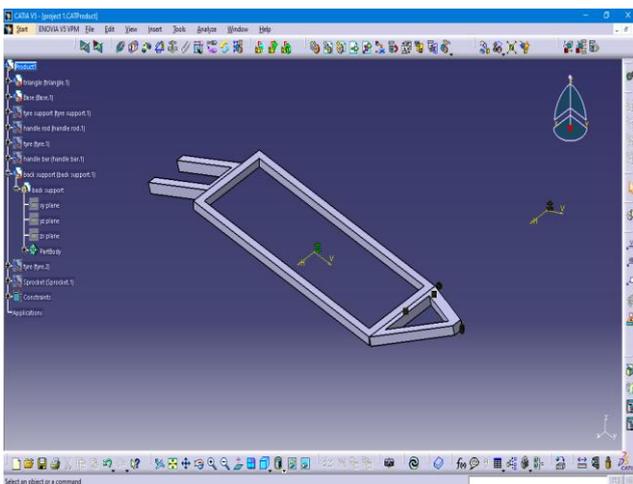
A\*H: battery capacity

cp: Charging efficiency (generally lithium batteries 90% and lead acid battery of 85%)

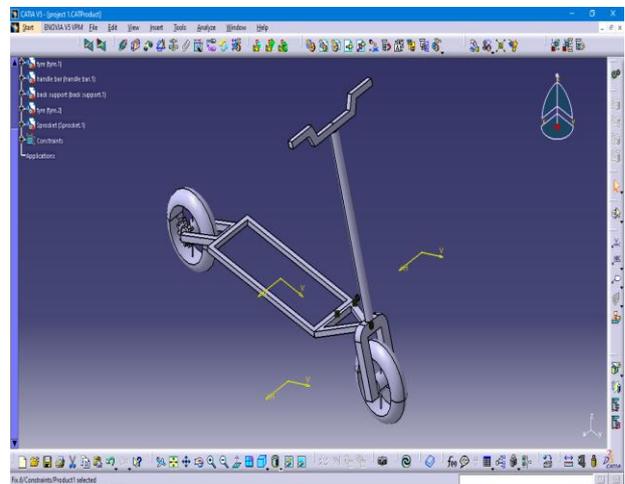
A: The ampere of charging.



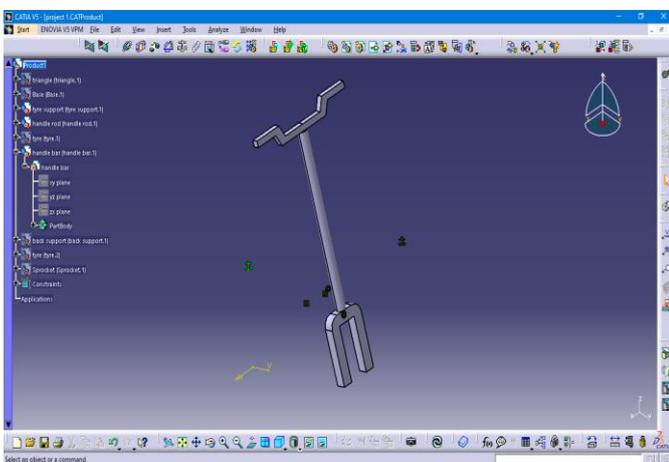
**FIGURE 2.3 WHEEL**



**FIGURE 2.1 FRAME**



**FIGURE 2.4 FRAME ASSEMBLY**



**FIGURE 2.2 HANDLE**

**2.6 Electric Scooter Specifications:**

- It has wheels of 12” diameter.
- Distance between the wheels centres is 50”
- Height of the Bike 55”
- Ground Clearance of 10.5”
- Has a base of 27” x 13”.

**2.7 Electric Scooter Features:**

- Easy to ride (As simple as riding a bike)
- Easy to handle
- No high speed, So word of risk
- Has initial high torque
- Can carry upto 110kgs

### 3.0 RESULT

**3.1 Electric Vehicle:** Now a days, utilization of fuel vehicles are increased rapidly which result into more air pollution. To control this, utilization of EV is must because it's several advantages like electric scooter is an eco-friendly product. EV is also known as Electric Vehicle. It is more suitable for city as it can avoid the emission of harmful gases and thereby it can reduce the atmospheric pollution. Due to frequent increase in fuel prices, the electrically charged vehicle seen to be the cheapest one compared to the traditional vehicle. E-scooters are more suitable for rural areas where the numbers of petrol bunks are not adequate, so that the rural people can charge the vehicle with the help of electricity. To understanding the EV technology, this study helps to provide outline of EV (Scooter) and there various components. Electric vehicles have low running costs as they have less moving parts for maintaining and also very environmentally friendly as they use little or no fossil fuels (petrol or diesel). While some EVs used lead acid or nickel metal hydride batteries, the standard for modern battery electric vehicles is now considered to be lithium ion batteries as they have a greater longevity and are excellent at retaining energy, with a self discharge rate of just 5% per month. Despite this improved efficiency, there are still challenges with these batteries as they can experience thermal runaway, which have, for example, caused fires or explosions in the Tesla model S, although efforts have been made to improve the safety of these batteries.

### 3.2 Hybrid Electric Vehicle:

Hybrid electric vehicles are powered by an internal combustion engine and one or more electric motors, which uses energy stored in batteries. A hybrid electric vehicle cannot be plugged in to charge the battery. Instead, the battery is charged through regenerative braking and by the internal combustion engine.

### 3.3 While Building:



**FIGURE 3.1 MOTOR**



**FIGURE 3.2 GRINDING**



**FIGURE 3.3 FRAME CONSTRUCTION**

#### 4.0 CONCLUSION:

The Electric Scooters are practical, convenient and relatively cheap. Electrical Scooters have a wide range of usage in future as these are eco-friendly and does not cause any pollution. These are used for short distances as well as for long distances. Most of the companies are converting into Electric vehicles and are making improvements in the increasing the performance and range of the Electric vehicles.



FIGURE 4.1 TESTING THE FRAME WITH LOAD



FIGURE 4.2 ELECTRIC SCOOTER SEGWAY

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