



Design And Analysis Of Folding Bike

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ABSTRACT :

The electric folding bike is lightweight, compact, and easy to carry; it can withstand a load of 60 kg, travel at a speed of 20 kmph, and have a range of 50 km on a single charge. **1.INTRODUCTION**

With the development of more efficient means of transportation, such as the vehicle, civilization has advanced hand in hand. Many years of ground-breaking research and development went into today's car. There are a number of issues with today's cars, including as pollution, low efficiency, and high fuel costs relative to mileage.

- In order to boost productivity
- Reduce the fuel cost as a percentage of miles
- Reducing pollutant levels requires
- Our "FOLDING SCOOTER" features in this regard. Implementing the most efficient, portable, and least polluting vehicle was the purpose of this project. Our prototype electric folding scooter includes a battery and motor that increases its fuel efficiency by a factor of twenty compared to a standard vehicle. For two-wheelers, we put this idea of a folding electric scooter into action. There has been a dramatic increase in the buildup of greenhouse gases, especially CO₂, which impact global climate change, and the pressing need for protection of the environment, ecology, and humanity as a whole has been a major focus of international judiciaries and policymakers for the past twenty years. Roughly fourteen percent of all sources of CO₂ come from motor vehicles. Vehicles powered by gasoline and diesel engines contribute to air pollution by the release of harmful substances including as carbon monoxide,

particulate matter, and oxides of tetra ethyl and lead. In the years leading up to and including the year 2000, regulations pertaining to car engine exhaust emissions have been steadily more stringent. As a result, manufacturers of motor vehicles are now obligated to meet these standards by incorporating provisions for the treatment of exhaust emissions and by creating engines that are both cleaner and more fuel efficient. Therefore, in order to address and triumph over these two issues, namely

- Pollution
- Efficiency

2.LITERATURE SURVEY:

In 2011, a Seoul resident named Keun. Soo Yun filed a patent for a folding bicycle. A foldable bicycle with structurally efficient folding that significantly reduces bulk is the intended product of this innovation. Also, to make riding more comfortable by adjusting for the interplay between the rider's weight and the vehicle's. A foldable electric bike that appears to be a mixture of a frame, front wheel assembly, and rear wheel assembly was patented in 2016 by Ford Global Technologies. When folded, the front wheel slides into the frame, and the entire frame slides into the rear wheel assembly. Here, the cycle is condensed. However, a high degree of calibration is required because this mechanism is extremely accurate. A foldable bike with an extremely intricate system was then patented in 2017 by Beijing Onemile Technology Co. Ltd. In addition, it had its own detachable folding frame. Despite lacking electric propulsion, this bike represents the most current innovation in the foldable bike patent sector.

1. **Raleigh Stow E Way** With a single charge, this bike can go up to 24 kilometers and folds into a compact 90x50x70 cm³. Inside the frame is a Lithium ion battery, which is both functional and aesthetically pleasing. About £1350 (or about 1 lakh INR) will get you it. Article ID: IJCRT23A4133
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2. **Whoosh Gallego** A Li-ion battery of 270 WH capacity is used in this cycle. You can fold it up and roll it up in fifteen seconds flat. This is accomplished by attaching two smaller wheels. This bike is priced at half of the previous one, making it a bargain. Price - £669 (about 53,000 INR).

3. **A2B Kuo** When compared to its predecessors, this bike is light years ahead. The device is comprised of an electronic screen that indicates the battery life. It takes approximately 6 hours to charge the battery, which is housed under the seat tube, for 25 miles of riding. The price is £999 (or almost 80,000 INR).

4. **BH Emotion Neo Volt Sport Lite** This bike may be understated, but it packs a serious punch. It has a top speed of 20 mph and can be propelled with the use of pedals. This model, however, is somewhat pricey, costing about £2199 (or about 175,000 INR).

5. **Free Go Folding** The primary goal of this strategy is long-distance transportation. A 16Ah battery is what it is made of. The front disc brake and headlights are two notable elements. Despite this, it weighs about 22 kg. A price tag of £1,099 (or about 88,000 INR) will suffice. Also, while foldable electric bikes are all the rage in other countries, they're not exactly a hit in India. The trend, however, is gradually spreading to India as well. The bike we made is a hybrid, meaning it has both electric and manual components, to make it more affordable for Indian consumers. The total cost of the bike would go down because of this cost savings.

3.PROBLEM STATEMENT:

When traveling by automobile, it can be a hassle to move the bikes.so that tourists can pedal their way about town or in scenic areas

3.1 OBJECTIVES:

- To manufacture the folding e bike
- To test the folding e bike

3.2 SELECTION OF COMPONENTS

We have compiled a list of the necessary parts for the folding scooter vehicle based on our research and what is currently available.

- Power source unit (battery)
- Controller for speed
- Direct Current Electric Motor
- A kit for charging batteries
- Convertible scooter



Battery Volt = 36 V

Battery Power = 250 W

Power equation

$$\text{Power} = I * V$$

Where

V = 36 V

P = 250 W

I = 250/36

To find torque of the motor of 36 volt dc

$$\begin{aligned}
 T &= P \cdot 60 / 2 \cdot 3.14 \cdot N \\
 &= 250 \cdot 60 / 2 \cdot 3.14 \cdot 1000 \\
 &= 2.35 \text{ N-m}
 \end{aligned}$$

Torque of the wheel motor, $T = 2.35 \text{ N-m}$

Power Required to Propell the Vehicle

Weight = scooter 20 kg+(rider weight 60kg)

=80 Kgf

3.3 WORKING:

We are utilizing the motor here, which is powered by a battery. You may find the battery under the cargo area, underneath the seat. The vehicle's back wheels are equipped with motors that are controlled by a central unit. Like e-bikes, scooters, solar cars, and a plethora of other lightweight electric vehicles, the motor is quickly becoming the de facto standard for driving these vehicles. In order to accommodate a motor and transmission, a motor conversion could necessitate the use of external mounting brackets and drive chains. The motors are stationary relative to the wheel hub's central axis. The wheel rims begin to rotate around the vehicle's axis now. Using the dedicated charger, electricity is transferred to the battery. In this case, mechanical friction could be to blame for some losses.

The vehicle's powertrain provides the necessary power for maneuvering within urban areas, traversing flat terrain, and minimizing energy use. The battery is what actually powers the motor.

During this process, the vehicle will not exceed a minimum speed and will not emit any pollutants that contribute to smog. How far an electric car can go on a single charge is highly dependent on the battery's capacity and the amount of time it takes to charge. During this process, the vehicle's mileage is significantly increased.

3.3.1 ANALYSIS OF VEHICLES

A. IC ENGINE VEHICLE

Old Vehicle cost – 35,000/-

Fuel cost (1 Lit) - 110 /-

Mileage (1 Lit) - 45-60 Km/Lit

Running cost of the vehicle per kilometre- 2/=Rs.

Speed of the vehicle-80-300 Km/hr

B. BATTERY VEHICLE

Vehicle cost - 21,000 /-

Fuel cost (1 Full charge Battery)- 8 /-

Mileage (1 Full charge Battery) – 50-120 Km

cost of the vehicle per kilometr- 0.10 /-Rs.

Speed of the vehicle-40-120 Km/hr

C.FOLDING SCOOTER VEHICLE

Vehicle cost- 28,000 /-

Fuel cost (1 Full charge Batter- 8 /-

Mileage (1 Lit and 1 Full charge Battery)- 50 Km

Running cost of the vehicle per kilometre-0.16 /- Rs./km

Speed of the vehicle-Max. avg. speed 20 Km/hr

COMPARISON

Type Category	IC Engine	Electric	Folding scooter
Vehicle cost(Rupees)	@ 35,000-5 lakh	21000-1,50000	28000
Fuel cost 1 Lit or per charge(Rupees)	@ 100	8	8
Mileage KM/1 Lit OR per charge	40-60km	50-120	50
Runningcost ofthe vehicle perKilometre	2	0.1	0.16
Speed of theVehicle	80-300 kmph	40-120	20

Table: 1 Comparison and Result

3.4 ADVANTAGES

- No fuel cost
- No pollution
- Easy to transport
- light weight
- compact size

3.5 DISADVANTAGE

- less efficiency.
- Less speed
- Low load carrying capacity

3.6 APPLICATIONS

- Good for tourists for local travel on this bike
- Travel at resorts, farms, beaches, industrial area travel

RESULTS

Bike successfully transporting a 60 kg person with 20 kmph speed for 50 km run in one full charging of battery

FUTURE SCOPE

- Can be modified with double seat capacity
- Can be fixed with good braking system if speed and investment cost is increased

CONCLUSION

Moving quickly is impossible in urban areas with high traffic. Because the IC engine's idle, stopping, accelerating, and braking times vary, more gasoline is wasted when the car is driven at that time. The power consumption can be decreased if the vehicle is powered by an electric hub motor that is connected to a battery. Using the batteries instead of the engine becomes much easier when the vehicle is not under heavy load. You can simply transfer a folding scooter inside your house using a lift, but when you're out and about, you'll need a car.

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