



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 Issue: IV Month of publication: April 2023

DOI: <https://doi.org/10.22214/ijraset.2023.50601>

www.ijraset.com

Call:  08813907089

E-mail ID: ijraset@gmail.com

Design and Prototyping of Micro Mobility Electric Vehicle

Piyush Surani¹, Parmar Urmish. R², Parth Dhameliya³, Harish Kapuriya⁴

Dept of Mechanical Engineering, Indus Institute of Technology & Engineering, Ahmedabad, India

Abstract: *The design and development of a micro mobility electric vehicle are detailed in this work. Since the last ten years, gasoline prices have increased in India, and air pollution is a major global concern. The majority of the city's air pollution comes from traditional power plants, but the vehicles that are driven around the populous areas also add to the problem. As the amount of green space in major cities is drastically decreasing, tiny mobility electric vehicles are becoming more and more popular as a form of urban transportation. Small, ultra-lightweight electric vehicles with long ranges may be the preferred mode of transportation. Due to growing concerns over issues including fuel prices, pollution, and increased traffic, electric vehicle (ev) are gaining popularity, as a vehicle an ev is quiet easy to operate and does not have the fuel costs associated with conventional vehicles, it is highly useful electric scooters work simply when the rider uses throttle, electric signals go from the throttle through wires to the controller, which instructs the battery to release electric energy to one or two motor in the wheels. the motor transforms that energy into a movement of the wheels, and the ev moves forward. Most of the component of system are either electric or electronic which are almost maintenance free for long duration. In the presented paper, the authors tried to prototype the concept that reduces overall cost of the vehicle with higher range of operation and with moderate speed such that the daily commuters in the city are benefited.*

Keywords: *Micromobility, EV, Mid motor*

I. INTRODUCTION

In the COVID-19 environment, a number of people favour a single mode of transportation, with micro mobility electric vehicles being the most popular option.

Due to their accessibility and zero-emissions nature, shared dockless electric scooters have recently become a popular daily alternative to driving for short commuter distances in big cities.

Electric vehicles are becoming more and more popular in recent years due to the high and steadily rising cost of petrol. Micro-mobility is utilised to provide short-distance travel services to one or two persons and get smiles for a miles.

Before the development of electric bikes and scooters, India was recognised as a two-wheeler mobility nation. After electric vehicles gained popularity, there was a discernible continuous change in the electric vehicle manufacturers.

The main components of electric vehicles are battery, motor, controller, DC-DC converter and wires

II. MODEL OF ELECTRIC BIKE



Fig 1.1 Our model

Utilising cutting-edge technical techniques, the production of electric motor cycles will begin on the basis of electrical and mechanical calculations. The design and construction of an electric vehicle begins with the gathering of data to be used while the vehicle is in operation. First, we must frame the chassis and then complete all necessary components, such as the battery, motor, controller, throttle, light horn, wires, and DC-DC converter.

A. MID Motor

High-end sports electric vehicles will use mid drive electric motors to improve athletic performance.

The mid drive electric motor, as its name implies, places the motor in the middle of the frame. This has the benefit of making it simple to keep the front and rear balance of an electric vehicle.



Fig 1.2 Motor (amazon.com)

It won't impair the motor's ability to absorb shocks, as well as being less affected by the road's surface on rough roads.

The mid drive motor is delivered to the rear wheel using a chain or belt, which will result in increased wear and tear, but its cost is significantly more than that of the wheel hub motor in terms of price, performance, and future maintenance.

B. Battery

A lithium-ion or Li-ion battery is a type of rechargeable battery which uses the reversible reduction of lithium ions to store energy. The battery which we are using is 48V 29Ah.



Fig 1.3 li-ion battery (Motorbeam.com)

C. Controller

The primary function of a controller is to regulate power in accordance with driving conditions. The effectiveness and smooth operation of the electric vehicle depend on the controller. The voltage and amperage ranges are used to rate controllers. DC motor controllers using pulse width modulation (PWM) operate by "pulsing" the current supplied to the motor. The separate pulses are smoothed to create a continuous flow, much like a piston water pump.



Fig 1.4 controller (google)

III. COMPONENTS AND MATERIALS

| Components | Description |
|----------------|--------------------|
| Motor | 48 volt / 750 W |
| Battery | 48 volt 29 Ah |
| Chain drive | #420 |
| Controller | 48 volt controller |
| Wiring harness | --- |

IV. BASIC PARAMETERS

| Parameters | Value |
|----------------------|--------------------|
| Gross vehicle weight | 60 kg |
| Windward area | 0.6 m ² |
| Maximum speed | 35 km/h |
| Wheel diameter | 254 mm |

V. COMPONENT COST

| COMPONENTS | PRICE |
|------------------|----------------|
| BATTERY | 28000/- |
| MOTOR | 3500/- |
| CONTROLLER | 2500/- |
| WIRE & THROTTLE | 500/- |
| CHASSIS | 3000/- |
| TYRES | 1000/- |
| CHAIN & FRIWHEEL | 800/- |
| TOTAL | 39300/- |

VI. CONCLUSION

The aim of the project, i.e. to design and fabricate a competition e-bike while understanding the principles of Chassis designing, Steering System, Caster, Camber, Drift, Acceleration, Top speed, Performance tuning, Limitations in practical fabrication compared to design and errors after manufacturing is completed.

Provides an low-cost and convenient form of private mobility and is thus an attractive alternative to public transit

It can easily give us smiles for a miles

Easy to use and less maintenance cost

REFERENCES

- [1] Rachel Aldred. 2018. Cycling injury risk in London: A case-control study exploring the impact of cycle volumes, motor vehicle volumes, and road characteristics including speed limits. *Accident Analysis & Prevention* 117: 75–84.
- [2] Bloom, M.B.; Noorzad, A.; Lin, C.; Little, M.; Lee, E.Y.; Margulies, D.R.; Torbati, S.S. Standing electric scooter injuries: Impact on a community. *Am. J. Surg.* **2021**, *221*, 227–232.
- [3] <https://www.mdpi.com/2624-6511/4/1/22>



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)