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Design and Prototyping of Micro Mobility Electric Vehicle

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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

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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)

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III. COMPONENTS AND MATERIALS

Components	Description
Motor	48 volt / 750 W
Battery	48 volt 29 Ah
Chain drive	#420
Controller	48 volt controller
Wireing 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

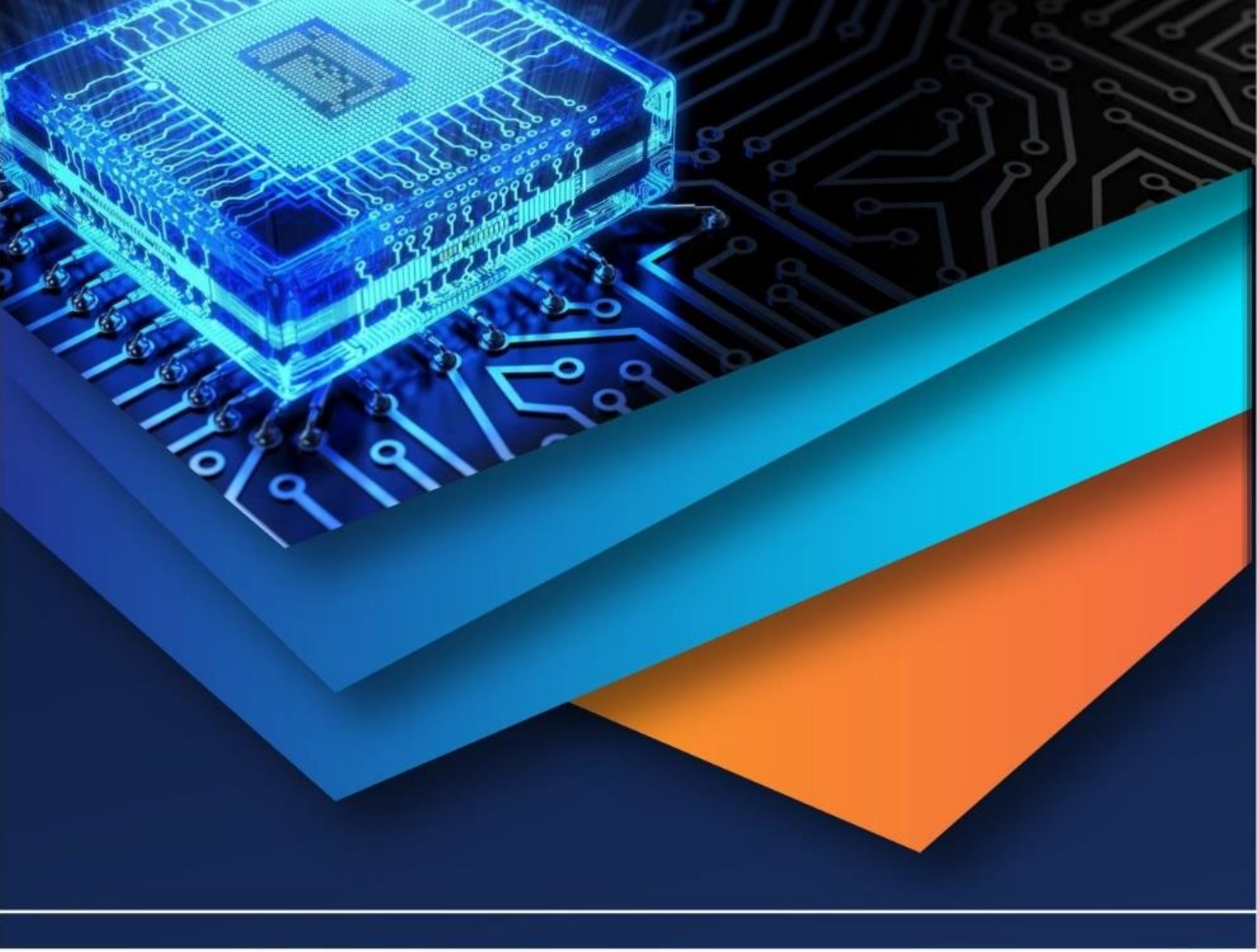
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