

**DEVELOPMENT OF A LIGHTWEIGHT, AFFORDABLE ELECTRIC
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ABSTRACT:

Creating a lightweight, reasonably priced electric scooter is a crucial first step in enhancing urban transportation's affordability, accessibility, and sustainability. The design and construction of an electric scooter that uses lightweight materials to lower the scooter's weight and cost are thoroughly examined in this research. Additionally provided are experimental findings of the scooter's performance, including its maximum speed, range, and charging time. All things considered, the study offers a viable design and manufacturing method for an affordable, lightweight electric scooter that can aid in the creation of a sustainable urban transportation system.

Keywords:

EV, Transportation, Battery, Motor, Emission.

1. INTRODUCTION:

India is one of the automotive industry's fastest-growing markets. As car usage rises, so does the consumption of fossil fuels, which are hazardous to human health and the environment. Every vehicle uses enormous volumes of gasoline, which are burned. Since these fuels are not renewable, they represent a burden on society. Due to their ease of handling and storage, lightweight e-scooters are gaining popularity. Additionally, they are less expensive than more bulky e-scooters. This trend toward inexpensive, lightweight e-scooters is poised to revolutionize urban mobility by providing a practical and sustainable substitute for conventional forms of transportation. It takes a lot of research and development to create lightweight, inexpensive e-scooters. Numerous considerations must be made by designers and engineers, including battery technology, motor power, weight, and size, among others. One of the main challenges of developing lightweight and low-cost e-scooters is finding the right balance between weight and performance. Lightweight e-scooters are easier to maneuver and store, but they may not have the power or battery life to travel long distances. On the other hand, heavier e-scooters may have better performance, but they are more difficult to maneuver and store. The study has got manifold scope and objective. Developing a kick (foot-powered) scooter into an electric scooter, designing the electric scooter's structure and integrating it with a specific motor, researching DC motors and their specifications for use in electric scooters, etc. are some of the key goals. The creation of an electric scooter covers how to design the scooter such that the battery, motor driver, and switch are used appropriately. DC motor and assess the scooter's capacity to support the highest weight. Waste from bike chassis is becoming a bigger problem. Motorcycle frames that are discarded or abandoned and frequently left to rust in scrap yards or on the streets are referred to as bike chassis trash. These abandoned frames can lead to a number of issues, including as pollution of the environment and risks to public health.

2. METHODOLOGY

Air pollution has long been one of the topics that people desire to address in light of the current global environmental sustainability challenges. In order to lessen the associated air pollution, the government of Taiwan is also aggressively pushing electric scooters, or E-Scooters, to take the place of conventional bicycles. Electric scooters are an inexpensive, practical, and humorous mode of transportation. Because they don't use gasoline or other fuels derived from petroleum, electric scooters are inexpensive and environmentally. The efficiency of electric vehicles (EVs), especially electric scooters, appears to be increasing daily. Electric two-wheelers and three-wheelers are thought to be the most likely drivers of EV growth in India, although from the bottom up, even though the country's EV market penetration is much lower than that of other nations (estimated at 0.12 percent). Sales of electric two-wheelers hit an all-time high of 1,52,000 units in the previous giving both new and established local manufacturers the confidence to increase their electric offerings.

3. Proposed System

- 1) Chassis - An e-scooter's chassis is an essential part that gives the vehicle stability and structural support. It distributes the weight of the rider and the vehicle equally and is in charge of supporting all other parts of the e-scooter, such as the battery, motor, suspension, and wheels. In this instance, light weight is achieved by using the Hero Navi chassis.Brush less
- 2) Customized Li-IO Battery: This electric scooter is powered by specially designed lithium-ion batteries. These batteries consist of many cells that are connected in parallel or series to form a pack with a particular voltage and capacity. Since the Hub motor needs 48 volts to operate the scooter, a number of 12*12 lithium cells are connected to produce the electricity and carefully packed to prevent excessive heat.
- 3) Controller: The hub motor's controller, which controls the motor's torque and speed, is an essential part of the e-scooter's power train. The throttle and battery of the e-scooter provide signals to the controller, which modifies the motor's output. A microprocessor, power transistors, and auxiliary circuitry usually make up the controller.
- 4) Brakes: Drum brakes are a common option for inexpensive electric scooters because they are often less costly and simpler to maintain than disc brakes. Additionally, they are more resilient to dust and debris, which can impair disc brake efficacy. However, drum brakes may not offer as much stopping power as disc brakes.
- 5) Tyres - To support the weight of the battery and other automobile parts, EV tyres need to have a stronger sidewall and a sturdy compound (such as nylon or something heavier). Strong tire compositions are required during construction since electric vehicles must also manage immediate torque.



Fig; 2 Total Kit of the vehicle



Fig:3 A series charge controller or series regulator



Fig:4 Battery capacity: 12V, 1.3Ah



Fig: 5 Chain Drive

**Fig: 6 Final Model****CONCLUSION**

By offering a sustainable and effective substitute for traditional forms of transportation, the development of lightweight and affordable electric scooters has the potential to completely transform the urban transportation system. Because lightweight materials and inexpensive production methods are required, the construction of such electric scooters is a difficult undertaking. However, the performance and usefulness of electric scooters can be greatly enhanced by integrating cutting-edge technologies like autonomous technology, IoT, and battery management systems. The environmental impact of electric scooters can also be lessened by the development of sustainable production practices and eco-friendly materials.

REFERENCE

- 1) Nigam, K Mathur, T., Tikkiwal, V. A. (2021). Feasibility analysis of a solar-assisted electric vehicle charging station model considering differential pricing. *Energy Storage*, 3(4),
- 2) Pooja Iyer M, G Ravi Teja, V Sitaram Prasad, Department of Mechanical Engineering, researched on concept "DESIGN AND FABRICATION OF ELECTRICAL SCOOTER", Published on MAY 2015.
- 3) Khande, M. S., Patil, M. A. S., Andhale, M. G. C., & Shirsat, M. R.
- 4) S. (2020). Design and Development of Electric scooter. *Energy*, 40(60), 100.
- 5) Babu, S. (2022). A Review on Phase Change Material–metal Foam Combinations for Li-ion Battery Thermal Management Systems. *Energy Storage Systems: Optimization and Applications*, 115.
- 6) Gupta, M., Halder, N., & Kharola, A. (2019). Design and Fabrication of Low-Cost Electric Scooter. *International Journal of Multidisciplinary Research and Publication*.
- 7) Yong, J.Y., Ramachandramurthy, V. K., Tan, K. M., & Mithulananthan, N. (2015). A review on the state-of-the-art technologies of electric vehicle, its impacts and prospects. *Renewable and sustainable energy reviews*, 49, 365-385.
- 8) Mueller, T. J., & DeLaurier, J. D. (2003). Aerodynamics of small vehicles. *Annual review of fluid mechanics*, 35(1), 89-111.
- 9) Choron, R.L., & Sakran, J. V. (2019). The integration of electric scooters: use full technology or public health problem? *American journal of public health*, 109(4),
- 10) [9] P. Rathore, K. Goyal and S. Khandelwal. " Design and Fabrication of Lightweight Electric Scooter." *International Journal of Engineering Research & Technology (IJERT)*, vol. 3, no. 7, 2014, pp. 2325-2329