DESIGN OF BATTERY ELECTRIC MOPED

'YELLOW E-BIKE' FOR CITY RIDING

[1]Subrahmanyam V, [2]Pavan Sai Kumar Gupta B, [2]Madhubabu A, [2]Vikash Padal Ch

[1]Assoc. Professor, [2]UG Student

[1]Godavari Institute of Engineering & Technology (A), Rajahmundry, India

Abstract: Now-a-days in the market of Electric Vehicles there is much number of models of different variations in size, speed, shape, etc., are available. Portable transportation is playing important role in pollution. The aim of this project is to model a small Battery Electric Bike which is simple in shape and appearance, works effectively, requires less maintenance, having more life and also with low price compared to any other product in the market. The project is carried out in three steps. 1. Preparation of rough pencil sketches of different models and finalizing the best out of them to suit the above said requirements, 2.Selection of the materials and electric drives, and 3.Preparation of final drawing using cad modeling.This Electric Bike is easy to Drive and Handle. This can be easily rechargeable and is easy for transport in Short distance transportation usages. This type of simple design is easy to transport from one place to another place, and gives good driving Balance.This Project could be helpful to everyone and can fulfill all requirements in both city and urban riding.

***Index Terms* – Electric bike, Plug-in bike, Yellow e-bike, Plug-in electric bike, Electric moped.**

I. INTRODUCTION

In India, two-wheelers play an important role in fulfilling personal transportation due to their ease of riding in rush roads and available at low price. They contribute nearly two-third of the vehicle population in India. The high fuel consumption and emission contribution of two-wheeler in urban areas needs to receive more attention in order to improve the sustainability of energy and urban air quality in the future. Therefore, the implementation of plug-in hybrid technology for two-wheeler will result in reduction of greenhouse gas emission and petroleum oil in-dependency to a large extent. The plug-in concept is implemented in certain concept car and two-wheeler in the market in a limited way. A Battery electric vehicle (BEV) is a type of electric vehicle (EV) that uses Chemical energy stored in rechargeable battery packs. BEVs use electric motors and motor controllers instead of internal combustion engines (ICEs) for propulsion. Electric vehicles derive all its power from its battery packs and have no internal combustion engine, fuel cell or fuel tank. BEVs include bicycles, scooters, rail cars, forklifts, buses, trucks and cars. Since the introduction of the all-electric Nissan Leaf in December 2010, over 6,00000 highway legal plug-in electric vehicles have been sold worldwide by September 2014, of which more than 3,56,000 are all-electric passenger cars and light-duty trucks. The best-selling all-electric car ever, the Nissan Leaf, has sold over 150,000 units worldwide by November 2014. Vehicles using both electric motors and internal combustion engines are examples of 'Hybrid Electric Vehicles' and are not considered pure or all-electric vehicles because they cannot be externally charged (operate in charge-sustaining mode) and instead they are continually recharged with power from the internal combustion engine and regenerative braking. Hybrid vehicles with batteries that can be charged externally to displace some, or all their internal combustion engine power and gasoline fuel are called 'Plug-in Hybrid Electric Vehicles' (PHEV) and run as BEVs during their charge-depleting mode. PHEVs with a series power train are also called 'Range-Extended Electric Vehicles' (REEVs), such as the Chevrolet Volt and Frisker Karma. Plug-in electric vehicles (PEVs) are a subcategory of electric vehicles that includes battery electric vehicles (BEVs), plug-in hybrid vehicles, (PHEVs), and electric vehicle conversions of hybrid electric vehicles and conventional internal combustion engine vehicles. In China, plug-in electric vehicles, together with hybrid electric vehicles are called New Energy Vehicles (NEVs). However, in the United States, Neighbourhood Electric Vehicles (NEVs) are battery electric vehicles that are legally limited to roads with posted speed limits no higher than 45 miles per hour (72 km/h), are usually built to have a top speed of 30 miles per hour (48 km/h).

There is a need of many variants in plug in electric bikes as only limited numbers of models are available in the market. In this project it is decided to model a body of bike which can be driven by any electric kit which are widely available in the market or online market.

II. MODELING OF E-BIKE

Initially drawn some rough sketches and finalized a model that looks like a vintage moped as shown in the fig. 1. This model is finalized because the various electrical components such as batteries, control unit and charging units can be kept sealed and not to expose and at the same time allows air to cool the components effectively.

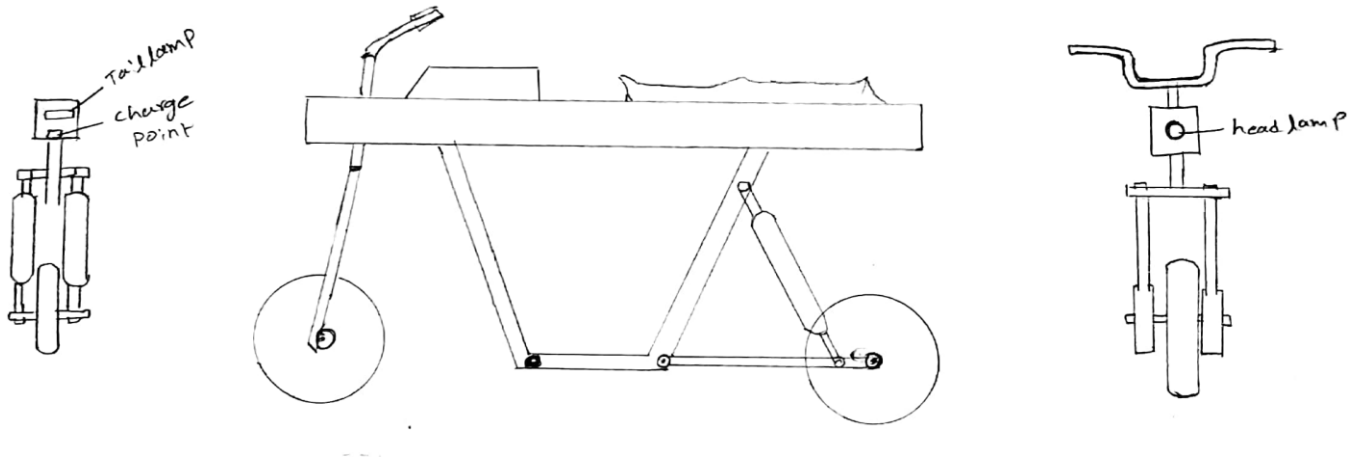

Fig. 1 Pencil Sketch of E- Moped

2.1 Specifications

- Height: 1000mm
- Width: 650mm
- Length: 1710mm
- Wheel Base: 1240mm
- Ground Clearance: 200mm

Suspension:

- Front: Telescopic shock absorbers
- Rear: Spring loaded Hydraulic shock absorber (Mono tube)

Tyres:

- Front: 16x3”- 42P/4PR
- Rear: 16x3”- 48P/6PR

Brakes:

- Front: Drum type internal expanding brakes (130mm)
- Rear: Drum type internal expanding brakes (130mm)

Batteries:

- 12v 7Ah Lead acid battery

Hub Motor:

- Capacity: 48v 250 watts
- R.P.M: 260 to 350

Frame Structure:

-MS Hollow square Bars (100mm)
- MS Rectangular Bar (50x15mm)

Caster Wheels:

- Made of Kolkata rubber

DC Controller,
Regulator,
Electric cables.

III. MATERIAL SELECTION

Parts of the E Bike

1. BLDC Hub Motor
2. DC Controller
3. Batteries
4. E-throttle
5. Rear wheel connecting stud
6. Locking Bolt
7. Front Suspension system
8. Rear suspension system
9. Brakes
10. Wheels & tyres
11. Power source control switch
12. Control unit Casing
13. Seat
14. Battery casing
15. Charging Port
16. Lock
17. Side Stand

3.1 Block Diagram of E-Bike and Key Parts

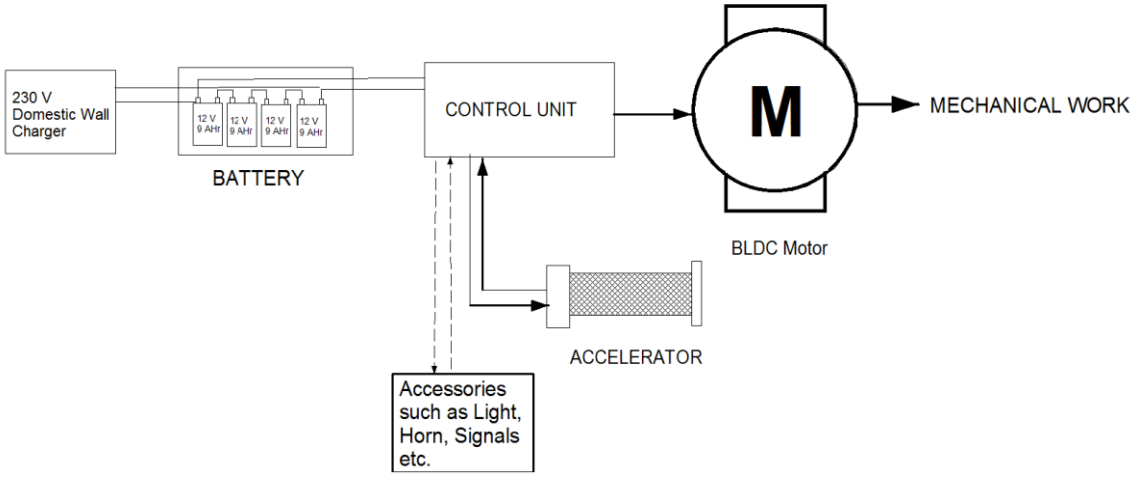

Fig. 2 Block Diagram of E-Scooter

3.2 SPECIFICATIONS OF ELECTRIC DEVICES

The type of battery, the type of Traction motor and the Motor controller design vary according to the size, power and proposed application, which can be as small as a motorized shopping or wheel chair, through pedicels, electric motorcycles and scooters, neighbourhood electric vehicles, industrial forklift trucks and including many hybrid vehicles. The Following are the specifications of the Electric devices which are selected to build 'Foldable E-Scooter'.

Hub Motor **:** Brush less DC Hub Motor, 250 Watts

- **Load Capacity** **:** 180 Kg
- **Top Speed** **:** 35 Km/h

Battery **:** Lead acid Dry Battery, 7Amph

- **Specifications** **:** 12 V × 4 = 48V

Charger **:** InputVoltage-AC110V220V50/60Hz

- **Rated Input Power** **:** 80VA90VA
- **Rated Exporting** **:** DC36V48V
- **Charging Time** **:** 2 Hours (To Full Charge)

3.3 ELECTRIC DRIVE

The plug in electric vehicle must require the following electric components.

- Battery
- Motor Controller
- Hub Motor

IV. CAD DESIGN

These draftings are done using CATIA V5 software and various views are captured and given in the figures 3 to 5.

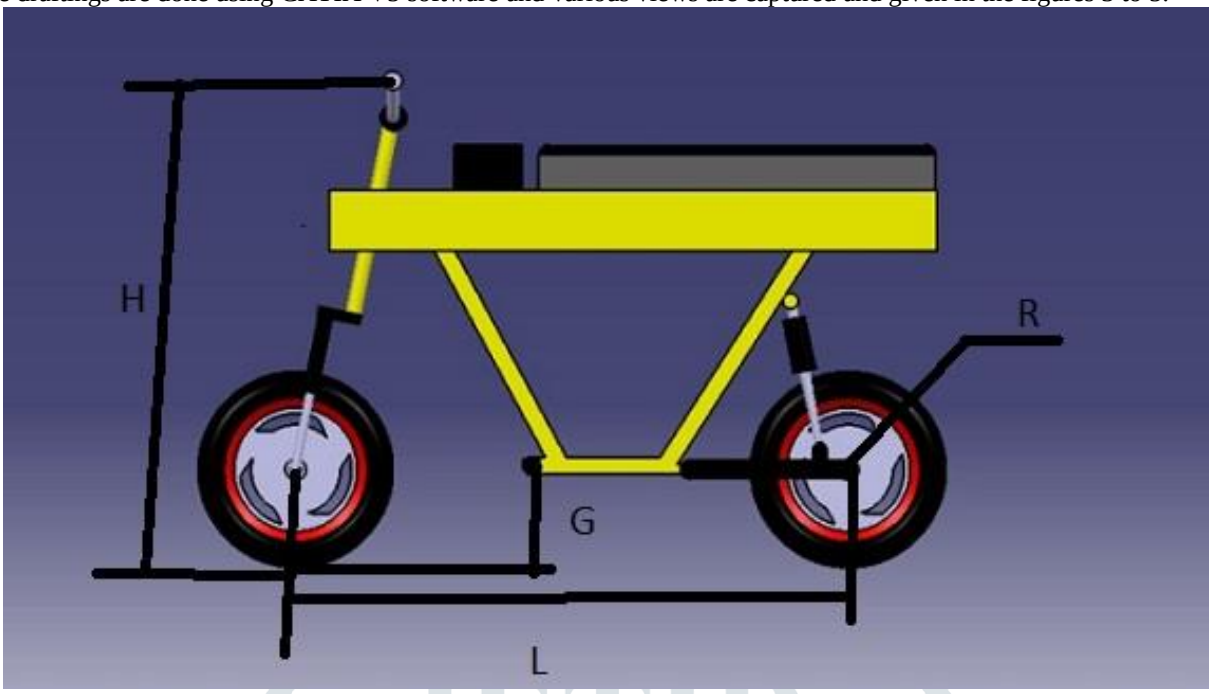

Fig. 3 Designing of chassis

Height (H) : 1000mm
Width (W) : 650mm
Length (L1) : 1710mm
Wheel Base (L) : 1240mm
Ground Clearance (G) : 200mm

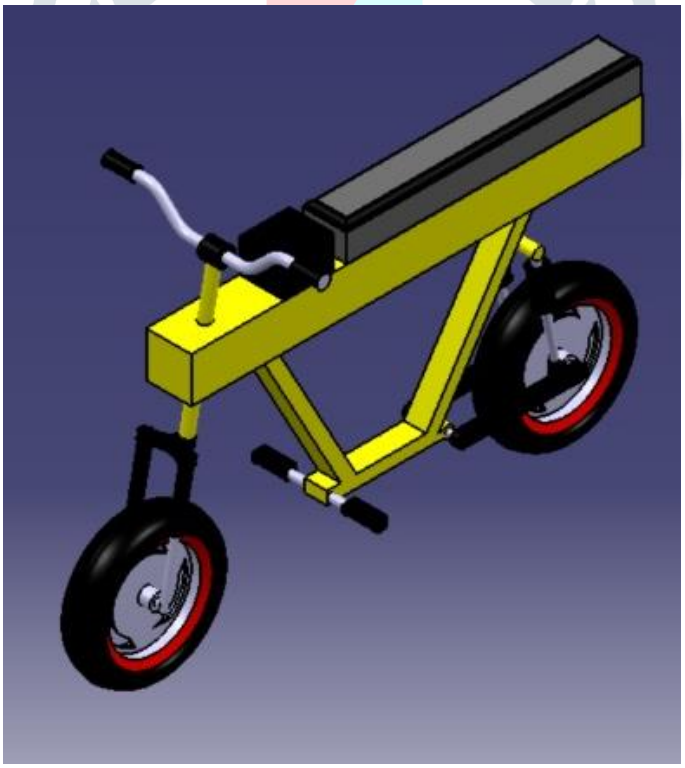

Fig. 4 Isometric view

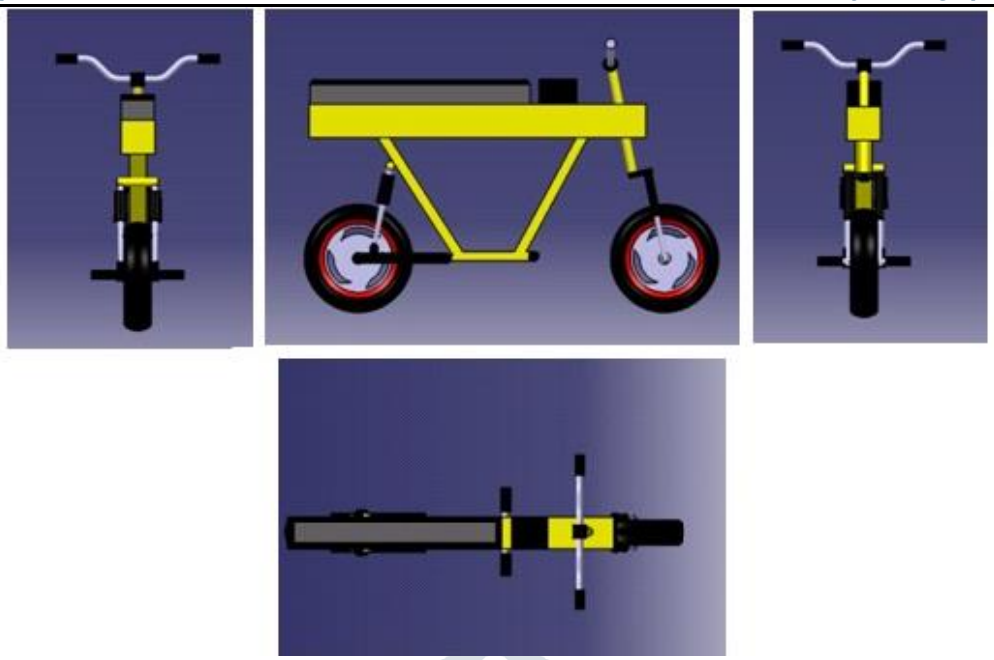

Fig. 5 Complete Views of E-Moped "YELLOW"

V. CONCLUSIONS

E-Mopeds play a vital role in the system of Portable transportation for city riding. The design looks pleasing and the most efficient and durable in present E-vehicles. This is the most economical and maintenance free as it does not contain any loose or fragile components, compared to other vehicles presently being used for portable transportation. The fabrication of electric scooter can be done by using simple structural components. The modeled E-Scooter can give its best in efficiency, load, speed, standby, durability. It can also be easily handled to carry inside the house, and through the elevators. The design allows make it propel by using any type of electrical kits available in the market or online market at wide range. One can customize their required power and speed. The vehicle can withstand any speed and power and moreover it can negotiate the road obstructions in a smooth manner due to its suspension mechanism.

"USE E-BIKES
STOP POLLUTION
SAVE ENVIRONMENT"

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