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# Design and Fabrication of Electric Motorcycle

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***Abstract*—We are concerning about the growing demand of energy all over the world, which motivate us to switch over renewable resource of energy. There are many different ways by which we can save energy in different sectors. Our main focus is on automobile sector where we are converting old petroleum bike to electric bike. In these electric bikes we use electrical motor (BLDC motor) instead of combustion engine as there is less pollution, low maintenance cost, reduces noise. These bikes utilize chemical energy stored in the rechargeable battery packs. This paper deals with the design and development of electric bike which make use of electric energy as primary source. There is a distribution for charging the battery emitting it from the main system**

***Keywords— BLDC motor, electric bike, lithium-ion battery***

## I. INTRODUCTION

Main reason to identify the need of finding and modifying E-Bike is to overcome the issue of the pollution because of vehicles in metro towns & urban zones is swelling uninterruptedly. During April 2012 Indian government has planed to the roadmap for the development of the domestic electric vehicle in the country. Electric vehicle include electric car, electric train, electric boats, electric aero plane, etc. Electric two-wheelers, as indicates itself, is electricity-powered two-wheelers. A battery pack and a motor are installed to store and transform the electricity. A user control is usually attached to the handle bar to brake and adjust the speed. Battery operated Vehicle (Two Wheeler)" means a vehicle adapted for use upon roads and powered exclusively by an electric motor whose traction energy is supplied exclusively by traction battery installed in the vehicle. Electric vehicle also referred to as an electric drive vehicle, uses one electric motor for provide the power. Three main types of electric vehicle exists those directly powered from an external power station, those that are powered by stored electricity originally from an external power source. The Electric bike is a bike which is driven with the help of battery which is coupled to electric motor.

Fig.1: electric motorcycle

## COMPONENTS OF E-BIKE

The e bike consists of following components

### *A. BLDC motor*

The advantages of a brushless motor over brushed motors are high power-to-weight ratio, high speed, electronic control, and low maintenance.
The motor is used to drive rear wheels with chain drive between motor pinion and rear axle gear.

Fig.2: electric motor

### B. Lithium ion battery

Fig.3: lithium ion battery

Lithium-ion batteries are commonly used for portable electronics and electric vehicles and are growing in popularity for military and aerospace applications it is the LIFEPO4 type of battery pack.
Rating of the battery 60V and capacities 42Ah
Low cost, low toxicity, well-defined performance, long-term stability
One important advantage over other lithium-ion chemistries is thermal and chemical stability.

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*C. Speed controller*

The simplest case is a switch to connect a motor to a power source, such as in small appliances or power tools. The switch may be manually operated.

The switch may have several positions to select different connections of the motor. This may allow reduced-voltage starting of the motor, reversing control or selection of multiple speeds.

*D. Frame*

It is the core structure on which other parts are assembled, it supports the motor, provides base for the location of starring and supports the passenger or luggage, batteries also attached to the frame.

*E. Chain drive*

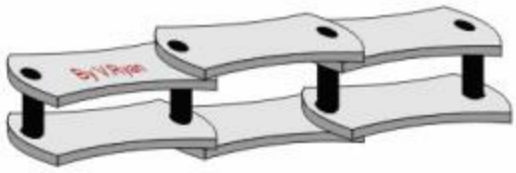

Fig.4: Chain drive

A Chain is an array of links held together with each other with the help of steel pins. This type of arrangement makes a chain more enduring, long lasting and better way of transmitting rotary motion from one gear to another.

F. Advantages

– Easy to commute with low fatigue.
– less maintenance cost.
– Deployable batteries – can be taken inside house.
– Cost of the unit is very low.
– Easy to carry since it is portable.
– less energy consumed.

G. Disadvantages

– High intensity of wind load
– High center of gravity.
– Cannot tolerate drastic changes in environment.
– Needs Periodic Monitoring
– Batteries are still very expensive and the autonomy is not that good.
– Charging can be achieved in about 30 minutes and it is possible to swap batteries

## II. OBJECTIVE

The main objective behind conducting the research is:

– to reduce the manufacturing cost of petrol bike by converting it into an electric one.
– To accelerate the efficiency of the bike and reduction of rate/km.

## III. LITERATURE REVIEW

Electric bike will be easy manufacturing & low cost compare to other vehicle. Low pollution.

**– KUNJAN SHINDE (2017)[1]** said that nowadays consumption of natural reserouce of petrol and diesel will be increases continuously so it will be require to find alternative resource like electric bike, solar vehicle.it will be comparatively easy to Manufacturing of electric vehicle than ICE vehicle. Electric vehicle will also cheaper and easy to maintenance. It's also pollution free vehicle so no effect on a global warning and noiseless vehicle. This type of vehicle get charge with AC current. Rate/km very low compare to the ICE vehicle. By using a lithium ion battery we can boost the thermal and chemical stability of battery.

**– SIMON *WASHINGTON, NARELLE HAWORTH (2014) [2]*** *said* that there are as of now in excess of 700 urban communities working bicycle share programs. Indicated advantages of bicycle share incorporate adaptable versatility, physical movement, emanations and fuel use. Certain or express in the figuring of program benefits are presumptions with respect to the methods of movement supplanted by bicycle share ventures. An optional and remarkable common and support. These two parts are then consolidated to gauge bicycle offer's general commitment to changes in vehicle kilometers voyaged.

**– K.J.ASTROM, R.E.KLEIN (2005) [3]** said that the elements of bikes is dissected from the point of view of control. Models of various multifaceted nature are exhibited, beginning with straightforward ones and closure with progressively practical models created from multimode programming. Models that catch fundamental conduct, for example, self-adjustment just as models that show troubles with back wheel controlling are considered. Encounters utilizing bikes in charge instruction alongside recommendations for the sake of entertainment and provocative examinations with demonstrated understudy fascination are introduced. At long last, bikes and clinical projects intended for kids with incapacities are depicted.

**– THE GERMAN NATURALISTIC CYCLING STUDY [4]** said that Objective of this paper to was to explore the acceleration and speed of orthodox and electrically powered bicycles under truthful statuses. Authors distinguished between electric bi

Cycles which deliver provision up to 45 km/h (as known as S-peddles) and 25 km/h (speed of peddles). Additionally, as speed limits of 30 km/h might influence especially on the execution of speedier cyclists (e.g. Sped Elec rider), the potential mean speed might be even advanced under various situations. Authors also found noteworthy variances in numerous measures between peddles and orthodox bicycles, although less noticeable. This might interpreted as a symptom that, when accelerating from standstill, the assistance provided from motor used by the pedaled riders to reach their preferred speed easier, not earlier. Authors also given the variance in the user population, it is not irrational to admit that at present, e-bikes do not cause any revolution in cycling mean speed at all. The growth of e-bikes in younger cyclists is still there. It has even been embraced that the e-bicycle is going from being a "recovery vehicle" to a stylish frill. By this authors gave the vision that this will change two wheeled activity and street security in the center and long stretch.

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**DESIGN OF ELECTRIC BIKE WITH HIGHER EFFICIENCY [5]** *said that* from this paper it can be found that they are focused on the improvement of efficiency of E-bike. Generally the speed of E-bike is in the range of 40-45 km/hr. at maximum. So there they increase the speed of E-bike and design the aerodynamic shape in such a way that the efficiency of E-bike is improved. For the increasing in that they found four power transmission system. Based on Application the out of four any one of them power transmission system is used in E-bike. Generally the chain drive is used for transmitting the power. Along with that there are three different types of motor is also used like Gear hub motors, Crank drive motors and direct drive motors. So after completing experimental study it can be found that due to the specifications like light weight, inexpensive, compact, offering non-slip the chain drive is more efficient as compared to belts or gears.

## IV. PROBLEM DEFINITION

– More than 80% of the world's sale for gasoline motorcycle is connected in the Asian region.
– In the modern days, the primary concern of government is to find out a way by which we can minimize consumption of fossil fuel and promote the use of electric vehicle in our daily life.
– They will be produce air pollution caused by gas exhaust from motorcycle has come a serious problem.
– Recent petrol price have hit the people hard economically.

### A. Working Procedure

Main principle: - It works on the principle that the electromotive force of an A.C. motor which receives electrical energy stored in D.C. battery.

Working:-

The principle behind the lithium-ion battery is to circulate electrons by creating a difference in potential between two electrodes, one negative and the other positive, that are immersed in a conductive ionic liquid called the electrolyte. When the battery is powering a device, the electrons accumulated in the negative electrode are released via an external circuit to travel to the positive electrode: this is the discharging phase.

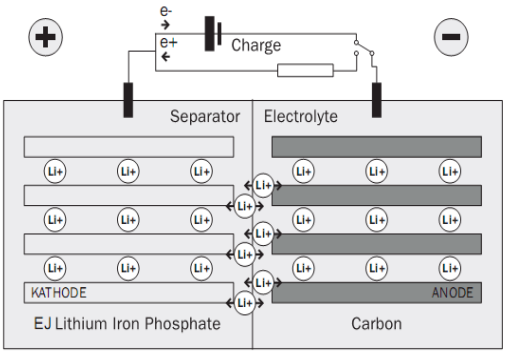


Fig.5: working of lifepo4

Operation:-

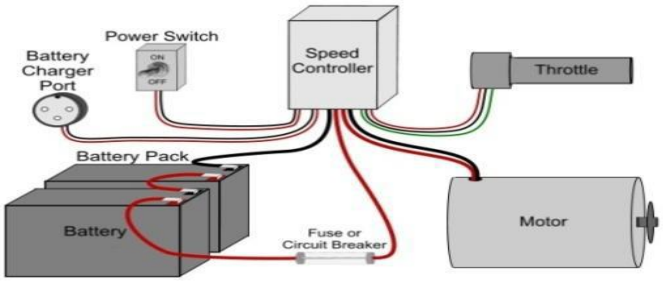


Fig 6. Block diagram electric motorcycle

In this a DC waveform which is obtained id made sinusoidal due to operational Transistorized D.C. to A.C. amplifying circuit by switching the electric energy in the form of electric current which flows from battery. In order to drive the circuit through the condenser, this amplified current is fed to the stator winding of the DC motor. The condenser which is used acts as a storage of electric energy and delivers at the time of requirement. The sprocket wheel installed on motor shaft is driven by the motive power of the electric energy. The rear sprocket wheel is being rotated by the chain drive mechanism on which the other two remaining sprocket wheels are installed. The wheel is driven by the rear wheel installed on the rear sprocket. Thus the electric bike is mobilized by using electric power.

## V. DESIGN PARAMETER

| | |
|---|---|
| Vehicle length | 2140.00mm |
| Vehicle height | 1030.00 mm |
| Vehicle width | 800.00mm |
| Wheel base | 1370.00 mm |
| Wheel diameter | 480.00 mm |
| Ground clearance | 135.0 m |

### A. model design of electric motorcycle

– 2D design of model

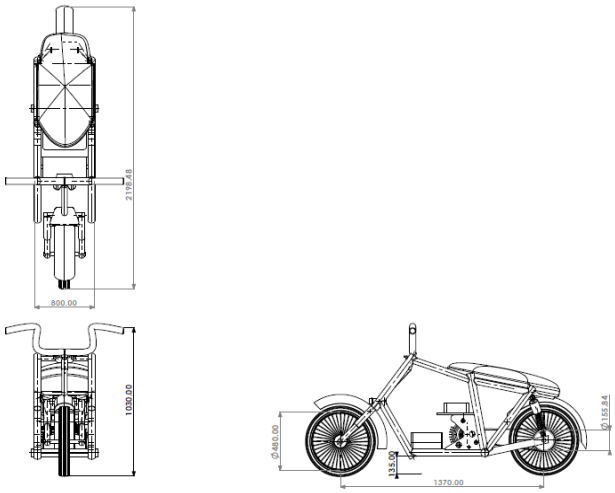

Fig 7: 2D design of model .

International Journal of Engineering Research & Technology (IJERT)
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– 3D design of mode

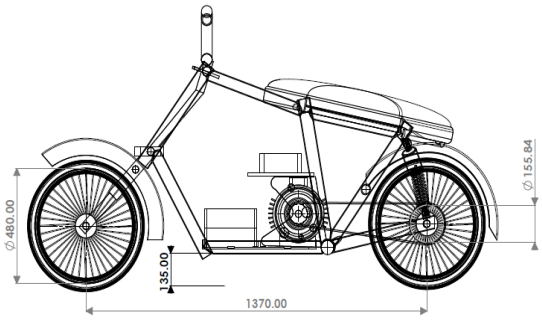


Fig.8: 3D front view of model

B. design procedure
– Frame design
– Brake and wheels
– Bodyworks design
– Assembly of sub design
– Body and composites
– Study of motor and other parts
– Fabrication of chassis
– Fabrication of parts of chassis
– Driving and testing

## VI. FUTURE SCOPE

–The Indian government has set targets to accelerate the adoption of electric vehicle.

–By 2023 its wants all three wheeler vehicle to run on batteries this rule is also applicable on the two wheeler

–Incentives are also being offered to make carmakers develop new EV model and manufacturing components such as lithium Ion batteries and electric motor

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