

## REVIEW OF ELECTRIC BIKE

S. S. Pawar<sup>1</sup>, Mayur Dumbre<sup>2</sup>, Samar Rajput<sup>3</sup>, Kunal Dalvi<sup>4</sup>, Pranav Deshmukh<sup>5</sup>

<sup>1</sup>Professor, Automobile Engineering, PHCET RASAYANI, MAHARASHTRA, INDIA

<sup>2,3,4,5</sup>B.E.Student, Automobile Engineering, PHCET RASAYANI, MAHARASHTRA, INDIA

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**Abstract** - The main objective of this review paper is to develop an 'electric bike system' done by earlier investigators with an innovative approach. This Review paper explores existing literature findings for design of Electric Bikes. It also deals with the experiences related to electric bike. This paper describes the recent study on electric motorcycles and also shows the development of different kind of electric bike. Design and Simulation of low speed electric bike for optimization of power covers all the research related to the electric bikes. As IC engine release hazardous gases which pollutes environment and people, So automobile industry is turning towards electric powered vehicles as electric vehicles which are going to be future means of transportation. To improve mileage of electric vehicle, power train design needs to be improved. Hence, there is a need to design and employ an optimized power train system for EVs.

**Key Words:** Electric Bike, DC Motor, Battery etc.

### 1. INTRODUCTION

Now a days there is great demand for electric vehicles due to its advantages related to pollution and use of energy. Electric vehicles uses electric motor instead of internal combustion engines. Two types of motors are used in electric bike are brushed motor and brushless motor. This electric motor gets electric charge from batteries. Electric charge is been generated from several sources (i.e solar energy by installing the solar panel or by wall charging which is provided in house) there by making use of conventional resources. Batteries provided in EV consist of set of cells connected to each other to provide proper amount of voltage to system as well as to propelled the vehicle. Variation in batteries depend upon voltage, number of cells, weight etc and type of usage decides the life of battery. Electric vehicle doesn't produce any Exhaust gases there by helping to reduce the pollution. Up to date large number of research work is been done on Electric Vehicle in industries. In 2009 China manufactured 22.2 million units and became world's leading manufacturer.

#### 1.1 REVIEW ON TRADITIONAL BIKE:

Gogola et al.[1], compared electric and traditional bicycles on the bases of road safety. The number of people having electric bike is lower in Slovakia as compared to other countries hence they decided to conduct the study on a small sample. First comparison was made on the bases of speed of both the bikes. Second factor was the user experience from the road safety point of view. The quality of road surface was also considered as it has significant effect on riding comfort.

Tournon et al.[2], proposed a traditional pedal operated bike which can be run by internal combustion engine or fuel cell which transform the bike into other type of vehicle. The main focus of research is to compare the traditional chain bike with a series hybrid bike. The research was conducted to find out efficiency requirements on powertrain of series hybrid bike. It was concluded that it is possible for series hybrid bike to travel as far as a traditional chain bike.

#### 1.2 REVIEW ON HYBRID BIKE:

Patel et al.[3], designed a hybrid two Wheeler. He modified a 127 cc Gensat engine by combining with a 24V, 120 A heavy duty DC electric servo motor commanded by aurdino Mega 2560. The main functionality of model was to prove increased efficiency of traditional motor scooter. Chan.[4], they observed about a reality of the electric vehicle. And developing the advancement of electric vehicles (EV) and half electric vehicles (HEV). EVs and HEVs were easily available in the market. The paper shows current condition of electric and hybrid vehicles around the world and their cutting edge technology, with importance on the building logic, innovations and improvement of EV and HEV. Asaei et al. [5], fabricated hybrid electric motor cycle with the help of a general integrated procedure. A model was designed and simulated on ADVISOR 2002 and the model was exported to MATLAB/SIMULINK. The Hybrid electric motorcycle was driven by a 125 cc IC engine and a BLDC motor attached in front wheel using CVT drive. In this experiment it was observed that motorcycle performance was improved. Wani et al.[6], developed the prototype of a hybrid electric two wheeler vehicle. The design was more suitable motorcycle and fulfil the requirement of hybrid design concept. The Innovative packing of component ensured as much space for pillion and the rider. They showed the experimental result of tested vehicle and it was found to deliver mileage of 107.5 km.

#### 2. REVIEW ON ELECTRIC BIKE:

Kumar et al.[7], performed experimental studies on Electric Bike which has an alternative source of Battery operated cycle. They found that the design of E-bike was more efficient than normal Bicycle. Electric bike was the hybrid one so it was electrically operated and also pedal operated. Mahadik et al.[8], introduce the concept of electric bike. He converted the normal bicycle in to electrical one with an innovative approach. Charging of Battery was provided by three ways i.e by means of wall charging, solar charging and by mechanical pedal. Main focus of concept was on System Architecture, operational Concept and Battery Management.

Use of PIC15F72 controller was used for over current protection and under current protection which is helpful. Paladini et al.[9], introduce an alternative powertrain in which electric vehicle was powered by fuel cell. Power train behaviour was developed on MATLAB/SIMULINK. As per the powertrain during acceleration power is demanded from battery, during deceleration battery is being charged. Powertrain was selected on certain parameters such as varying for input parameter, fuel cell efficiency, battery minimum state of charge, number of fuel cell active area, From this they obtain good fuel economy and final battery state of charge. Evtimov et al.[10], they studied consideration of energy efficiency on an experimental bicycle. the bicycle was fitted with board computer to store information about motion and energy consumption. Experiment was carried for three types of city routes. Without regeneration of energy the electric bicycle could go up to 35 km studies show that use of electric bicycle could reduce the pollution up to 10 time compared to conventional vehicles. Esther et al.[11], conducted a survey to promote the use of electric bike as well as the awareness about environment in highly polluted countries like china, USA, India, Germany etc. This survey resulted in an awareness about the need of electric vehicle which lead to publication on electric bike. Shao et al.[12], conducted a survey in which they interviewed several bikers and found speed, acceleration, green as the benefits of using electric bike. Also they focus on the reducing the emission of two wheelers. Andrzej et al.[13], found technological solutions and properties of an electric powertrain designed for a motorcycle. Design considerations of powertrain as well as inverter and battery pack with BMS system choice was done. The results of road tests of the electric powertrain made on public roads are included. The electric motorcycle was designed and built in the Gdynia Maritime University. Trevedi et al.[14], they identify the need of E-Bike in recent time. They beat the issue of the pollution in view of all class of society. It was not sensible to purchase scooters, mopeds and motorcycle for everyone. Thus combination of both issues environmental as well as economically affordable option would be the best solution. Objective of there research was to explore the acceleration speed and electric powered bicycle under balance. Sousa et al.[15], Experimentally designed the described traction system for a self driving vehicle. The presented system consisted two different power sources. One was based on batteries and another on supercapacitors. They described using both the power sources at same time. They used a battery pack along with a super capacitor for traction system. In this system super capacitor were also used for storing the energy. Matsuda et al.[16], described the experimental examples regarding practicality of EV-MC. They explain developments of prototypes and assess them by the practical view of the MC usage. They shows the Mechanical protection of the battery's with the design concepts and the actual methods. They designed the other electric components and showed the experimental results by the practical point of view. Choi et al.[17], they briefly explain about the RT lab and Simulink software and with help of this software they designed and

simulated the electric bike. They discuss about the how to solve the problem on real simulation using this method. They described how to simulate an each major part of electric bike system using the RT-Lab, Simulink and Bike sim software. Sim Power System was used for modelling and simulation of power components. Simulink was used for modelling every major electric component of E-Bike. Actual experimental results were compared for evaluating the performance of hardware in the loop simulator. Cheng et al.[18], discussed the recent development in electric vehicle. Also they described the development and the comparison of different part of components. They gave summary of the recent work of electric vehicle. They examined the major electrical components technologies. Klein et al.[19], analysed dynamics of bicycles from the controlling point of view. Different kind of model from simple ones to realistic models were presented. Self stabilizing models were considered for this research. Experiences using bicycles in control education. Finally bicycles and clinical programs designed for disable children are described. Slater et al. [20], restored a 1996 Kawasaki ninja 250R and converted a traditional gasoline motorcycle into an electric motorcycle. He compared both the traditional gasoline bike as well as the electric bike on the basic of their performance characteristics such as top speed, miles per charge and watts to charge etc. The main goal behind conducting this experiment was to identify the best version of bike for environment and economy. Reddy et al.[21], designed a highly adaptive electric bike. In his research he listed the hardware design guidelines for designing an electric bike and selection of main components of electric bike such as motor, battery, material and controller. Primary objective of research was to design an e- bike as the no. of gasoline powered vehicles were increasing day by day which resulted in environmental problems. Sakamoto [22], carried out experimental work on design and manufacture of electric motorcycle. The whole work was done by student itself. Work included on this motorcycle was 3D-CAD, stress analysis and manufacture. Maximum velocity obtain to be around 23 km/h.

### 3. CONCLUSION

From above literature survey we have seen that the proposed system using an hub motor at the front wheel is best as compared to the existing systems. The system introduced is an innovative step to increase the mileage of electric bike. The cycle of charging and discharging continue, thus this helps in increasing the battery life. Due to extended battery life the vehicle battery can run more than that of the existing system.

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