

DESIGN AND FABRICATION OF PORTABLE ELECTRIC VEHICLE

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Abstract - The main funda of this project is that the vehicle can easily dissembled and assembled and can take where ever easily and can use. Portable electric vehicle is an automobile is that propelled by one electric motor, using electric energy stored in batteries or another storage devices and controlled by controller.

Using the concept of hybridization of vehicle results in better efficiency and also save a lot of fuel deficit. It can surely conclude that this research and development is done in this field, hybrid vehicle promises a practical, efficient, low pollution vehicle for coming era.

Key Words: Bldc motor, DC controller, lead acid battery, Throttle, CAD models,

1. INTRODUCTION

Electric vehicles also called as BEVs and more frequently called as EVs. The electric vehicle industries are continuously evolving day to day. One type of electric vehicle is electric bicycle [e-bike]. E-bikes are run by taking battery as source. The batteries can easily charged to ordinary domestic sockets or shops at cheaper costs.

Here we are developing e-bike into 4 wheels vehicle because more than 1 member can sit easily and can go and mainly it can take where ever we want and can easily assemble and disassemble with in time. The vehicle run by electric motor which receives power from battery. Here we are using Bldc motor [Brushless Direct Current motor]. The vehicle speed can be controlled driver by using throttle which is connected to handle bar. Here the controller is placed between the motor and battery the power is divided and sends to motor depends on how much the throttle was turned. Based on that the vehicle will move. The paper presents a way of how electric vehicle designed and implemented.

From, experiences, we know that even at current high oil prices, fossil fuelled vehicles are more favored over bicycles. We should search for other alternatives that are electric bicycles or e-bikes. The premise of this paper is to overcome many this barriers by technology means at minimum cost to create a usable transport for public use.

1.1 Why we are not using EV's

People are habituated to use fuelled vehicles rather than EV's because due to lack of knowledge in EV's. Government should do campaigning about EV's and tells about future scope and what advantages are by using EV's. EV's are must

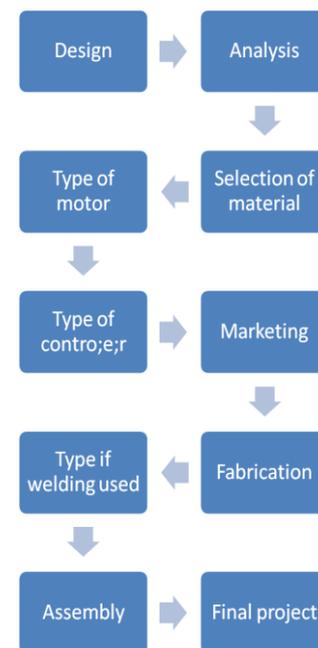
developed in rural areas because the cost is less and maintenance cost is low. Now a days the latest e-bike design was looks like sports model and goes top speed upto 85 kmph and the design by Revolt company and bike model is RV400.

A. Components with specifications

These are the following components with specification, which is used to design portable electric vehicle.

- a) Motor
- b) Controller
- c) Battery
- d) Throttle

4.1 Methodology and Work Plan



Motor

Motor is a electric component that covertos on form of energy to another form example like when the current is supplied to motor get rotated with help of inside winding and magnets. Nearly all type of DC motor have same internal mechanism, either electrochemical or electronic, to change the direction of current in part of the motor.

Here we are using 48V 1000W DC motor. A brushless DC [BLDC] motors are synchronous motors consisting of

armature winding on stator permanent and magnets on rotor.



BLDC motor

The stator of bldc consists if stacked steel laminations with windings placed in the slots and these stator winding can be arranged in tow patterns i.e. a star pattern or delta pattern. The major difference between the two patterns is that the star pattern gives high torque at low RPM and delta pattern giver low torque at low RPM. There are many advantages of BLDC motor like Torque characteristics

- high dynamic response
- high efficiency
- long operating life
- noiseless operation
- higher speed ranges

Dc motor is having 1000 watt. capacity with maximum 3000rpm. Its specifications' are as follows:

Current rating; 26.7amp

Voltage rating; 48 volts

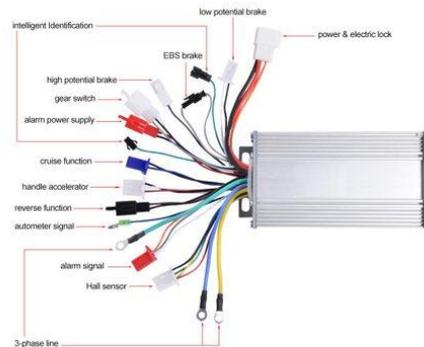
Cooling; air-cooling system

Bearing; single row bearing

Controller

An electronic speed control or ECS is an electronic circuit and regulates the speed of an electric motor. It may also use reversing of vehicle and dynamic braking.

This type of motors required different speed controls for brushed DC motors and brushless DC motors



Controller

Electronic speed control follows a speed reference signals derived from a throttle lever, and varies the switching rate of a network of field effect transistors[FETs]. BY adjusting the duty cycle or switching frequency of the transistors, the speed of the motor is modified.

Brushed motors can be vary or controlled its speed by varying the voltage on its armature. voltage on its armature. (Industrially, motors with electromagnet field windings instead of permanent magnets can also have their speed controlled by adjusting the strength of the motor field current.)

A brushless motor requires a different operating principle. The speed of the motor is varied by adjusting the timing of pulses of current delivered to the several windings of the motor. Brushless ESC systems basically create three-phase AC power, like a VFD variable frequency drive, to run to brushless motor.

Features of controller

- It supports the following modes they are torque, speed and balanced mode operation.
- low EMC
- It gives battery protection when there is current cutback, warning and shutdown of configurable high and low battery voltage.

Battery

EV's select mostly rechargeable batteries because whenever the ordinary battery was drained it's waste of buying new one. Battery system in use include lead-acid [SLA], nickel-cadmium [NiCad], nickel-metal hydride [NiMH] or lithium-ion polymer [Li-ion}. Batteries are vary according to some terms like voltage, total charge capacity and weight.



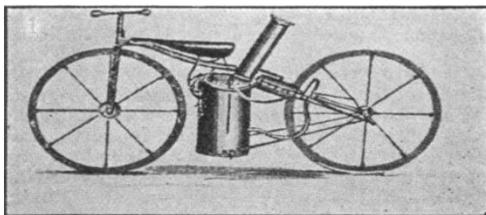
lead-acid battery

Even without batteries vehicles can run with the help of solar energy. But even we are using solar energy we need battery to store solar energy into chemical form and use for further time. In this project we are using 48v lead-acid battery current rating; 20amp lead-acid batteries are one of the most successful recycling program in the world.

Throttle

Here we are using twistgrip to control speed of throttle. It is commonly found on motorcycle handlebar grip to control the throttle. The first use of twist grip throttle control was on the Roper steam velocipede of 1867-69.

Rather than a sleeve that rotated around the handlebar, Sylvester Roper's steam motorcycle's entire handlebar rotated, with a dual mode operation. When it rotated forward it will open the throttle, and when it rotate backwards it will applied the spoon brake.



18th century throttle controller

Types of throttles

- Thumb throttle
- Half twist throttle
- Full twist throttle

At present situation the using of throttle was updated and more advanced. Now a day's all are preferring full twist throttle.

Full twist throttle

This type of throttles are used in all bikes to control the speeds of vehicle. Its look like bike handle and fit correctly to

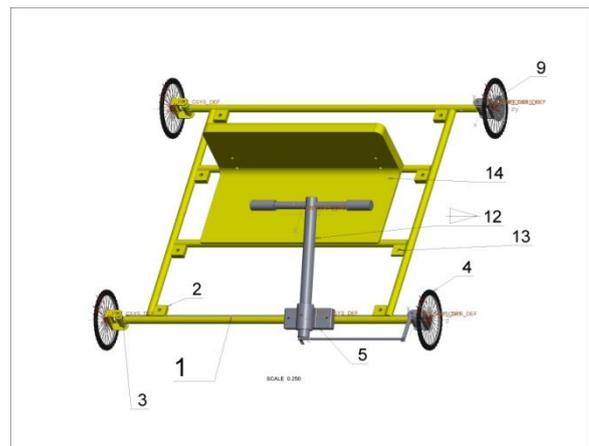
handle. To operate throttle simply put hand on the handle and turn to your side for acceleration and for slow down turn to opposite direction.



full twist throttle

This type of handle bar as some disadvantages like when we fall down its may get broke or damaged. Throttle continues all the way to the end of the handlebar, bumping into walls, doorways and even handlebars of other bikes. If some-one didn't have knowledge about throttle if they turned it may damages us. I've personally seen this happen a few times.

Construction



It contains following components shown in figure

1. **Chassis:** It is the backbone of every automobile. The entire component is mounted in it. We are using steel-based fame more rigidity and for better strength.
2. **Square blocks:** Take steel sheets and cut into square shapes as per required dimensions and drilling holes to alof them..
3. **Knuckle joint:** This joint is used to connect two røds which are one is fixed another should move. Example like Ackermann steering system.
4. **Front and rear wheel:** It is a main component of an automobile. There are many type of wheels are available in market with high specs. However, we are using
5. **Pedestal bearing:** this type of bearings are use to support for rotating shafts. We are suing this type of bearings to operate handle.

6. **BLDC motor:** motor is use to drive the rear wheels with connection of chain system to sprocket.
7. **Controller:** It is placed between motor and battery and connected to throttle. The power is divided as how much throttle is turned.
8. **Battery:** It covertes the chemical energy to electrical energy and send to motor to drive.
9. **Sprocket:** sprocket is a tooth wheel. Which consists of number if teeth. Sprocket is connected to rear wheel for driven by motor
10. **Chain:** A Chain is an array of links held together with each other with the help of steel pins. Chain is joined between motor and sprocket.
11. **Brakes:** Brakes are used reducing speeds or prevents from moving. Here we are using RIM brakes
12. **Cycle handle:** It is used to control the vehicle and give directions as well.
13. **Nut and bolts:** Nut and bolts are used for joining two parts. In this project we used different type of bolts, nuts and washers.
14. **Seat:** It is mounted top of the frame and two members can sit easily.

Conclusion

With the help of this research papers we are able to design an EV's which may be the solution to our problems which are experience now a days like traffic, pollution, parking difficulties and many more.

We innovate a idea to develop a portable electric vehicle which increases thinking about the use of electric vehicles.

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