SELF CHARGING ELECTRIC BICYCLE

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Abstract: In this paper, a traction system useful for an autonomous Electric Vehicle of individual use is described. The developed system is constituted in a first approach by two different power sources: one is constituted by batteries and the other by the dynamo. This paper describes a technical solution joining and accomplishing the usage of two energy storage systems in the same traction system. In the developed system, the dynamo run as element that store energy temporarily and that can be used to retrieve energy. Starting from the functional characteristics of typical electrical vehicles and characterization of a typical routing profile, the energy consumption is obtained. In order to characterize and design the system, this is described in detail, namely the battery, the dynamo, the power converters and the implemented strategy of control. According to the obtained results, a control strategy that allows an effective management of the stored energy in the system regarding the vehicle's optimal functioning and increasing its autonomy is also presented and discussed.

KEY POINTS: Cycle, Motor, Dynamo, batteries, Controller,

1. Introduction

In the modern societies, the increasing needs of mobility means sometimes increasing the number of vehicles circulating. Ambient concerns, as for instance local Electric bikes are new and promising form of urban transportation. The electric bicycles can progress both cleaner development and moreover a lesser dependent on oil and gas. There is no need of fuel or coolant to run the electric bike as compare to other automobiles. The electric bikes provide safe and comfortable transportation at free of cost. Electric bikes are ecofriendly with nature as they do not emit any pollutant gas in the atmosphere pollutant emissions for the atmosphere, influence also, in nowadays, the technical decisions related with all kind of vehicles. Picking an engine was the initial phase in making a suitable framework for the electric bicycle. Electrical bicycle uses an electric motor, alternator and battery system, in which riders have to pedal the bicycle and the generated electricity in the generator, is stored in storage battery. The stored energy can be used for riding the bicycle. Electrical bicycle can be used for a variety of purpose. At first, the task was to be driven by DC miniaturized scale engines that were arranged to turn a sprocket. The sprocket is utilized to transmit revolving movement between two shafts. In this context, new alternatives to the existing internal combustion engines are mandatory. So, vehicles with electric propulsion seem to be an interesting alternative. The electric bicycle is an errand that can progress both cleaner development and moreover a lesser dependence on oil. It will continue running on clean electric power with the ability to resuscitate the battery. This is our opportunity to contribute a greener and more profitable planet.

2. Technologies Used

1. Cycle is driven by using 24V DC motor of 250W.
2. The battery is connected to the controller which maintains the current flow.
3. The speed of motor is controlled by the throttle which is connected to the controller.
4. The battery is charged using 24V DC dynamo.
5. Using flywheel for the continuous and fast rotation of dynamo while the bicycle is driven.
6. The shaft of the dynamo is connected to the rear wheel of the cycle using chain drive and freewheel.

3. Methodology

To achieve the above stated objectives, the following methodologies are to be used:-

1. A mathematical vehicle model will be developed and MATLAB simulation will be carried out for evaluation of power and energy requirements for a plug-in hybrid electric two wheeler for different driving cycles.
2. A simple control strategy has to be developed for Indian city driving conditions with less fuel consumption for reducing emissions.
3. A conventional two-wheeler will be converted into a plug-in hybrid electric two-wheeler by retrofitting a hub motor in the front wheel.
4. Experiments will be carried out on engine and electric hub motor to estimate the power and torque requirements for various operating conditions.

5. A detailed investigation will be carried out to estimate the battery energy and power requirements for various conditions.
6. A cost benefit analysis will be carried out to estimate the battery pack cost and its payback period.
7. An assessment of annual petroleum saving and greenhouse gas emission reduction from the two-wheeler segment in India in the next decade will be carried out using a simple emission model.
8. The controller is powered by batteries which are placed in the control box.
9. Controller connects the main electrical components: the throttle and electric brake assembly and also the Hub motor. The throttle sends signal to the controller and based on these signals the controller sends output to the hub motor.
10. Firstly the Hub motor was fit on to the rim using spokes.
11. The fabrication was carried out keeping in mind the maximum load the motor will be able to withstand.
12. Various fabrication processes were carried out.
13. Tube cutting for the construction of chassis.
14. Edge grinding to provide smoother surface finishing.
15. Welding to join the tubes to form a stable chassis.
16. All the fabricated parts were assembled.

4. Advantages

1. In day to day life the prices of the fuels are increasing rapidly. Within few years the common man couldn't afford the fuel powered bikes due to the price.
2. To maintain economy, save money and to save fuel.
3. To encourage ecology.
4. To reduce transportation cost.
5. To make ride comfortable for everyone.
6. To eradicate pollution.
7. Low maintenance cost.
8. Easy and free parking.
9. Weight is lesser compared to motorbikes.
10. To design an electronic circuit that can be appended to an existing hardware (a system comprising a bicycle, a DC generator and a lead-acid battery) that will make the charging process more comfortable for the user and increase the life-time of the batter human transportation as a personalized vehicle.
11. In industries for different level personnel to move around to inspect the work progress. In hospitals, Airports, Shopping malls, IT campuses, Hotels &resorts, Power stations, manufacturing units, etc..
12. Lightweight & easy to control, makes convenient for use by anyone.
13. Controlled speed ensures rider's safety.
14. Can be used by old aged demography.
15. On site charging facility. No need to visit fuel station.

5. Disadvantages

1. The motor gets heated after so it cannot run for too long hours.
2. The motor cannot carry more than 2 people as there is load limit.
3. Electric bikes do not have too much speed like petrol engines.

6. BILL OF MATERIALS

1 Cycle	1,100
2 24v DC Motor	4,500
3 Controller 350W	700
4 Throttle	350
5 Reverse Threaded Freewheel	300
6 24V DC Dynamo	1,500
7 Flywheel	270
8 Crank	220
9 Batteries	1,200
TOTAL	10,140

Fig.1. cycle

- It is most economical means of transport, it uses muscle energy for it's working.
- Cycling enhances the stamina of cyclists and also helps in strengthening the muscles.
- It doesn't require much space for parking

Fig2: motor

- It is an 24V Dc geared motor .
- Which is used to drive the cycle
- Which is controlled by controller
- And its can be accelerated by throtal

Fig.3. dynamo

- It's use in our project to charge the battery while discharging.
- When cycle is running dynamo generate dc current and charge battery's
- When Cycle is in running position we will connect dynamo with motor

Fig.4. battery

- It's a 24V lead-acid battery.
- It is used to supply electricity to motor to run.
- It will be charge with the help of dynamo.

Fig.5. controller

- It is used to drive and control the motor.
- It is analogous to the human brain, processing information and feeding it back to end user.

7. CONCLUSION

1. Electric bikes are vital part of our future as it makes transportation affordable, quick, easy and convenient.
2. One of the key reason for the increase in electric bike is that batteries and motors have become high efficient, durable and light weight.
3. No need to charge the battery externally as there is dynamo inbuilt through which battery is charged.
4. If you want to charge battery externally you can charge using an adopter or eliminator and you can also add solar panel if you are able to bare the expenses.
5. With an electric bike you don't need to worry about paying for any sort of special license or registration.
6. Electric bikes are one of the cheapest way of traveling.
7. Electric bike riders can tailor the difficulty level of their rides to meet their unique health and fitness needs.
8. You can go peddling incase the battery is totally discharged.
9. The discharged battery gets recharged as you keep peddling or riding the bike.

Fig.6. Fabricated self-charging electric bicycle.

8. REFERENCES

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