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An innovative solar powered electric bicycle

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ABSTRACT

The project is based on the microcontroller with automation technology, it consisting of components such as ATMEGA328 and PIC30F2010 as a controller, three phase inverter, solar panel, hall effect sensor, variable resistor etc., In the existing system, a traditional bicycle is a two-wheel vehicle that is propelled by the rider who delivers 50% muscle power through pedals that rotate one of the two wheels and 50% motor powered to rotate the wheel for riding the bicycle, the motor used in the existing system is brushed dc motor, it has less efficiency. Electric bicycle have simultaneously gained popularity in many regions of the world and some have suggested that it could provide an even higher level of service compared to existing systems. In proposed system an electric bicycle carries batteries that deliver electric power to a motor that is coupled to either wheel, the motor used here is brushless dc motor, it has high efficiency. The project consist of additional features such as LCD display, umbrella, mobile charger, Bluetooth connectivity, and speaker.

Keywords: BLDC motor, solar recharging, Bluetooth

INTRODUCTION

Motor powered bicycle have been making their way into the United States market for about two decades. In the U.S, such bicycles can be fully powered by a motor. In other countries such as Japan, electric-motor-powered bicycles are required to operate with 50% human pedal power for up to 12 mi/h, and even higher percentage of human power is required above that speed. Such bicycles are commonly known as "ped-elecs" (pedal electric cycle). In this project, the term "electric bicycle" is used to describe "electric-motor-powered bicycles," including both fully and partially motor-powered bicycles. Electric bicycles can be used for a variety of purposes, for instance, as a vehicle for police or law enforcement in cities where parking and traffic are a problem, as a guide bicycle during bicycle races, as a park ranger vehicle, or for leisurely rides and commuting purposes. This electric bicycle uses a compact circuitry built around microcontroller DSPIC30F2010 and ATMEGA328 programs are developed in Embedded C. The power requirements and different riding speed situations are also identified and display on LCD. The results are confirmed by experimentally obtained.

Issues and Challenges Involved in the Present work: A traditional bicycle is a two-wheel vehicle that is propelled by the rider who delivers muscle power through pedals that rotate one of the two wheels. The rider steers the front wheel to create a force that returns and maintains the vehicle center of gravity into a stable zone whenever necessary, thus keeping the bicycle upright. An electric bicycle carries batteries that deliver electric power to a motor that is coupled to either wheel. In most electric bicycles the rider can chose to use muscle power to deliver all, part, or none of the propulsion power required to maintain an adopted travel speed. Some models even sense pedal pressure and command the motor to deliver more power whenever the rider pedals harder. So no other advanced features in existing system.

Existing system:

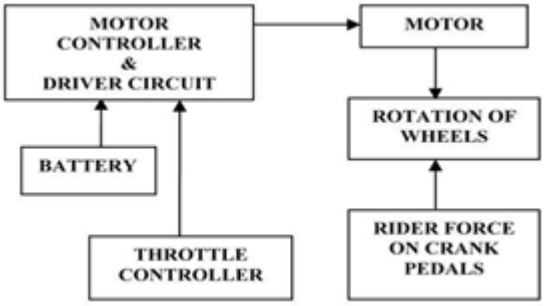

Figure.1. Block diagram of PV Electric Bicycle

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Scope and Objectives of the Present Work: The aim of this project is based to reduce pedal force from the human and riding the bicycle by using solar charged battery. It can be self-energized easily.

Formulation of the Problem: In existing system brushed dc motor has been used.Expensive battery has been used as battery source. No self-energization. No extra features. Simulation result is carried out in MATLAB platform.

Methodology of Present Work: Rheostat variable resistor control method is used to control the speed of the vehicle. Solar panel is implemented for charging the battery. Hub motor is implemented, the "Hall Effect" sensor is inbuilt. Embedded C tool is adopted.

Present Work:

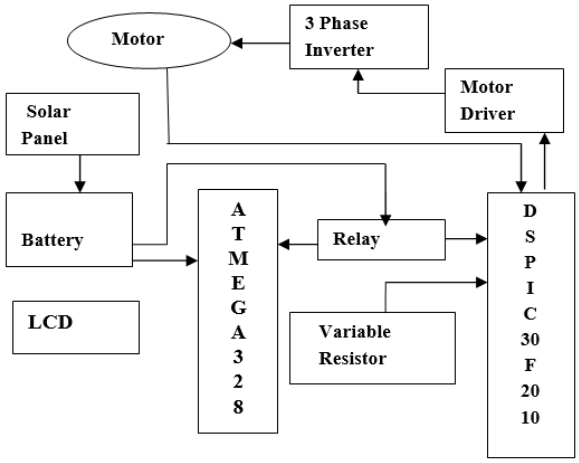

Figure.2. Proposed Solar Bicycle

Experimental Work – Details: The bicycle itself had no gear and therefore before the motor may draw up to 40A with a 36V battery for 20kms. Since then, the conception of the electric bicycle became possible and sensible. Because the years progress, additional and additional electrical bicycles were made with varied driving mechanisms. The electrical bicycle offers a cleaner various to travel short-to-moderate distances instead of driving a petrol/diesel-powered automotive. The value of crude has multiplied considerably over the past few years and it looks to be no turning back, the electrical bicycle could be a project which will promote each cleaner technology also as a lesser dependence on oil. It'll run on clean power with the flexibility to recharge the battery three separate ways: through the 120V AC wall supply, by generating power through the pedals of bicycle dynamo and by solar-cell generative power. Fashionable electrical bicycles integrate many inventions from technology and style, significantly within past year. The Speed will be sensed and feed back to the PIC Controller. Battery and Speed will be indicated in LCD display using ATMEGA Controller.

Figure.3. Photograph of Front Elevation

RESULTS AND DISCUSSIONS

This e-bicycle is used for police or law enforcement in cities where parking and traffic are a problem. It can be used as personal transporter inside the colleges and schools. This Electric Bicycle run in an efficient manner with the voltage of 37V for 20 km. The Battery level can be displayed in a LCD display and its eco-friendly. It has extra features like mobile charging capacity, Bluetooth and roof facility.

Figure.4. Photograph of Proposed PV based Bicycle

CONCLUSION

Bicycle use is known to be healthy, efficient, and environmentally friendly and in some localities is even faster than driving (either due to traffic conditions, or the distance of available parking spaces from origin and destination respectively).A number of different aspects thrust the use of electric bicycles in different situations. These include lower energy cost per distance travelled for a single rider, savings in other costs such as insurances, licenses, registration, and parking, improvement of the traffic flow, environmental friendliness, and the health benefit for the rider. This paper shows the design of an electrical drive for a motorized bicycle is described, using commercial components available on the market. In this paper , we have proposed electric propulsion system using BLDC motor with sensory speed control along with smooth running operation is shown. The system performance can be improved if renewable energy sources like solar power can be employed and making the world a much better as a safe driving.

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