Article ECORFAN Journal
June 2016 Vol.2 No.2 1-4

Hybrid Electropedaleo-Solar Car

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Received January 11, 2016; Accepted June 13, 2016

Abstract

The hybrid Vehicle combine the electric car system with a mechanic system driven, given a versatility vehicle with three operation modes, one is through an electrical system using a main battery, the next mode is using the mechanical driven based on a bicycle system and the third mode is combined using the electrical system and the mechanical driven. In the electrical system is included a solar charger system to an auxiliary battery, it provides the enough energy to load the second battery until the vehicle is parked or it is moving, getting with that more use of the vehicle on the electric system. Another function is that the battery charge system can be using a common electrical outlet with 110 ACV. Achieve learning of power systems based on alternative energy, involving students in projects where the theoretical concepts are applied in the generation of a functional prototype. The objective has been achieved through the development of projects done in labs and classrooms, also seek participation in local and extramural events specifying competition in order to test and overcome the knowledge acquired.

Hybrid, Solar, Vehicle

Citation: ARELLANO-YAÑEZ, Ricardo & LOPEZ-REYES, Fernando Octavio. Hybrid Electropedaleo-Solar Car. ECORFAN Journal-Republic of Paraguay. 2016, 2-2: 1-4.

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Introduction

One problem with solar vehicles is their deficiency on cloudy days as well as for use at night.

A solar vehicle depends directly on the solar panels therefore it is not possible to consider the use of solar energy alone.

A hybrid vehicle provides the solution of use and efficiency to a solar vehicle, when using another system of alternative impulse combined with the electrical part.

Solar vehicles are an alternative of self-sustaining vehicles capable of moving people, using clean energy, such as solar energy.

However its deficiency by the cloudy days or at night can be compensated realizing the suitable combinations to obtain a hybrid auto with capacity to be driven by mechanical energy and even to be able to recharge auxiliary batteries in order to increase its versatility.

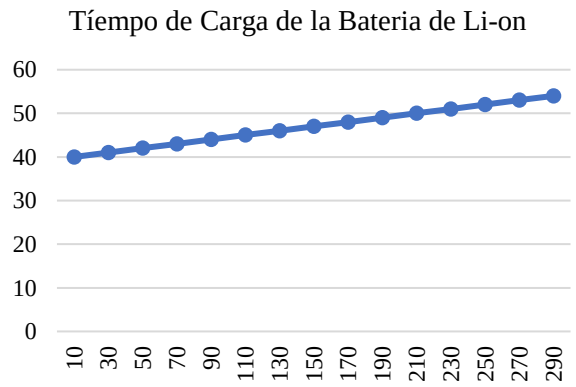
The vehicle UTNA Solar 1, is a solar hybrid vehicle with characteristics of electric auto and mechanical impulse that is with an electric system of motor to batteries and of a transmission of chain with pedaleo.

It achieves its greater efficiency when combining both characteristics, can be moved with the electric motor and at the same time pedal assisting both systems, causing the engine to give part of the impulse and the pedalear complements this impulse making a pedaling more comfortable and minimizing the effort of the motor Extending the payload of the battery.

In addition, the vehicle UTNA Solar 1 can be driven by any of the impulse systems, you can choose to move it with the electric system or just pedal.

The electrical system relies on two Li-on batteries from 48 volts to 30 amps, one of which is connected to the electrical impulse system by activating a 1500 Watt (2HP) motor, leaving the other battery as an auxiliary to be charged by the Solar system, having a battery exchange system for when the main is discharged using the charged auxiliary battery and allowing the discharged battery can be charged by the solar system or failing that with a home outlet without special features. If there is the case of both batteries discharged you can use the pedaling and move the car.

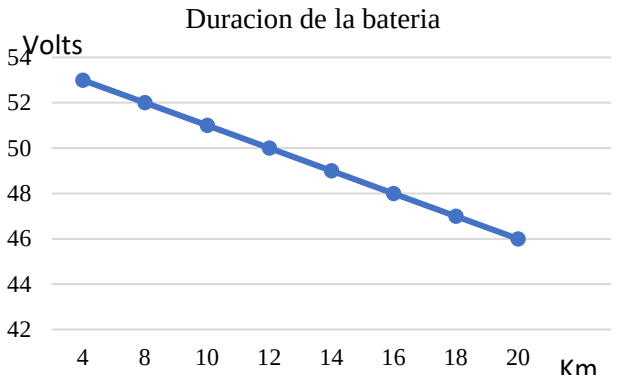
Charging the Li-on battery takes an average of 3 to 4 hours



Graphic 1 Charging Li-ion battery

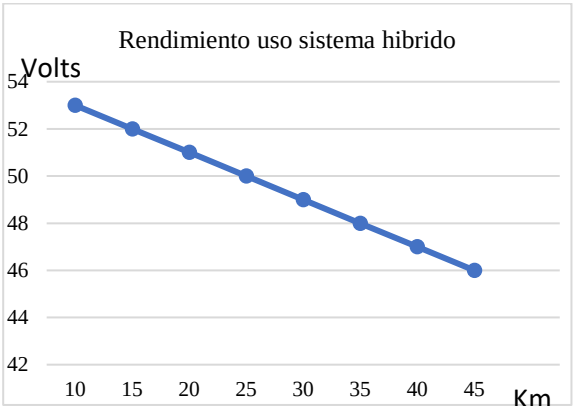
The use of the vehicle UTNA Solar 1 has a performance of approximately 20 to 25 km of travel by a charged battery and at an average speed of 20 to 25 km / h

ISSN-On line: 2414-4827



Graphic 2 Battery performance (voltage vs. distance traveled)

It improves the performance making use of the hybrid system which means pedaling and electrical system up to 45 km while maintaining an average speed of 20 to 25 km / h.



Graphic 3 Performance with hybrid system (voltage vs Km of course)

Increasing the speed decreases the yield of distance traveled to an average of 15 to 20 km with a battery charge and when the exchange of battery charged by the solar system can be added on average another 15 to 20 km, ie with 2 battery charges you can have a total of up to 60 km of travel, this would be an ideal for a medium-sized city. The vehicle complements its use considering in the last case, pedaling without the electrical system.

It is also important to note that the vehicle lighting system such as directional lights, high and night lighting, is provided by an automotive type alternator that is also charged with the solar system. It is important to mention that the number of passengers is one person each trip. The vehicle, if not used 60km a day, can be used at night if one of the two batteries is kept in an electric system, pedaling or hybrid. The vehicle can be charged overnight in a 110 VAC household type electric outlet and use the next day in any of its modes. Also the vehicle will be charged, while there is sunlight and it is even parked.

Figure 1 UTNA vehicle Solar 1

Methodology

The vehicle was made based on home-type solar systems proposing that the solar battery charger be included in the vehicle, also proposed the electric motor system for electric bicycles to create an electric-mechanical hybrid system.

Results

The result obtained is an electric-mechanical hybrid vehicle, which takes advantage of sunlight to charge the batteries that provide the electric power to the engine. Having the versatility of the mechanical impulse by pedaling, electrical and hybrid system.

ISSN-On line: 2414-4827

Aknowledgement

The support given before, during and after the development of this vehicle, as well as the financing of the same to the Technological University of Aguascalientes by its corresponding authorities is appreciated

Conclusions

A favorable result is obtained according to the proposed one, being this hybrid electric-mechanical vehicle, giving direction to the development of new prototypes, thinking in the academic development as well as to take them to compete for greater learning and achievement of the competition in the Participating students and teachers.

References

Manual de Apoyo Curso gratis Energia Solar CEMAER, 2015 Centro de Estudios en Medio Ambiente y Energias Renovables.
Abril 2015, http://energia.cemaer.org/curso---gratis---amigos/

http://wing-ebikes.co.uk/wp-content/uploads/2015/01/S-LCD3-Operation-Manual.pdf
S-LCD3 eBike Display User Manual
Wings e Bikes