

SOLAR ELECTRIC VEHICLE

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ABSTRACT:

People are becoming more aware of the benefits to our environment when using devices that combine electrical technology and renewable energy. This interest in renewable energy has been growing rapidly since people have been noticing the effect non-renewable energy's been having on our environment. In order to preserve our environment, researchers have been studying ways to utilize renewable energy in better ways, using solar energy for instance. With that in mind, the increase in fuel prices all around the world created the need to find alternatives by attaching solar energy to charge batteries which provides voltage to run the motor. Also, by using solar energy it has less negative impact on the environment, so it can reduce the danger in the environment. In addition, solar energy can be applicable everywhere. We can put solar energy in houses, cars, trains, lights, streets, etc.

Designing the project, we specifically focused on how to use as much solar energy as possible to allow the bike to move for the longest time possible by storing the solar energy and allowing the bike to use it whenever it needed to recharge. We took a bike and designed it so the top roof top will be the photovoltaic panel and we insert a tracker for the sun so that it can track the sunlight.

1. INTRODUCTION:

Global warming is one of the major problems the world has been facing due to pollution and other factors that lead to the increase of carbon dioxide in the atmosphere. People have been looking for

many solutions to help decrease this problem and to avoid causing more damage to the earth. A huge factor that has been playing a large role in causing pollution and therefore increasing the effect of global warming is car exhaust as recorded in 2004 (IPCC 2007, p 29).

People have been looking for alternatives to this problem which lead them to focusing on studying and learning different ways to create environment friendly methods of transportation.

As people are becoming more aware of the negative effect climate change has towards our planet, electrical bikes have been increasing in popularity. Many people are using it as their main form of transport as it is very convenient and does not contribute to global warming.

Specifically, in countries where one of their main source of transport is bikes, China for instance have been selling 9 out of every 10 electrical bikes are sold (Navigant Research, 2014).

2. LITERATURE REVIEW:

As people are gaining more knowledge on the horrible effect fuel has on our environment they are constantly searching for less harmful alternatives. Renewable energy is one of the main sources that has been becoming very popular and more commonly used now days. People have been relying more and more on it as it doesn't have a negative impact in our popular being used in many devices such as lamps, chargers and cookers.

3. ANALYSIS AND DESIGN:

3.1 Overview

In this section, system requirements are formulated in a shape that will be converted into system functionalities based on the detailed gathered during the project initialization phase. Business requirements will be defined here supposed to meet the functionalities the system will perform such as mainly to run the motorcycle based on solar energy received.

Also, all hardware components and related details will be discussed in this section of the report, in addition to the cost analysis conducted to clarify project budget including the price of each component, development cost, connections, and any other considerations that should be added to the project budget.

3.2 System Initial Design

The solar based motorcycle is a simulation for electronic bike that would help in finding an effective alternative of fuel-based vehicles as an approach to reduce power consumption and as a step to be considered within the global plan for the renewable energy. System designed to generate the required energy with less power consumption by reducing the mechanical movement in the project. The project is developed to develop a transportation method to move from location to another using one of the renewable energy resources which is the sun that performed through using LDR sensors, which are responsible to get the light intensity data and send it to the microcontroller to take the proper action.

4. System Requirements:

4.1 Functional Requirements

Solar powered motorcycle system will perform several functionalities to achieve the expected outcome as follows:

Receive energy from the sun and store it in a battery.

Rotate the sun tracker to follow the light and intensity.

Rotate the solar panel in different directions.

Detect sunlight intensity and collect the required power.

Move the bike based connecting and disconnecting the circuit using the stored energy in the battery.

4.2 Non-Functional Requirements

4.2.1 Usability

Usability, simplicity and functionality of any system make it successful. Before starting the system, the user requirements will be specified in details. After that there will be research about the required hardware needed such as sensors and electrical components will be specified. Each component will be tested independently to be sure that it fulfills the required operation

Usability defines the ease of use and the acceptability of the system for the users. There are many methods to measure usability such as analysis and study of the principles behind the efficiency. Below are some measurements included for assessing usability:

- **Efficiency.** How much effort and resources the user provides to achieve those objectives successfully.
- **Satisfaction.** Reflect how much the stakeholder is satisfied with the delivered project.

4.2.2 Performance

The system performance should be optimized, and response time to the user request should

be minimized to the lowest.

4.2.3 Scalability

The system should be highly scalable; since it is meant to be used by public people not

only in Kuwait, but the ambition to reach the global as one of the renewable energy researches applications.

4.2.4 Extensibility

The system should be extensible to allow adding other services in the future, such as move

into a longer distance and ability to receive bigger amount of power and energy.

REQUIRED EQUIPMENTS:



Figure:PV Solar Panel



Figure:Dc Motor



Figure:Ac Motor



Figure:Battery



Figure:Inverter

5.MECHANICAL IMPLEMENTING:

After thinking of the design, we bought the bicycle that we will work on and the steel we need to build the mounts that will hold the solar panel and the bracket that will hold the panel while the sun tracking works. After buying the metal and the bicycle we started the welding process of the mounts for each component. We welded four metal pipes for mounting the solar panel on top of the bike then we welded a base that will hold the panel while moving with the sun. we also welded two foot rests for the driver to put his/her leg on.



Figure:The Electrical Components Mounting



Figure:Mounted Components Under the Seat

6.CONCLUSION:

To conclude all our work, in this chapter we will be talking about the progress and results we reached through our development and research of our solar powered bicycle. We had two stages to create our project, the first four months was the capstone I course which was focused on research following it was capstone II course where we implemented our findings. Our project idea was to create a solar powered bicycle that powers itself through energy obtained from solar panels as well as sun tracking.

During capstone one course, we did a lot of research on our project. We focused on how solar panels worked and which type would be the best one for us to use in our project. We researched different solar powered bicycle projects to help us obtain better insight on how we will be implementing our design. We created a prototype which was a smaller version circuit of our sun tracking device and motor for our bicycle with a miniature wheel.

We struggled with creating the circuit at first, but with several attempts and mistakes created we were finally able to create the circuit properly. We had to do intensive research on the mechanical aspect of our project as our knowledge was limited to computer engineering and electrical engineering. We were able to finally fully understand how each component of our project will work and how we are going to be able to construct it. We also attempted to approximate the cost of our project as well as finding out where we are able to find all the components.

After completing all the mechanical aspects of the bicycle, we then focused on the electrical side which includes connecting the circuits that consisted of an Arduino where we needed programming skills to be able to use.

