REVIEW ON SOLAR TRAVELER FOR IN-CAMPUS PERSONAL TRANSPORTATION SYSTEM

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Abstract : Campus traveller is sportive it may not cost substantially more energy to drive the solar campus traveller, When there is no sunlight the batteries are charged the bycle should be running.A solar traveller bycle has the advantage of it can weight upto 80 to 90kg and can use the riders foot power to supplement the power generated by the solar panel. In this way, a comparatively simple and in expensive vehicle can be driven without the use of any fossil fuels.The solar traveller is easily accessible, safe and practical with limited maintenance requirements due to a fewer mechanical parts. It is ideal not only for the experienced cyclists but also for those non athletes, the elderly and individuals with health problems.Normal campus traveller need large and heavy batteries to allow riding long distances, because the battery is charged only once at home. The solar bike approach is different the photo voltaic panels have enough power and give the traveller an infinite range.This traveller is supported with a switch array to move this in different directions using H-Bridge IC. High torque DC motors are arranged for the movement. Solar panel charges the battery for the functionality of all these modules.

IndexTerms **– Traveler, Solar, In Campus**

I. INTRODUCTION

In this we are discussing about the various component which we will use. As we know that there are different types of components are available in market. The components we are using are brushless DC motor, Solar panel, Battery, charge controller throttle. Hand-powered tricycles are presently being used to provide mobility for disabled persons. With this project we designed and manufactured a system to convert the hand powered tricycle to an electric motor powered version. Solar-powered vehicles (SPVs) use photovoltaic (PV) cells to convert sunlight into electricity. The electricity goes either directly to an electric motor powering the vehicle, or to a special storage battery. PV cells produce electricity only when the sun is shining. Without sunlight, a solar powered car depends on electricity stored in its batteries. There are several types of tricycle that can be categories that is paddle tricycle, motorized tricycle, and electric tricycle. The weakness of the tricycle make people do not like to used tricycle. First, paddle tricycle needs a lot of energy to paddle the tricycle. Next, motorize tricycle that used fuel as it prime mover. The tricycle use fuel that is costly. Besides that, motorize tricycle will make pollution that can be very bad for our environment especially in this period that global warming happen to the earth. Lastly, electric tricycle that generate by battery can be only be sufficient for about an hour. The user needs to find power supply to recharge the battery or else they need to paddle the tricycle that used more energy compare to the normal tricycle because of the weight.

II. COMPONENT DISCRIPTION

2.1 Solar panel :

Photovoltaic is the field of technology and research related to the devices which directly convert sunlight into electricity. The solar cell is the elementary building block of the photovoltaic technology. Solar cells are made of semiconductor materials, such as silicon. One of the properties of semiconductors that makes them most useful is that their conductivity may easily be modified by introducing impurities into their crystal lattice. For instance, in the fabrication of a photovoltaic solar cell, silicon, which has four valence electrons, is treated to increase its conductivity. On one side of the cell, the impurities, which are phosphorus atoms with five valence electrons (n-donor), donate weakly bound valence electrons to the silicon material, creating excess negative charge carriers. On the other side, atoms of boron with three valence electrons (p-donor) create a greater affinity than silicon to attract electrons. Because the-type silicon is in intimate contact with the n-type silicone p-n junction is established and a diffusion of electrons occurs from the region of high electron concentration (the n type side) into the region of low electron concentration (p-type side). When the electrons diffuse across the p-n junction, they recombine with holes on the p-type side. However, the diffusion of carriers does not occur indefinitely, because the imbalance of charge immediately on either sides of the junction originates an electric field. This electric field forms a diode that promotes current to flow in only one direction. Ohm metal semiconductor contacts are made to both the n-type and p-type sides of the solar cell, and the electrodes are ready to be connected to an external load.

When photons of light fall on the cell, they transfer their energy to the charge carriers. The electric field across the junction separates photo-generated positive charge carriers (holes). From their negative counterpart (electrons). In this way an electrical current is extracted once the circuit is closed on an external load. There are several types of solar cells. However, more than 90 % of the solar cells currently made worldwide consist of wafer-based silicon cells. They are either cut from a single crystal rod or from a block composed of many crystals and are correspondingly called mono-crystalline or multi-crystalline silicon solar cells. Wafer-based silicon solar cells are approximately 200 μm thick. Another important family of solar cells is based on thin-films, which are approximately 1-2 μm thick and therefore require significantly less active, semiconducting material. Thin-film solar cells can be manufactured at lower cost in large production quantities; hence their market share will likely increase in the future. However, they indicate lower efficiencies than wafer based silicon solar cells, which means that more exposure. A number of solar cells electrically connected to each other and mounted in a single support structure or frame is called a "photovoltaic module". Modules are designed to supply electricity at a certain voltage, such as a common 12 volt system. The current produced is directly dependent on the intensity of light reaching the module. Several modules can be wired together to form an array. Photovoltaic modules and arrays produce

Direct - current electricity. They can be connected in both series and parallel electrical arrangements to produce any required voltage and current combination. There are two main types of photovoltaic system. Grid connected systems (on-grid systems) are connected to the grid and inject the electricity into the grid. For this reason; the direct current produced by the solar modules is converted into a grid-compatible alternating current. However, solar power plants can also be operated without the grid and are then called autonomous systems (off-grid systems). More than 90 % of photovoltaic systems worldwide are currently implemented as grid-connected systems. The power conditioning unit also monitors the functioning of the system and the grid and switches off the system in case of fault.

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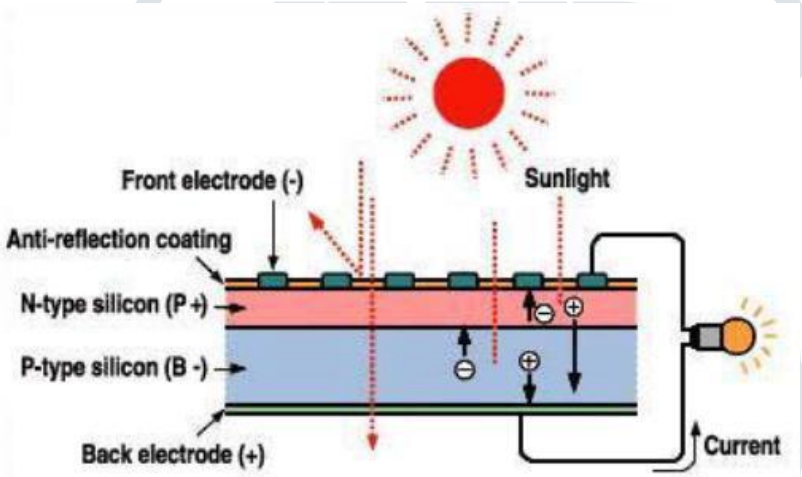

Figure 2.1: Solar Panel

2.2 Motor:

The Brushless DC (BLDC) motor is used as the drive motor for the vehicle. It"s a permanent magnet square wave motor. BLDC motor uses feedback directly of the rotor angular position so that the input armature current can be switched among the motor phases in exact synchronization with the rotor motion..The reason for opting for the BLDC motor is because of its efficiency, noiseless operation, dynamic response and high torque to weight ratio. Brushless DC electric motor (BLDC motors, BL motors) also known as electronically commutated motors (ECMs, EC motors) are synchronous motors that are powered by a DC electric source via an integrated inverter/switching power supply, which produces an AC electric signal to drive the motor in this context, AC, alternating current, does not imply a sinusoidal waveform, but rather a bi-directional current with no restriction on waveform. Additional sensors and electronics control the inverter output amplitude and waveform (and therefore percent of DC bus usage/efficiency) and frequency (i.e. rotor speed). The rotor part of a brushless motor is often a permanent magnet synchronous motor, but can also be a switched reluctance motor, or induction motor.

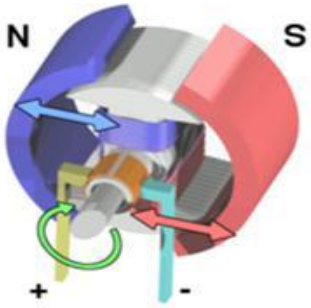

Figure 2.2 : DC Motor

2.3 Lead acid battery:

Lead acid batteries are one of the most popular types of battery in electronics. Although slightly lower in energy density than lithium metal, lead acid is safe, provided certain precautions are met when charging and discharging. This have a many advantages over other conventional types of batteries, the lead acid battery is the optimum choice for a solar assisted bicycle. Current supplied from battery indicates the flow of energy from the battery and is measured in amperes (or Amps) . The higher the current flow faster the battery will discharge. A battery is rated in ampere-hours (abbreviated Ah) and this is called the battery capacity. This project revolves around supplying and utilizing energy within a high voltage battery. It demands for a battery with longer running hours, lighter weight with respect to its high output voltage and higher energy density. Among all the existing rechargeable battery systems, the lead acid cell technology is the most efficient and practical choice for the desired application. The battery chosen for this project was a high capacity lead acid battery pack designed specifically for vehicles. Plastic casing is provided to house the internal components of the battery.

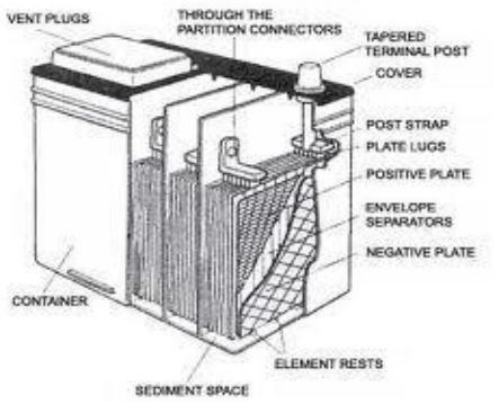

Figure 2.3 : Lead Acid Battery

2.4 Tilt sensor:

Tilt sensors allow you to detect orientation or inclination. They are small, inexpensive, low power and easy-to-use. If used properly, they will not wear out. Their simplicity makes them popular for toys, gadgets and appliances. Sometimes they are referred to as "mercury switches", "tilt switches" or "rolling ball sensors" for obvious reasons. They are usually made by a cavity of some sort (cylindrical is popular, although not always) and a conductive free mass inside, such as a blob of mercury or rolling ball. One end of the cavity has two conductive elements (poles).

When the sensor is oriented so that that end is downwards, the mass rolls onto the poles and shorts them, acting as a switch throw. Tilt switches used to be made exclusively of mercury, but are rarer now since they are recognized as being extremely toxic. The benefit of mercury is that the blob is dense enough that it doesn't bounce and so the switch isn't susceptible to vibrations. On the other hand, ball type sensors are easy to make, wont shatter, and pose no risk of pollution.

Size: Cylindrical, 4mm (0.16") diameter & 12mm (0.45") long.
Sensitivity range: > +-15 degrees
Lifetime: 50,000+ cycles (switches)
Power supply: Up to 24V, switching less than 5 m amp

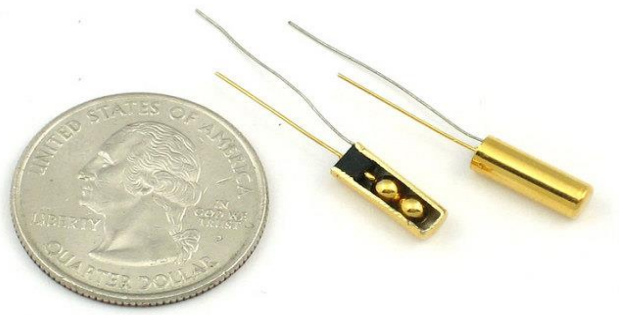

Figure 2.4: Tilt Sensor

2.5 Motor driver (H bridge) :

The L298 is an integrated monolithic circuit in a 15-lead Multi watt and PowerSO20 packages. It is a high voltage, high current dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DC andstepping motors. Two enable inputs are provided toenable or disable the device independently of the input signals. The emitters of the lower transistors ofeach bridge are connected together and the correspondingexternal terminal can be used for the connectionof an external sensing resistor. An additionalsupply input is provided so that the logic works at alower voltage.

2.6 Microcontroller:

Microprocessors and microcontrollers are widely used in embedded systems products. Microcontroller is a programmable device. A microcontroller has a CPU in addition to a fixed amount of RAM, ROM, I/O ports and a timer embedded all on a single chip. The fixed amount of on-chip ROM, RAM and number of I/O ports in microcontrollers makes them ideal for many applications in which cost and space are critical. The Intel 8052 is Harvard architecture, single chip microcontroller (µC) which was developed by Intel in 1980 for use in embedded systems. It was popular in the 1980s and early 1990s, but today it has largely been superseded by a vast range of enhanced devices with 8052-compatible processor cores that are manufactured by more than 20 independent manufacturers including Atmel, Infineon Technologies and Maxim Integrated Products. 8052 is an 8-bit processor, meaning that the CPU can work on only 8 bits of data at a time.

Data larger than 8 bits has to be broken into 8-bit pieces to be processed by the CPU. 8052 is available in different memory types such as UV-EPROM, Flash and NV-RAM.The present project is implemented on Keil Uvision. In order to program the device, proload tool has been used to burn the program onto the microcontroller. The features, pin description of the microcontroller and the software tools used are discussed in the following sections.

III FEATURES OF AT89S52:

- 4K Bytes of Re-programmable Flash Memory.
- RAM is 128 bytes.
- 2.7V to 6V Operating Range.
- Fully Static Operation: 0 Hz to 24 MHz.
- Two-level Program Memory Lock.
- 128 x 8-bit Internal RAM.
- 32 Programmable I/O Lines.
- Two 16-bit Timer/Counters.
- Six Interrupt Sources.
- Programmable Serial UART Channel.
- Low-power Idle and Power-down Modes.

Description:

- The AT89S52 is a low-voltage, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcomputer, which provides a highly flexible and cost-effective solution to many embedded control applications.
- In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functioning. The power-down mode saves the RAM contents but freezes the oscillator disabling all other chip functions until the next hardware reset.

IV CONCLUSION:

The solar vehicle solves many problems related to the environment and is the best pollution free method. We need to make use of them so that we can reduce our dependence on fossil fuels. Solar vehicles do have some disadvantages like small speed range, initial cost is high. Also, the rate of conversion of energy is not satisfactory (only 17%). But these disadvantages can be easily overcome by conducting further research in this area; like the problem of solar cell scan be solved by using the ultra efficient solar cells that give about 30-35% efficiency. As this field of automobiles will be explored the problems will get solved. The solar automobiles have a huge prospective market and we should start using them in our day to day life. We have already completed making a solar vehicle prototype as our project and the vehicle is running.

V References:

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