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DESIGN AND DEVELOPMENT OF POWER CONTROL UNIT FOR OPITIMSATION OF SOLAR BASED POWER CONTROL UNIT FORELETRICAL VEHICAL DRIVE UNIT

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Abstract - This paper described a novel idea implementation for development of power control unit including solar controller system for electric vehicle and its drive unit. The first part of the paper presents a concept of solar vehicle development. The second part of paper describes the design & implementation of solar based converter circuit. The third part of the paper presents testing, analysis and validation of the control unit.

Key Words**:** DC motor, Solar panel, Battery, Wheels, MPPT, Controller.

1. INTRODUCTION

The sizable portion stored in the nature is in the form of chemical compounds (fossile etc), the itoms, and nucli of substances (such as nuclear etc), the flow of rivers, the tides of sea (potential), the wind & heavy solar radiations. These are not in electrical form but needs to convert in the suitable electric form. In brief the,electricity neither occurs in natural form which can be further stored & utilized as per the requirement. Such form of electricity can be generated , stored and utilized for electric vehicles. The development of electric vehicles are based on the basis of major components such as electric motors, drive units etc. & for the same there is need to use S R motors or BLDC or Induction motors for power saving. Such electric motor analysis is present in the paper (1) for novel approch of spice integration for modeling and utilization in the electric drive system. The power optimation is possible if the vertical's dynamic system studied well and utilized. Hence the paper(2) reviews the dynamic equivalent circuit for Letter power optimization study. The motor component is well studied and decribed using software is well studied and described using software presented.

REN21 is a global policy network that provides a forum for international leadership on renewable energy in which ideas are shared and action is encouraged to promote renewable energy worldwide. Its goal is to bolster policy development for the rapid expansion of renewable energies in developing and industrialized economies. Open to a wide variety of dedicated stakeholders, REN21 connects governments, international institutions, non-governmental organizations, industry associations, and other partnerships and initiatives.[3]

This chapter provides an overview of the clean energy sources and technologies in Africa. It concludes with case studies of clean energy projects (potential, ongoing, tried and tested) across the different African countries and highlights the challenges, barriers, and approaches to the development, transfer, and diffusion of new and innovative energy technologies. [4]

2. BLOCK DIAGRAM

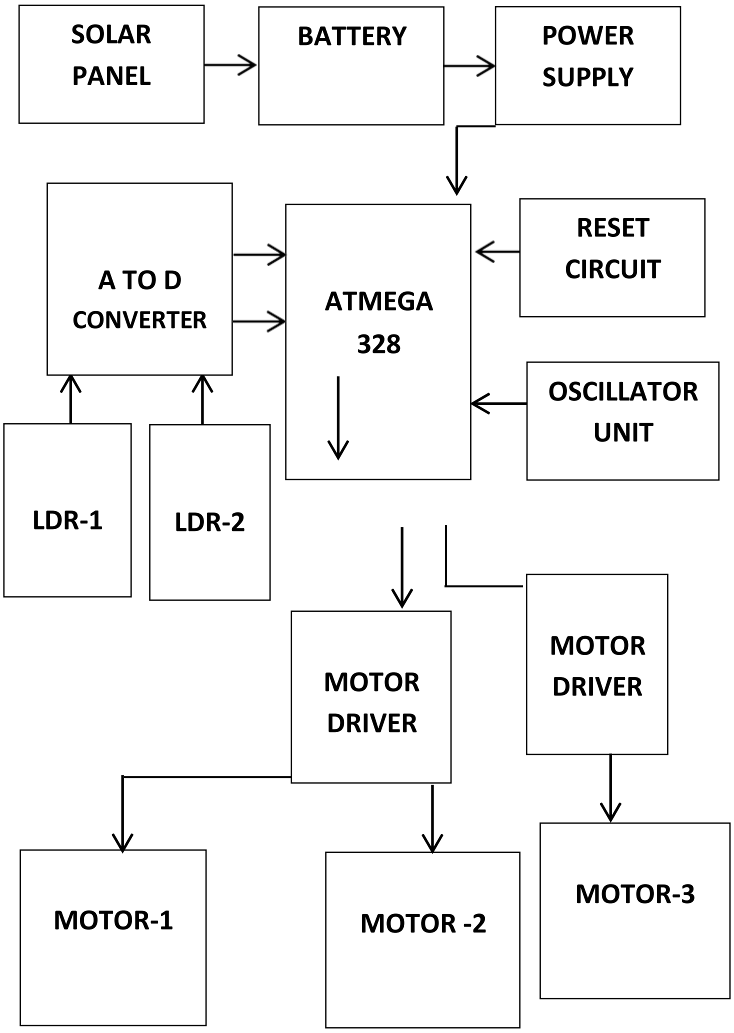

Fig.1: Block Diagram

List of different circuit diagrams

1. Circuit Diagram

Battery is connected to the bridge rectifier. Bridge rectifier is used for maintain polarity and capacitor is connected to the bridge rectifier for filter the supply. After that voltage regulator is connected to the capacitor. 1 k resistor and led for indicating the supply. Atmega 328p is main microcontroller of the circuit. It required basic three things. Power supply, reset circuit, oscillator unit.

Light Dependent Resistors or LDRs are the resistors whose resistance values depend on intensity of the light. As the intensity of light falling on the LDR increases, resistance value decreases. In dark, LDR will have maximum resistance. LDR will output an analog value which should be converted to digital. This can be done using analog to digital converter.

ATmega328 has analog to digital converter internally. It has six ADC channels from ADC0 to ADC5 (Pins 23 – 28). The two LDRs are connected to ADC pins i.e. 27 and 28 in a voltage divider fashion with the help of individual 10KΩ Resistors. ADC conversion is done using successive approximation method.

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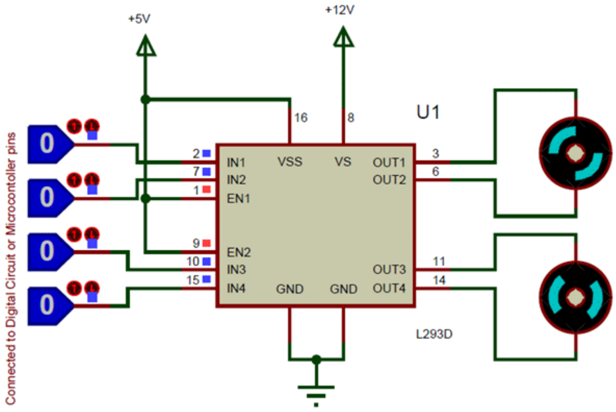

2. Motor driver

Fig.3: Motor Driver

The L293D is a popular 16-Pin Motor Driver IC. As the name suggests it is mainly used to drive motors. A single L293D IC is capable of running two DC motors at the same time; also the direction of these two motors can be controlled independently. So if you have motors which has operating voltage less than 36V and operating current less than 600mA, which are to be controlled by digital circuits like Op-Amp, 555 timers, digital gates or even Microcontrollers like Arduino, PIC, ARM etc.. this IC will be the right choice for you.

3. H-bridge

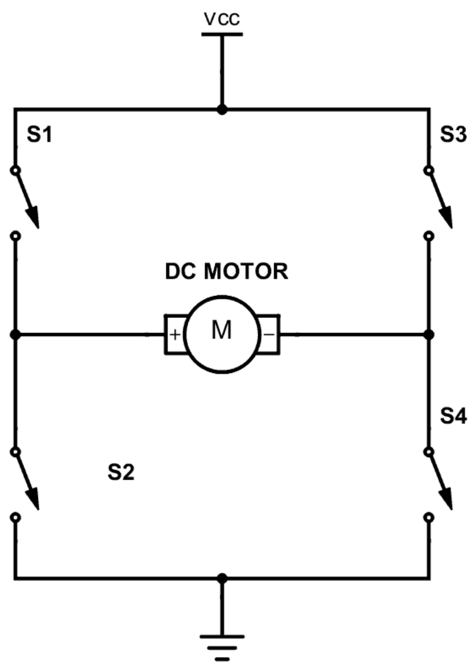

Fig.4: H-bridge

A H-bridge is fabricated with four switches like S1, S2, S3 and S4. When the S1 and S4 switches are closed, then a +ve voltage will be applied across the motor. By opening the switches S1 and S4 and closing the switches S2 and S3, this voltage is inverted, allowing invert operation of the motor.

An H bridge is an electronic circuit that allows a voltage to be applied across a load in any direction. H-bridge circuits are frequently used in robotics and many other applications to allow DC motors to run forward & backward. An H-bridge is fabricated with four switches like S1, S2, S3 and S4. When the S1 and S4 switches are closed, then a +ve voltage will be applied across the motor. By opening the switches S1 and S4 and closing the switches S2 and S3, this voltage is inverted, allowing invert operation of the motor.

4. LDR sensor

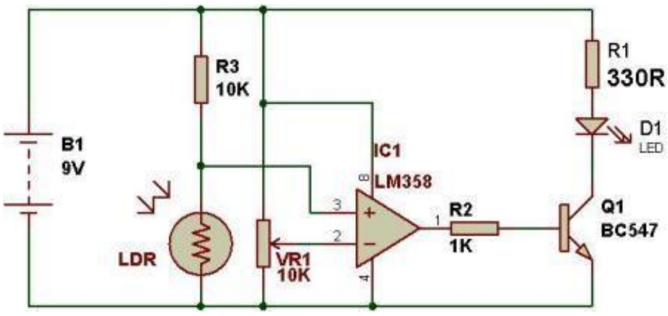

Fig.5: LDR circuit diagram

The LM358 datasheet specifies that it consists of two independent, high gain, internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.
This dark sensor IC LM358 circuit is used to test a light dependent resistor, a photo diode and a photo transistor. But, you need to change a photo diode and the photo transistor in place of LDR. The dark sensor circuit using LDR and LM358 IC is shown below. The required components to build the following circuit is LDR, LM358 IC, 9V battery, resistors R1-330R, R2-1K, R3-10K, variable resistor VR1-10K, transistor Q1-C547.

5. Battery Charger Circuit

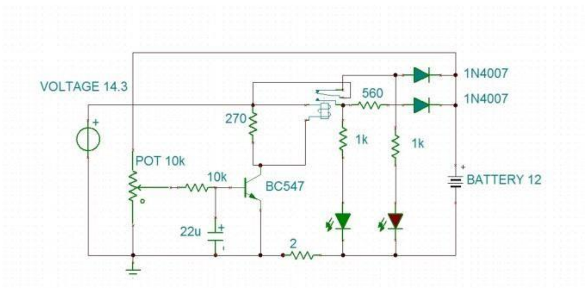

Fig 5: battery charger

3. CONCLUSIONS

Solar energy more specifically solar car would be a tremendous advancement in future technology. They might allow a free travel and unlimited accessibility. They'd allow a free and pollution less travel. Solar powered cars are running without burning fossil fuels makes them a possible solution to our energy crisis. Solar power is clean, renewable and free energy which will supply all the energy needs of the globe. This energy is pollutant free with no emissions of greenhouse gases released into the air whatsoever. With the rising concerns over warming and temperature change, this can be one among the foremost important reasons to pursue developing more ways to utilize alternative energy. The employment of alternative energy for private mobility seems ripe for passing from prototypical applications to commercial products. The mixing of photovoltaic panels in electric and hybrid vehicles is becoming more feasible, thanks to the increasing fleet electrification, to the rise in fuel costs, to the advances in terms of PV panel technology, and to the reduction in their cost. Of course, these vehicles cannot represent a universal solution, since the simplest balance between benefits and costs would rely upon mission profile: specifically, significant reductions in fuel consumption and emissions may be obtained during typical use in urban conditions during working days. Moreover, the mixing with solar power would also contribute to cut back battery recharging time, a critical issue for Plug-in vehicles, and to feature value for Vehicle to Grid applications.

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