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Electrical Vehicle through Solar Panels and Wind Turbines

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ABSTRACT: In this paper we are introducing an updated version of charging of batteries through renewable energy grids. The major sources of this charging by solar panels and wind turbines. A voltage regulator is used to produce a constant voltage at the output side. Buck-Boost converter is used to convert the low voltage DC [LVDC] to high voltage DC [HVDC]. A rectifier circuit is used only at the output of the wind turbine which rectifies the harmonics produced. This power is stored in the battery. The output of this battery can be used for any type of electrical component. However, we are using a switching mechanism used at the battery side which makes sure that output from the batteries will be continuous.

KEYWORDS: Energy grids, Solar panels, Wind turbine, Buck-Boost converter, LVDC, HVDC, Rectifier, Batteries, Voltage regulator.

I. INTRODUCTION

As we move toward the next generation where every machine or some other thing that makes human work easy will work only on electrical energy. If that is the case, then production of this energy and storage of these charges will be a major task for humans. Through this project, we have come up with a production of this energy by renewable energy. These two major renewable energies by renewable energy. These two major renewable energies are easily available in our nature. Even people living in the urban area can easily find this out. Till now the major producer of electrical charges was from a thermal power plant, But the pollution produced by these power plants is very harmful to nature. By the latest research, deforestation is increased from 11.5% to 22.5% in the last 15 years. These woods go for burning. In this way, we make sure that the production of electrical energy will increase day by day and also make sure that we are not harming the environment. According to a World Health Organization report, India ranks 13th out of 20th highest polluted countries in the world. The implementation of this project can help us to reduce carbon dioxide emissions by about 50%. Battery charging from renewable energy systems is possible with hybrid wind-solar energy. Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Moving towards energy sustainability will require changes not only in the way energy is produced. In this project, we have proposed the design and development of the battery by renewable energy grids.

II. METHODOLOGY

The two modes of renewable energy sources used in this project are solar energy and wind energy. Starting from solar PV cell and wind turbine which are the components which convert the natural phenomenon into electrical energy. Using of Buck-Boost converter is common for both solar PV cell and wind turbine, this converter make sure of increasing the low voltage into requiring high voltage which can be used to charge the battery. A rectifier with C smoothing is used only at the wind energy source, as this circuit converts AC to DC only in one direction. After regulating the supply, this electrical energy is directly sent to the microcontroller to switch from one battery to another battery which is having a higher potential using a relay, and the supply is given to the charging port.

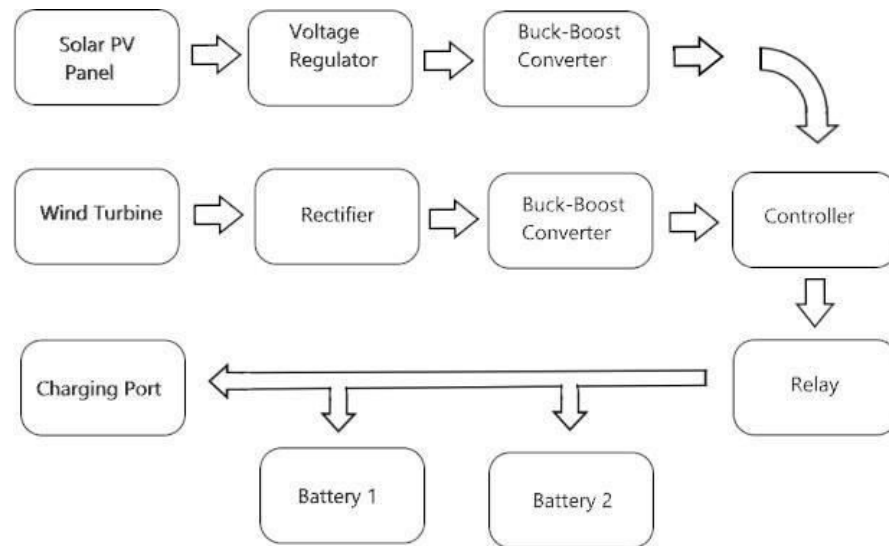


Figure 1: System Architecture of Charging grid

A. SOLAR PV PANELS

Photovoltaic [PV] is the conversion of light into electricity using semiconducting materials. A solar cell is made up of two types of semiconductor materials called P-type and N-type. When sunlight strikes a solar cell, an electron in the silicon is ejected, which results in the formation of holes. The electron will travel from the n-type to the p-type layer by crossing the depletion zone and then go through an external conductor producing electricity.

B. VOLTAGE REGULATOR

A simple voltage regulator can be made from a resistor in series with a diode. The basic voltage regulator used is IC 7800 series voltage, apart from this we can use IC 7805 and IC 7812.

C. WIND TURBINE

A wind turbine is a device that converts the wind's kinetic energy and the turbine gains just as much. Then, it is transferred to the gearbox in which the gears convert the relatively slow rotation of spinning blades into the higher speed motion. The gear, immediately behind the gearbox takes the kinetic energy from the spinning driveshaft and turns it into electrical energy.

D. RECTIFIER

A capacitor input filter circuit in which the first element is a capacitor connected in parallel with the output of the rectifier in a linear power supply. The capacitor increases the DC voltage and decreases the ripple voltage component at the output side.

E. BUCK-BOOST CONVERTER

It is a DC-DC converter of the required voltage. Buck converter coupled with Boost converter gives Buck-Boost converter. The principle of this component is the inductor in the input circuit which resists sudden variation in input current. There are two modes of operation, continuous conduction mode, and discontinuous conduction mode. This type of converter offers the most efficient solution with the smallest external components and is less expensive compared to most converters.

F. CONTROLLER

Here in this project, we will be using Arduino. It is an open-source electronics platform based easy to use software and hardware. It is designed to make electronics more accessible to innovators. The users can develop

their kit using the components owing to its open-source hardware feature. This is used in

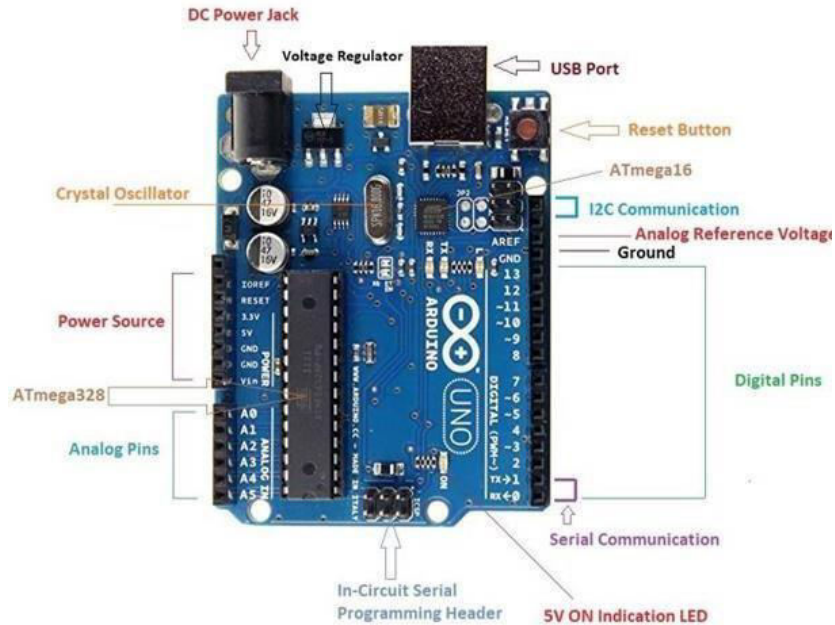


Figure 2: Arduino Board

communications and in controlling or operating many devices. Here we also use AT mega 168 which is an 8bit AVR microcontroller that comes with 32 pin interfaces. Another factor is, it is inexpensive compared to other microcontroller platforms and works with all the common operating systems. This microcontroller is used in this project to switch the power source to a lower potential battery and the higher potential battery is directly given to the charge point by using a relay.

There are many types of battery systems, but in this project, we go with Li-ion batteries because of the advantages like energy-weight ratios. High open-circuit voltage, slow loss of charge. Even the life span of these batteries is having a long span. The working of this battery can be explained as the electrolyte carries positively charged lithium ions from the anode to the cathode by vice versa through the separator. The movement of the lithium ions creates a free electron in the anode which creates charge at the positive current collector.

G. RELAY

It is an electrically operated switch. They commonly use an electromagnet to operate their internal mechanical switching mechanism. Here, this relay is used at the battery side where the switching of the output power of the battery is controlled by this relay. This relay is coupled with a microcontroller chip, where the programming is done in such a way that the battery with 100% charged till we switch it ON towards it, on the other side the other battery will be connected to B. B converter for charging.

H. CHARGING POINT

The output of the battery system is given to the charging points where these points are capable of producing voltages which are varying from 10v-240v with 50 Hz frequency. These charging points, basic home appliances, and other electronic devices.



IV. EXPERIMENTAL RESULTS

Achieved success in charging the battery with various renewable grids such as solar energy and wind energy. These charged batteries can be used to supply power for charging various electronic components and basic electrical devices. If the renewable system works for the whole 24 hours of the day, a battery of rating 12v. 1.3Ah would charge around 1 hour to 70 minutes. The process is set up in such a way that after a battery is charged, another battery is kept for charging. The charged battery is used for providing output.

V. CONCLUSION

By developing this project, it looks forward to changing all mechanical works into a purely electrical base, it is because of the high efficiency and long span of the product. Eventually, if the number of electrical and electronic goods increases, the source which to provide the energy will also increase, and by this project, providing of electrical energy is successfully conducted.

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