Generation of Electricity by Solar Using Programmable System on Chip

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Abstract— **New technological development efficiency of solar cell is increasing every day and it is becoming cheap also for use in regular day to day production of energy. Along with this government is also providing help and subsidies in set up of new solar power plant. This all things together provide a great new platform for setup and generation of new solar power plant for individual customer. This proposed system will try to bring all component and aspects of generating energy from solar cell easy, convenient and in user friendly way for non-technical person, by using latest development in the field of electrical and electronics.**

Keywords—component; formatting; style; styling; insert (key words)

I. INTRODUCTION

Energy has been playing important role in human and economic development, world peace. Under current acute power shortage scenario with increasing cost of natural gas, coal and other power generator turbine fuel. There is a very urgent and great need of finding alternate source of energy to generate electricity. There are some natural and eco-friendly source of generating power ,which requires more R&D by using latest technologies to make them more cheap, efficient and easy to use and maintain for technical person .

Along with this government is also providing help and subsidies in set up of new solar power plant. This all things together provide a great new platform for setup and generation of new solar power plant for individual customer. Of all the renewable energy sources, solar energy received the greatest attention in the decade of the 1970s and has been rubbed of much emotion and pleasure. It is the solution for reducing the use of fossil and nuclear fuels for a linear environment solar energy as a result has been the object of inflated.

Although solar energy may be used in many market such as in active and passive space heating and cooling Industrial process heating ,desalination and in electric generation. After investments by federal and agencies amounting to several hundred million dollars in the 1970's and all these technologies, only one is in commercial use today. This proposed system will try to bring all component and aspects of generating energy from solar cell easy, convenient and in user friendly way for non technical person, by using latest development in the field of electrical and electronics. As wind does not blow all time or does the sunshine all time, solar and wind power alone are poor power sources. Hybridizing solar and wind power sources together with the battery storage to cover the periods of time without sun or wind provides realistic form of power generation. This variable feature of wind turbine power generation is different from conventional fossil fuel; nuclear or hydro-based power generation .Wind energy has become the least expensive renewable energy source in existence and has peaked the interest of scientists. PVs offer added advantages over other renewable energy source in that give off no noise and require practically maintenance. Most industrial use of electricity requires AC power. Wind turbine and PV cells provide DC power. A semiconductor based device known as power inverter is used to convert DC power to AC power.

II. LITERATURE SURVEY

1. Power Controller Design for Maximum Power Tracking in Solar Installations, Eugene V. Solodovnik, Shengyi Liu, Senior Member, IEEE, and Roger A. Dougal, Senior Member, IEEE vol19, NO. 5, sep2004. A new state-based approach to the design of a maximum power point (MPP) tracking system for photovoltaic energy conversion has been presented. [1]

2. A novel maximum power point tracking technique for a solar panels using a SEPIC or CUK converter, H.S Hung Chung, K.K.TseIEEE Trans power Electronic vol.18 no.3 may2003. A novel technique for efficiently extracting the maximum output power from a solar panel under varying meteorological conditions is explained. [2]

3. A Novel Maximum Power Point Tracker For PV panels using Switching frequency Modulation, K..K.Tse"a. S.h Chung IEEE Trans on power electronics vol 17 no 6 Nov 2002.A novel technique for efficiently extracting the maximum output power from the solar panel is discussed. A PWM dc/dc SEPIC or Cuk converter operating in

discontinuous inductor–current or capacitor–voltage mode is used to match with the output resistance of the panel. [3]

4. Novel maximum power point tracking controller for photovoltaic energy conversion system,Y Kuo, T Liang, and J Chen, IEEE Trans. Ind. Electron, vol. 48, no.3,pp. 594-601, Jun. 2001. – 721.The novel approach of MPPT control algorithms developed from various photovoltaic technologies. [4]

5. Development of a microcontroller-based photovoltaic maximum power point tracking control system, E Koutroulis, K Kalaitzakis, and N C Voulgaris, "IEEE Transaction on Power Electronics, Vol.16, No.1, pp.46-54, Jan. 2001. Maximum power point tracking (MPPT) is used in photovoltaic (PV) systems to maximize the photovoltaic array output power, irrespective of the temperature and irradiation conditions and of the load electrical characteristics. A new MPPT system has been developed, consisting of a buck-type DC/DC converter, which is controlled by a microcontroller-based unit. [5]6. PSoC® 3 Development Kit Guide, in this system use PSOC 3 kit & use all information about PSOC 3 kit. [6]

7. 7.Performance Characteristics of Buck-Boost Type Two-input DC-DC Converter With an Active Voltage Clamp, W. Lin, H. Matsuo, and Y. Ishizuka, IEICE Tech.Rep., Vol. 102, No. 567, 2003, 7 – 13. In this paper discuss on the two input DC-DC converter with active voltage clamp. [7]

8. Design and development of a low cost miniaturized wind-solar hybrid power generation system with performance optimization using Virtual Instrument, Pranavan and Harvard dhagini S2, Dr.C.Kiran Mai R.Sandeep P R Nikil Swathi Kamble. In this paper designed wind-solar power generation system. [8].

III. MOTIVATION

Now a day's the big problems of electricity. As people are much concerned with the fossil fuel exhaustion and the environmental problems caused by the conventional power generation, renewable energy sources and among them photovoltaic panels and wind-generators are now widely used. These problems solve by using Solar panel energy source. Basically solar cell give the DC voltage output store in the battery & through inverter circuit; it gives 230v AC output which can use for building surrounding lights, stair case lights as well as main load.

III. PROBLEM STATEMENT

The proposed system is to reduce the problems of electric energy by using the natural source like solar energy. The solar cell give the DC voltage output to store in the battery & through inverter circuit , it gives 230V AC output which can use for building surrounding lights, stair case lights as well as

main load. The actual proposed system designed by using solar installation.

This proposed system uses PSOC microcontroller based (photovoltaic) because the energy from the sun fluctuates with climate conditions; the impedance of the PV system must be adjusted to match the change in climate condition. In this system, PSOC microcontroller can handle both analog and digital circuits, to reduce the need for additional circuit elements. PSOC is an application related review of programmable array systems & the system-on-chip.

IV. METHODOLOGY
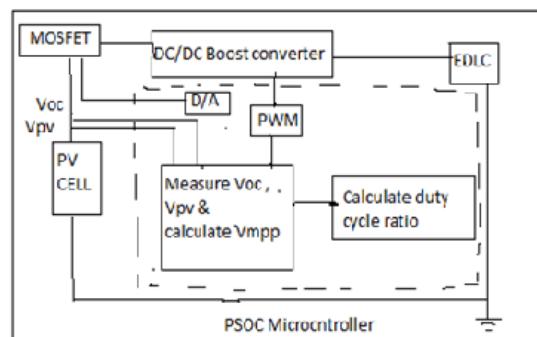
Fig.1. Proposed system [1]

A. Photovoltaic technology / Wind energy-

Fig.2.Solar panal

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. A solar panel Siemens SM-10 with a rated output power of 10W is used.

Wind power is the conversion of wind energy into a useful form of energy. All renewable energy (except tidal and geothermal power), ultimately comes from the sun. About one

or 2 percent of this energy is converted to wind energy (which is about 50-100 times more than the energy converted to biomass by all plants on earth.

B. Battery –

An electrical battery is one or more electrochemical cells that convert stored chemical energy into electrical energy. Here are two types of batteries: primary batteries which are designed to be used once and discarded when they are exhausted, and secondary batteries which are designed to be recharged and used multiple times.

C. PSOC microcontroller-

Fig .3. Hardware model

"PSOC" is an application related review of programmable array systems, the system-on-chip. Cypress's PSOC Creator software is a state-of-the-art, easy-to-use integrated development environment (IDE) that introduces hardware and software design environment based on classic schematic entry and revolutionary embedded design. The CY8CKIT-030 PSOC3 Development Kit is based on the PSOC 3 family of devices. PSOC 3 is a Programmable System-on-Chip™ platform for 8- and 16-bit applications. It combines precision analog and digital logic with a high-performance CPU [10].

D. LCD display-

Fig.4.LCD display

A liquid crystal display (LCD) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). LCs does not emit light directly.

E. LDR-

The main purpose of a light dependent resistor is to change the brightness of a light in different weather conditions. This can easily be explained with the use of a watch. It is the light dependent resistor that allows the watch to know when it has gotten dark, and change the emissions level of the light at that time.

F. Relay driver-

The eight NPN Darlington connected transistors in this family of arrays are ideally suited for interfacing between low logic level digital circuitry (such as TTL, CMOS or PMOS/NMOS) and the higher current/voltage requirements of lamps, relays, printer hammers or other similar loads for a broad range of computer, industrial, and consumer applications. In our system microcontroller and relay driver ,inverter circuit using MOSFET contact will be connected the battery to solar or wind for charging that check battery voltage if greater than 12 V then start inversion otherwise it will not active r starting of inversion process check the switch and turn on the load as well as repeat the same process

V. HARDWARE SETUP
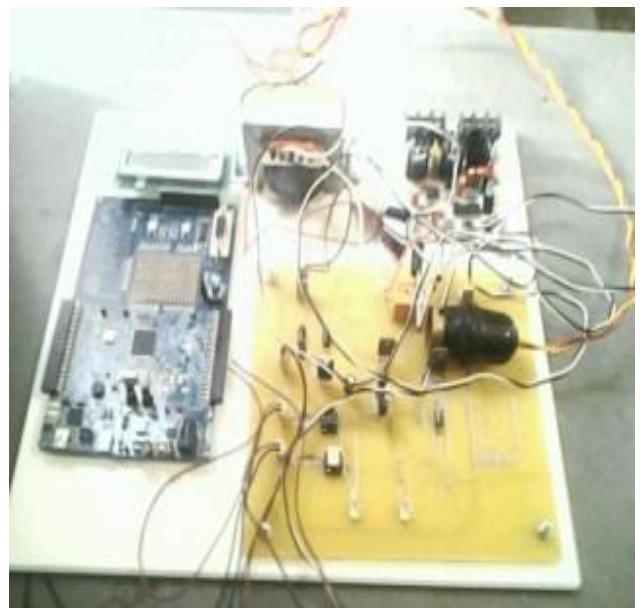
Fig.5.Demo Model

Conclusion

In this case a novel technique for efficiently extracting the maximum output power from the solar panel is presented .It is useful for providing grid quality, reliable power in rural areas where the line voltage is low and insufficient to connected load. In other places, other power sources could be used.

For example hybrid combinations of wind power, solar power, geothermal power, hydroelectric power, tidal power, biomass generated power, power from incineration of solid wastes, and many other technologies could be considered depending on local interests and resources. PSoC is an industrial tool, aiming shorter design to market cycle. It targets professional applications and university projects with limited budget, as well. The key elements of this test bed concept presented in this project are two or more renewable power sources connected to a power grid with complex electrical interactions.

Acknowledgement

References

[1] Waseda University, Tokyo, Japan "Development of PSoC Microcontroller Based Solar Energy Storage System" SICE Annual Conference 2011 September 13-18, 2011,

[2] Eugene V. Solodovnik, Shengyi Liu, Senior Member, IEEE, and Roger A. Dougal, Senior Member, IEEE "Power Controller Design for Maximum Power Tracking in Solar Installations" vol 19, NO. 5, sep 2004.

[3] Technology White Paper on "Solar Energy Potential on the U.S. Outer Continental Shelf Minerals Management Service Renewable Energy and Alternate Use Program " U.S. Department of the Interior May 2006

[4] R. B. Darla, S. R. Kurode "Continuous Conduction Mode SEPIC Converter For Maximum Power Point Tracking" IEEE ACE 2003.

[5] H.S Hung Chung, K.K.Tse "a novel maximum power point tracking technique for a solar panels using a SEPIC or CUK converter." IEEE Trans power Electronic vol.18 no.3 may2003.

[6] K.Ktse. S.h Chung "A Novel Maximum Power Point Tracker For PV panels using Switching frequency Modulation" IEEE Trans on power electronics vol 17 no 6 Nov 2002.

[7] Y Kuo, T Liang, and J Chen, "Novel maximum power point tracking controller for photovoltaic energy conversion system," IEEE Trans. Ind. Electron, vol. 48, no.3,pp. 594-601, Jun. 2001. – 721

[8] D.C.Martins, A.H de Oliveira"Three Phase Rectifier Using a SEPIC DC-DC Converter in continuous conduction mode for power factor correction" IEEE 1998

[9] "A Hybrid Solar-Wind Power Generation System as an Instructional Resource "for Industrial Technology Students 2000.

[10] PSoC® 3 Development Kit Guide.

[11] Cypress Semi PSoC1™ product documentation

[12]Vendelin, Pavio, Rohde: Microwave circuit design using linear and nonlinear techniques

[13]Analog Devices Inc, ADI: DDS and Fractional-N synthesizer product data

[14] Anatol I. Zverev: Handbook of filter synthesis

[15] B. Parsons et al., Grid Impacts of Wind Power Variability: Recent Assessments From a Variety of Utilities in the United States, National Renewable Energy Laboratory, Tech. Rep. NREL/CP-500-39955, 2006.