The International Journal of Engineering And Science (IJES)
||Volume|| 4 ||Issue||2 ||Pages|| 39- 43 ||2014||
ISSN: 2319 – 1813 ISBN: 2319 – 1805
www.theijes.com

"Self Electricity Generation and Energy Saving By Solar Using Programmable System on Chip (PSOC)"

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----------**ABSTRACT**----------
New technological development efficiency of solar cell is increasing everyday and it is becoming cheap also for use in regular day today 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 paper 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: Psoc. MPPT (Maximum Power Point Tracking), Solar Panel.

Date of Submission: 24 January, 2015 Date Accepted: 10 February, 2015

I. Introduction

Basically from solar cell & wind mill gives 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.

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. Of all the renewable energy sources, solar energy received the greatest attention in the decade of the 1970's and has been the rub of much emotion and pleasure. Many regarded it is as the solution for reducing the use of fossil and nuclear fuels and for a linear environment solar energy as a result has been the object of inflated. Overly optimistic predictions ranging from largely supplementing to eventually replacing all the current means of production of both electric power and thermal energy requirements. Solar energy, in sheer six does have the potential to supply voltage energy needs Electric, thermal chemical even transportation fuels .it is however, very diffuse cyclic and often undependable. Although solar energy may be used in many markets 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. Namely flat plate collectors for water heating .All other remain in various stages of research and development .It now appears that solar electric systems are not expected to make engineering and economic sense as central generating plants of hundreds of mega watts capacities in the foreseeable future [1].

Solar panel & wind mill are the main source. Basically from solar cell & wind mill gives 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.The system was designed and implemented with the following goals to be completely different from traditional electricity labs and to be fresh and interesting.To be intimately related to real world industrial power issues such as power quality. To show a complex, interrelated system that is closer to the "real world" than the usual simple systems covered in educational labs.

To motivate learning by introducing such elements as environmental and economic concerns of practical interest to the students. This paper describes a new PSoC microcontroller based PV (photovoltaic) system. Because the energy from the sun, fluctuates with climate conditions, the impedance of the PV system must be adjusted to match the change in lighting condition. To do this, we employ a PSoC microcontroller which can handle both analog and digital circuits, to reduce the need for additional circuit elements. The PSoC controller is used as a programmable Maximum Power Point Tracking (MPPT) controller.

The intermittent nature of solar and wind power can be effectively mitigated by using a solar and wind hybrid system. Energy storage on-site (batteries) ensures that power is available when the sun isn't shining or the wind isn't blowing. Pairing solar and wind collection systems at one site can provide diversity protection against the variable natures of both energy sources [10].

II. Literature Review

The literature in the subject areas of this is very extensive. An excellent textbook for instructional use is Wind and Solar Power Systems by Patel (1999) that covers the specific issues in this project in a style appropriate for Industrial Technology students. Sabin (1999) and coworkers have summarized the various standards and benchmarks used in large-scale power quality, and Koval (1999) and coworkers have presented similar finding for rural (small-scale) power quality problems. Taylor (1987) is responsible for some of the early practical work on power quality measurements in wind generation [1].

Kariniotakis and Stavrakakis (1995) have written extensively on simulation problems in wind generator and power grid interactions. Finally, many papers have been written on the electronics regulation/ control aspects of the problem including a recent study by Neris and co-workers (1999) proposing an IGBT (Integrated-Base-Bipolar-Transistor) based regulator [3].

The novel approach of MPPT control algorithms developed from various photovoltaic technology [6]. Barbosa (1998) and coworkers have described the use of PWM (pulsewidth- modulation) control schemes to power quality control. Numerous studies have appeared describing the impact of power quality problems caused by PV systems from early work by McNeil (1983) and coworkers in to more recent work by Oliva (1988) and coworkers and most recently by Chowdhury (1999).[8]

Many articles have appeared on the impact of new electronics technologies on power quality management, for example Poisson (1999) and coworkers have described the impact of DSP chips on the problem [10].

The extensive literature on power quality aspects of wind generation includes work by Demoulias and Dokopoulos (1996) on transient power measurement and by Thiringer (1996) on harmonic contamination measurement issues [10]. Amit Kumar; Dr. Yunfei Liu; Dr. Manu Sood; Tanvir Singh; S Singh"Sustainability in Wireless Mobile Communication Networks through AlternativeEnergy Resources" IJCST Vol. 1, Iss ue 2, December 2010.

Numerous technologies hold promise for harnessing and utilizing the sun's energy. They include: agricultural and architectural technologies, solar lighting, solar thermal, HVAC, solar cookers, electricity generation, solar to petroleum, transportation, and satellites to mention a few.A number of well-known large corporations have launched initiatives to generate their own energy for a variety of reasons, such as reducing energy price volatility, increasing security of supply, decreasing costs or meeting carbon objectives. Example - companies with their own renewable energy generation include IKEA, Google, Toyota, Toshiba, Hertz, FedEx, AT&T, BMW, Renault, VW, Audi and PepsiCo. VW, for example, is investing €1b in offshore wind projects to meet renewable energy objectives and provide a natural hedge against volatile energy prices. That said, a third of respondents expect to meet a greater share of their energy needs through self-generation over the next five years [12].

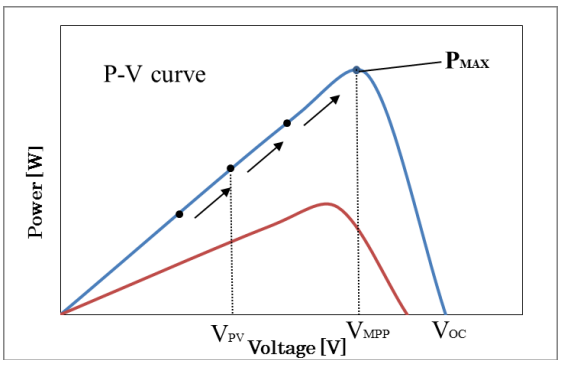

Fig 2.1. Power-voltage characteristics of PV [1].

Now a days the big problem of electricity. There is no alternate source available in emergency. Thus we are trying to reduce the problems of electric energy by using the natu ral source like solar power & wind power.

Figure 2.1 shows the P-V characteristics of a PV cell. The available electric power from the PV cell varies depending on the P-V curve, which is determined by the characteristics of the PV cell. Since the P-V curve is a convex curve, a maximum power point (MAXP) exists, which changes with the intensity of solar irradiation. Therefore, in order to maintain the output power of the PV cell at MAXP even while the solar irradiation is changing, MPPT control is needed [1].

In order to obtain the maximum power from the PV cell as shown in Fig. 1, we need to find and control the maximum power point voltage (VMPP) which may vary depending on the sunlight conditions. To obtain the maximum power, we apply the constant voltage method to find MPPV from the open-circuit voltage (V_{oc}).

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. Working Principal

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. In this we are using solar panel & wind mill are the main source. Basically from solar cell & wind mill gives 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.

4.1Photovoltaic technology

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.

The intermittent nature of solar or wind power can be effectively mitigated by using a solar or wind system. Energy storage on-site (batteries) ensures that power is available when the sun isn't shining or the wind isn't blowing. Pairing solar and wind collection systems at one site can provide diversity protection against the variable natures of both energy sources.

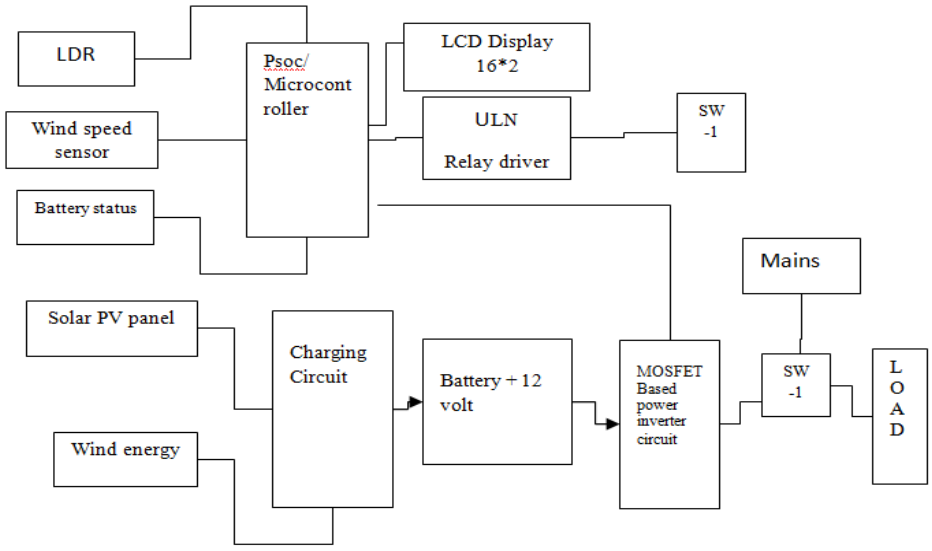

Fig 4.1 -Basic Block Diagram Of Self electricity Generation using Psoc

4.2.Wind energy-

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.

4.3.Battery

An electrical battery is one or more electrochemical cells that convert stored chemical energy into electrica 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.

The CY8CKIT-030 PSoC 3 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.

4.4.PSoC Creator-

"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 a hardware and software design environment based on classic schematic entry and revolutionary embedded design.

4.5.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.

4.6. 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.

4.7.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. While the proposed analysis can be used to differentiate between competing energy storage technologies and determine the maximum energy storage requirement, the determination of the actual energy storage technology should be based on a life cycle costing analysis.

V. EXPERIMENTAL RESULT

TABLE I-solar panel output voltage of proposed system variable with time

Time	Output voltage of solar panel
7 AM	15.3 V
9 AM	17.6 V
11 AM	18.10 V
12 PM	19.9 V
1.30 PM	17.3 V
3 PM	16.47 V
5 PM	14.4V

Table I gives the information about solar panel output voltage with respect to time. Table shows output voltage in day time at the afternoon solar panel voltage get exceeds as time goes increasing solar panel voltage diminishes.

VI. Conclusion

In this case we are following all component & aspects of generating energy from solar cell easy, convenient & in user friendly way for non technical person, by using latest development of electrical and electronics. 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 paper are two or more renewable power sources connected to a power grid with complex electrical interactions. The Govt. of India is planning to electrify 18,000 villages by year 2012 through renewable energy systems especially by solar PV systems. . The various MPPT (Maximum Power Point Tracking) methods are also applicable for control mechanism

The cost of the electricity produced by photovoltaic technology is higher than that from conventional fuels. This is a major obstacle for sustained long-term growth of solar technologies, and currently requires massive governmental support to create artifi cial markets for solar electricity

ACKNOWLEDGEMENT

I am sincerely thankful to all professors for their guidance for my paper. Without their help it was tough job for me. I am really thankful for their relevant help and providing the necessary guidance given by Prof MR.KolkureV.S.

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