ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 5, May2017

IOT Based Monitor and Control of Smart Grid Energy Sources using VLSI

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ABSTRACT: The journey for maintainable energy models is the fundamental variable driving exploration on brilliant grid technology. Smart Grids speak to the crossing over worldview to empower very proficient vitality generation, transport, and utilization along the entire chain, from the source to the client. This paper portrays a Smart Grid engineering executed with the assistance of Internet of Things. The objective of the Smart Grid design utilizing Internet of Things (IoT) is to give the dependable power supplies to the buyers by making most extreme utilization of sun powered vitality source. The Internet of Things include an arrangement of Web administrations give on top of various Internet empowered Embedded gadgets. The Internet program on any PC can go about as an interface to the administrations given by this Internet of Things. Internet of Things is another data preparing and securing technique, that is been generally utilized as a part of shrewd transportation, ecological checking and different fields. The Internet is a vital specialized intend to the advancement of brilliant network and security Smart Grid. IoT innovation can viably join the infrastructure resources in increment the level of energy framework data, and enhance the usage effectiveness of foundations in the current power framework.

KEYWORDS: Internet of Things (IoT), Smart Grid (SG), Solar Energy Source, FPGA, Smart Home (SH),ADC

I. INTRODUCTION

The Smart grid is an innovation that makes electric network control, mechanize and deal with the developing requests and needs of power, permitting two-path communication between the utility and the clients.Smart grid enhances control quality, gives effective transmission, faster rerouting when hardware falls flat or when blackouts happen and lessens peak demand. A fundamental component of a smart grid is to enhance the proficiency, financial matters, and manageability of the generation, transmission, and dissemination of power by the utilization of data and communications innovation. The brilliant lattice, being a huge framework, uses different communications and systems administration advancements with its applications, which incorporate both wired and wireless communications. "Internet of Things" alludes to the general thought of things, particularly regular articles, which are decipherable, unmistakable, locatable, addressable, and additionally controllable by means of the Internet, independent of the communication implies (regardless of whether by means of RFID, wireless LAN, wide-range systems, or different means).Consistently we experience objects incorporate the electronic gadgets as well as the results of higher technological advancement, for example, vehicles and equipment yet things that we don't conventionally consider as electronic by any stretch of the imagination -, for example, sustenance and clothing.[1]The "things" of this present reality should coordinate into the virtual world, empowering at whatever time, anyplace network. The quantity of regular physical items and gadgets associated with the Internet was around 12.5 billion in 2010. The quantity of significant worth anticipated that would twofold to 25 billion in 2015 as the quantity of more smart gadgets per individual increments, to the extent to a further 50 billion by 2020. The effect and esteem that IOT conveys to our day by day lives turn out to be more pervasive as Smart gadgets associated in the IOT scene. Better choices, for example, taking the best courses to work or picking their most loved eatery is finished by individuals. The Internet of Things vision to effectively rise, the processing foundation should go past conventional versatile registering situations that

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utilization advanced cells and portables, and advance into interfacing ordinary existing articles and implanting insight into our environment condition.

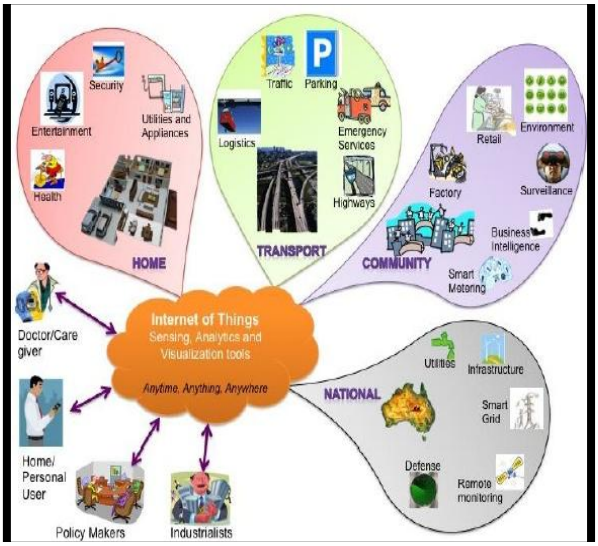

Fig 1: WOT Anything, Anywhere, Anytime

1. Smart Grid and Internet of Things

Smart grid is another and current power grid, which is exceptionally, incorporated with advanced sensor estimation innovation, information and communication technology, analysis of the decision-making technology, automatic control technology, and energy power technology and grid infrastructures. Compared with the traditional grid, Smart grid has been enhanced unmistakably in the streamlining of energy control, the adaptability of grid structure, optimizing the allocation of resources, and improving the power quality of services. Along these lines, smart grid has numerous attributes including solid, self-mending, similarity, economy, coordination and enhancement thus forth. [2] Internet of Things, to be specific "the Internet in which the things associated with each other", is the augmentation and extension of Internet-based system. As per the concurred protocols, with IOT key advancements: radio frequency ID innovation, sensor innovation, smart innovation and nanotechnology, the communication data can be traded, and the intelligent recognition, positioning, tracking, monitoring and administration can be accomplished.

II.LITERATURE SURVEY

The smart grid[1]can be considered as a modern electric power grid infrastructure for improved proficiency and unwavering quality through mechanized control, high power converters, present day communications infrastructure, detecting and metering innovations, and current vitality administration systems in light of the enhancement of demand, energy and network availability, and so on. While current power frameworks depend on a strong data and communication infrastructure, the new smart grid needs an alternate and a great deal more unpredictable one, as its measurement is much larger.[2] Application of wireless advancements in the savvy home is managed by indicating out points of interest and impediments of accessible methodologies for the arrangement of heterogeneous and existing together issues related the dispersed monitoring of the home and the tenants. Some hot difficulties confronting the abuse of non-invasive wireless devices for user behavior monitoring are then addressed and the application fields of smart power management and elderly people monitoring are chosen as representative cases where the estimation of user activities improves the potential of location-aware services in the smart home. This paper proposes an advanced framework for condition monitoring,[3] determination and supervisory control connected to smart grids. The framework depends on three equipment topologies: remote data acquisition units (RDAUs),

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intelligent sensors modules (ISMs) and a PLC modem. The developing share[4] of fluctuating power generation by inexhaustible assets and the expanding conveyance of battery electric vehicles require the joining of canny Energy Management Systems (EMS) into the electrical power grid.

III.PROPOSED SYSTEM

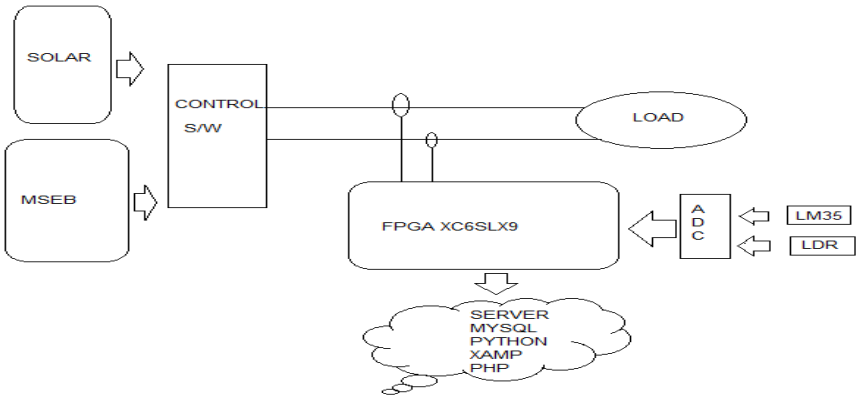

Fig 2: Block diagram of system

The fig 2 shows the proposed system of smart grid in this temperature sensor sense the temperature and LDR is applied to the Analog to Digital converter, which convert the input to digital ones.Baterry is charged by solar. The supply is given to the first switch and battery is connected to another switch. Relay is ON and OFF through relay. The load is connected to relay.

3.1 Hardware Description

1. Spartan-6 FPGA

Spartan®-6 LX and LXT FPGAs are accessible in different speed grades, with - 3 having the most elevated execution. The DC and AC electrical parameters of the Automotive XA Spartan-6 FPGAs and Defense-review Spartan-6Q FPGAs gadgets are comparable to the business details aside from where noted.Spartan-6 FPGA DC and AC characteristics are determined for commercial (C), industrial (I), and extended (Q) temperature ranges. Only selected speed grades and/or devices might be available in the industrial or expanded temperature ranges for Automotive and Defense-grade devices. Because Xilinx FPGA configuration data is stored in CMOS configuration latches (CCLs), it must be reconfigured after it is powered down. The bit stream is loaded each time into the device through special configuration pins. These configuration pins serve as the interface for a number of various configuration modes:

- JTAG configuration mode
- Master Serial/SPI configuration mode (x1, x2, and x4)
- Slave Serial configuration mode
- Master SelectMAP/BPI configuration mode (x8 and x16)

2. ADC

The Microchip Technology Inc. MCP3204/3208 devices are successive approximation 12-bit Analog- to-Digital (A/D) Converters with on-board sample and hold circuitry. Differential Nonlinearity (DNL) is specified at ±1 LSB, while Integral Nonlinearity (INL) is offered in ±1 LSB (MCP3204/3208-B) and ±2 LSB (MCP3204/3208-C) versions.

Feature:

- ± 1 LSB max DNL
- 4 (MCP3204) or 8 (MCP3208) input channels

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• On-chip sample and hold

3. Solar panel

Sunlight based board alludes to a board intended to assimilate the sun's beams as a wellspring of vitality for creating power or warming. Every module is appraised by its DC yield control under standard test conditions (STC), and ordinarily extends from 100 to 365 watts. The proficiency of a module decides the zone of a module given the same evaluated output– a 8% productive 230 watt module will have double the range of a 16% proficient 230 watt module.

Specification

- Output Load: 100W
  Load back up time: 10Hr.
  Input Voltage (Battery): 12V

- To find Battery Specification:

Battery Backup: Output Load*Load Backup
B.B=100*10=1000
Current=B.B/Input=1000/12=83A
i.e. Battery=12V, 83A.

- To Calculate Solar Plate design:
  Current of System=83A
  Battery to be charged in Hour:7Hrs

- To find Current of Solar Plate:83/7=12A
  Power=Current*Voltage
  P=12*12=144
  i.e. Solar Specification: 144W,12A,12V

4. LM 35

LM35 is a precision IC temperature sensor with its output proportional to the temperature (in oC). With LM35, temperature can be measured more precisely than with a thermistor. The operating temperature range is from -55°C to 150°C. The output voltage varies by 10mV in response to every oC rise/fall in ambient temperature, i.e., its scale factor is 0.01V/ oC.

Features:

- Linear + 10.0 mV/℃ scale factor
- 0.5℃ accuracy guarantee able (at +25℃)
- Rated for full −55° to +150℃ range
- Suitable for remote applications
- Operates from 4 to 30 volts

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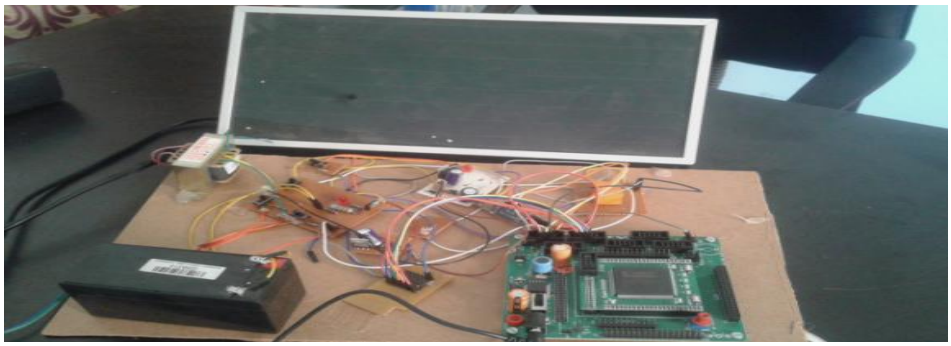
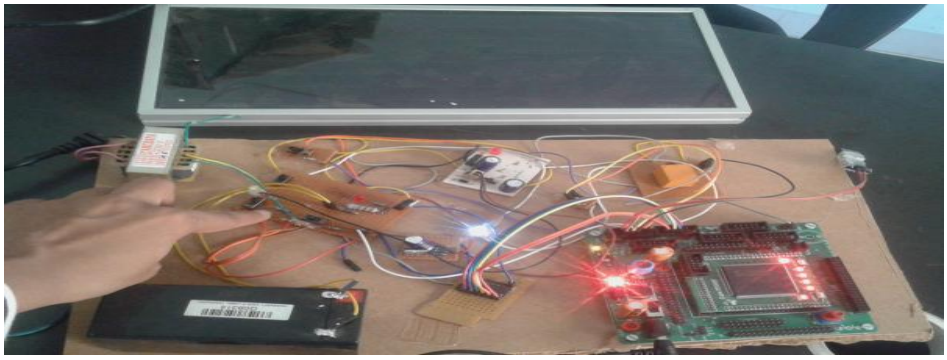
IV. RESULT



(a)



(b)

Fig 4: Hardwareimplementation (a) ON condition (b) OFF condition

V. CONCLUSION

The designed system is easy to implement and very customizable according to needs. It provides effective techniques of using our sustainable power source assets which would otherwise have been underutilized. FPGAs have emerged as a innovation that strikes an optimal balance between processing power, vitality prerequisites, and adaptability. In this paper, an implementation of remote monitoring framework for smart grids using FPGA based wireless sensor network technology has been implemented. A prototype for wireless sensing module with FPGA coprocessors was designed and implemented for monitoring line parameters. The sensor node is programmable using low power FPGA and a microcontroller. The experimentation results demonstrate that the measured parameter matches the rated parameters in the smart grid hardware prototype.

REFERENCES

[1]Smart Grid Technologies: Communication Technologies and Standards Vehbi C. Gungor, DilanSahin, TaskinKocak, SalihErgüt, ConcettinaBuccella, Carlo Cecati, Gerhard P. Hancke

[2]Federico Viani, Member IEEE, FabrizioRobol, Alessandro Polo, "Wireless Architectures forHeterogeneous Sensing in Smart Home Applications: Concepts and Real Implementation", 2013 IEEE

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[3]F. Salvadori, Member, IEEE, C. S. Gehrke, A. C. de Oliveira, M. de Campos, and P. S. Sausen, "Smart Grid Infrastructure Using a Hybrid Network Architecture", IEEE TRANSACTIONS ON SMART GRID, VOL. 4, NO. 3, SEPTEMBER 2013
[4]B. Becker, A. Kellerer, and H. Schmeck, "User interaction interface for energy management in smart homes," in Proc. 2012 IEEE PES Innov. Smart Grid Technol. (ISGT) Conf., Washington, DC, USA, pp. 1–8.
[5]Sebastian Meiling, Till Steinbach, Moritz Duge, and Thomas C. Schmidt, "Consumer-Oriented Integration of Smart Homes and Smart Grids: A Case for Multicast-Enabled Home Gateways?", 2013 IEEEThird International Conference on Consumer Electronics - Berlin (ICCE-Berlin)
[6]Antonio J. Jara1_, Latif Ladid2, and Antonio "The Internet of Everything through IPv6: An Analysis of Challenges, Solutions and Opportunities,"University of Applied Sciences Western Switzerland (HES-SO) Vice-chair, IEEE ComSocIoT.
[7].Liu Hua1, Zhang Junguo1, Lin Fantao2 " Internet of Things Technology and its Applications in Smart Grid ," Indonesian Journal of ElectricalEngineering Vol.12, No.2, , pp. 940 ~ 946 ,February 2014.
[8]VedangRatanVatsa, Gopal Singh " A Literature Review on Internet of Things (IoT)," International Journal of Computer Systems (ISSN: 2394-1065), Volume 02– Issue 08, August, 2015.
[9].SomayyaMadakam, R. Ramaswamy, SiddharthTripathi "Internet of Things (IoT) :A literature review," Journal of Computer andCommunications, 2015, 3, 164-173 .
[10].MdMasudRana ," An Overview of Distributed Micro grid State Estimation and Control for Smart Grids," ISSN 1424-8220, 2015.