IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 6, Issue 5, May 2017

Home Energy Management by using Hybrid Power

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Abstract: A smart house, may be a home that includes advanced automation systems to supply the inhabitants with refined observation and management over the building's functions. star and wind energy and hybrid electrical vehicles (HEVs) usually utilized in smart homes. Renewable power sources like alternative energy and wind energy have become progressively vital due to the restricted fossil fuels resources and their negative environmental impact, on the opposite hand HEVs have become promising alternatives to be remedy for urban pollution, greenhouse gases and depletion of the finite fuel resources as they use centrally generated electricity as an influence supply. In smart homes, the vital factor is energy management between input sources, therefore this paper proposes to increase the battery life and keep system parts hazard-free, it includes actual battery - level sensing, charging -current dominant by microcontroller unit (MCU) and a additive DC/AC (MPPT) most wall plug following. A controller that monitors the operation of the autonomous/grid- joined system is intended. Such a controller determines the energy out there from every of the system parts and therefore the environmental credit of the system. The aim of the EMS is delivered a sleek line voltage to the facility grid.

Keywords: Provenance Model, Security, Sensor Networks, Bloom Filter Packet generation, Fault location.

I. INTRODUCTION

Use of Renewable Energy power sources is that the absolute best resolution nowadays to cut back progressively risk of worldwide warming and also the most significant style of renewable is Wind and star energies that ar the foremost economical. The inexperienced power generation resources are used power generators in Distributed Generation (dgs) sources that ar in direct relation with the utilization of small capability power generating units of facility that ar put in in distribution level of power systems or all segments that masses and energy customers are situated. Hybrid systems vary in models. The simplest hybrid model offered nowadays is combination of grid connected star PV cells that may compensate one another within the grid connected state. Additionally, star cells offer electricity needed in day-time whereas wind turbines compensate the facility required within the night amount. Star cells ar consisted of a series of assembly of various cells along to create a flat electrical phenomenon system to soak up the photons and generate electricity by electrons energized within the circuit.

II. MOTIVATION

Renewable energy sources were found to be promising energy sources for building a property and setting friendly energy economy within the next decade. Among these renewable energy sources, the alternative energy and therefore the wind energy ar thought-about 2 of the foremost promising renewable power generation technologies [1], on the opposite hand, distributed generations (dgs) like wind turbines (wts), electrical phenomenon (PV) cells and fuel cells (fcs), good homes ar expected to play necessary role to satisfy the longer term energy demand and these ar one among the foremost important parts of the rising good homes paradigm [2]. Hybrid electrical vehicles (hevs), (using batteries, super capacitors (scs)), ar expected to represent one.7% to 3.5% by 2025. Victimisation these vehicles for good homes, they can quickly power the ménage, e.g., throughout demand peaks once power could become costlier and therefore the energy storages will give a district of the whole demand, or throughout outages by powering the complete ménage till the battery reaches its lower state of charge (SOC) threshold [3]. Power sharing and crossbreeding of PV, WT, battery and SC from literature reviews [4-8] show that management methods play an important role in rising system performance and potency. During this context, there ar some studies associated with energy management of hybrid power systems [6]. Among them, in [7] a completely unique energy management system (EMS) planned, that treated a hybrid PV, WT associated FC installation containing an SC bank. Ahmed et al. [8] planned power management strategy to check the ability fluctuations on a hybrid EMS installation. Paper [9] planned associate EMS for chemical element production performance and system potency. Paper [10] planned the management and charge management strategy of a PV with plug-in HEV as energy storage accommodates battery and SC. Paper [11] conferred a main

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ISSN (Print) 2319 5940

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circuit structure that connects the SC and battery to convertor} through the Buck/Boost bidirectional converter. Paper [12], planned a standard construction device (MMC) for the EMS that mixes battery and SC; this configuration will alleviate the high power burden on the battery, extend the battery period of time, and scale back the dimensions and power loss of the battery. With the rising implementation of hybrid energy network with each renewable alternative energy and non-renewable electricity, there's a necessity to develop the EMS algorithmic rule to enhance energy unitization rate, thus paper [13] planned a multi provider and multi client downside formulation with an answer by minority game based mostly cyber-physical controller. Paper [14] planned the modelling and management of warmth and electricity flows in a very good house with a star heating, PV panels, and lead-acid batteries for energy storage.

III.LITERATURE REVIEW

1. Intelligent solar hybrid power:

This paper demonstrates the implementation of a epitome of IPS (instant power supply) system to make sure continuous output current to load in residential application utilizing each electrical phenomenon (PV) energy and AC Grid. Utility interfacing PWM electrical converter designed here to work by each alternative energy and storage batteries that extremely satisfies the requirement in rural areas wherever National Grids are hardly offered and power cut downside reduces the effectiveness of IPS. Alternative energy gets priority here to charge voltaic battery instead of AC supply that will save many megawatts power a day. To increase the battery lifespan and keep system elements hazard-free, it includes precise battery-level sensing, charging-current dominant by microcontroller unit (MCU) and a additive DC/AC MPPT (Maximum outlet Tracking) charging to congregate most PV energy from AC star Modules. Investigation on improvement of power-interfacing management and improvement of overall system operation assent to intend usage recommendation during this exposition. Laptop simulations and experiment results show the validity of this planned system to possess high power conversion potency and low harmonic distortions.

2. Hybrid wind solar power system:

The aim of this paper is to supply the core of a CAN/CAA tool that may facilitate styleers detuning the best design of a hybrid wind-solar facility for either autonomous or grid-linked applications. The projected analysis imploys applied mathematics techniques to reduce the common cost of electricity whereas meeting the load necessities during a reliable manner, and takes environmental factors into thought each within the style and operation phases. Whereas in autoiionious systems, the environmental credit gained as compared to diesel alternatives are often obtained through direct optimisation, in grid-linked systems is another variable to be decreased specified the utilization of renewable energy are often even.

3. Fuel cell based hybrid power generation:

The technology utilized in this paper is fuel primarily based. This method isn't totally supported renewable sources.

Sr. No	Parameters	Intelligent solar hybrid power	Hybrid wind solar power system	Fuel cell based hybrid power generation
1	**Name of author**	Masudul H. Imtiaz	Riad Chedid	U. R. Prasanna
2	**Technology used**	PV Energy	Wind & PV energy	Solid oxide fuel cells
3	**Specification**	Power- 100watt Current- 6amp. Voltage- 16.5V	Power-400watt Current-6amp Voltage-18V	Power-500watt Current-13.3amp Voltage-27V
4	**Advantages**	Easy installation Overcharge/overload protection.	Autonomous system Excess energy storing battery	Continuous supply of energy
5	**Disadvantages**	Low solar radiation. Dust collection.	Complexed circuitry. Overvoltage may damage circuit.	Use of fuel.

Table No3.1: Literature survey

 DOI10.17148/IJARCCE.2017.6561

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
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This paper determines the employment of combination of renewable sources and fuel cells. The main concern within the style of an electrical installation that utilizes renewable energy sources is that the correct choice of system elements which will economically satisfy the load demand. Whereas in autonomous systems, the environmental credit gained as compared to diesel alternatives are often obtained through direct optimisation.

IV. PROPOSED SYSTEM

Gigantic population and comprehensive electricity consumption have created power crisis one in every of the gravest national issues within the developing countries. Excessive demand of power is usually tough to satisfy and as a result economy is being hampered severely owing to this liberation of electricity. Use of Renewable Energy power sources is that the very best answer these days to scale back more and more risk of world warming and also the most vital variety of renewable is star energies that ar the foremost economical. The utilization of small capability power generating units of facility that ar put in in distribution level of power systems or all segments that masses and energy customers ar situated. Hybrid systems vary in models. The simplest hybrid model out there these days is combination of grid connected star PV cells that may compensate one another within the grid connected state. Additionally, solar cells give electricity needed in day-time.

BLOCK DIAGRAM:
The diagram of projected system is as shown in figure 3.1. The solar array is employed to convert the alternative energy into electrical energy by exploitation electrical phenomenon cells. This energy is keep in battery and this keep energy is employed for various applications. The varied operations like charging of battery, use of keep electricity, management of hundreds and switch of grid in controlled by controller.

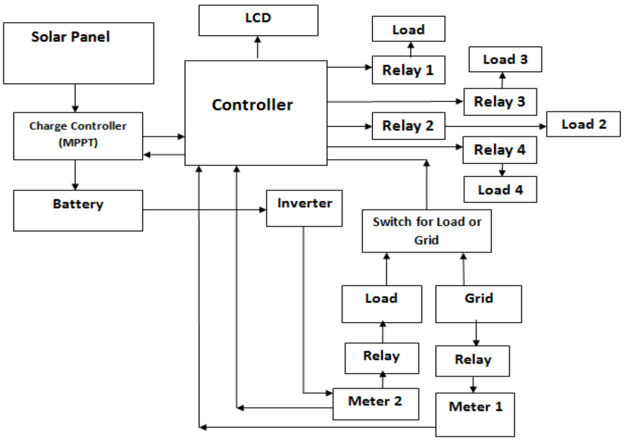

Fig.3.1 Block diagram of proposed system

BLOCK DIAGRAM DISCRIPTION:

1. Solar array
A solar array may be a prepacked connected assembly of electrical phenomenon cells. The solar array will be used as a part of a bigger electrical phenomenon system to come up with and provide electricity in business and residential applications.
Solar panels use lightweight energy gauge boson from the sun to come up with electricity through the electrical phenomenon impact.

2. Battery
Energy Storage capability and Autonomy: to store voltage once it's created by the PV array and to produce energy to electrical masses as required or on demand.
Voltage and Current Stabilization: to produce power to electrical masses at stable voltages and currents, by suppressing or smoothing out transients which will occur in PV system.
Supply Surge Currents: to produce surge or high peak operational currents to electrical masses or appliances.

3. Charge Controller
A charge controller limits the speed at that current is additional to or drawn from electrical batteries. It stops overcharging and should prevent against overvoltage, which may scale back battery performance or period of time, and

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ISSN (Print) 2319 5940
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should cause a security risk. It's going to additionally stop fully debilitating ("deep discharging") A battery, or perform controlled discharges, betting on the battery technology, to shield battery life.

4. Controller
The controller is employed control all the acting actions of unit. It's used for deciding power between the central power and also the generated power and also the alternative operations.

5. Relay, masses and Meter
Relays employed in projected system square measure act as switches like to show on/off the hundreds. The hundreds employed in projected system is nothing however bulb, tube lights, fans or any applications as per the necessity of the user. Meters square measure accustomed show the facility consumption of electricity.

V. IMPLEMENTATION

PROJECT SPECIFICATION:
Solar charger: 12v, 10ma
Voltage required: 12v
Current required: 750ma
Battery: 12V, 7Ah

A. **HARDWARE SPECIFICATION:**
Controller: PIC 18F4550
Program memory: 32kb
Package used: 40 pins DIP
Operating Frequency: 12mhz

B. **SOFTWARE SPECIFICATION**
Software Tool Used: - MPLAB IDE 8.91
Environment: - Window 10 (32 bit)
Processor: - Core i5
RAM: - 4 GB

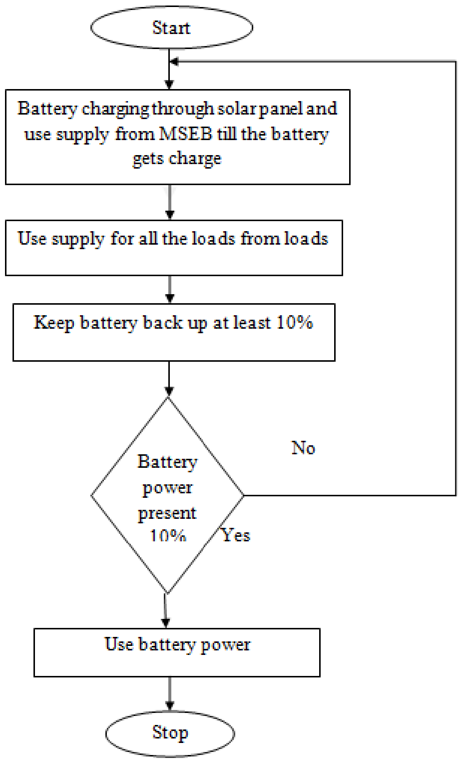

Fig.3 Flow Of System

IJARCCE

ISSN (Online) 2278-1021
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Software used in this system is MPLAB IDE 8.91. Following are the algorithm & flowchart of project.

Algorithm:

1. Start
2. Charge battery through solar panel and use supply from MSEB
3. Use supply for all loads
4. Keep battery back up at least 10%
5. Check whether battery is present or not
6. If yes then use battery power and if not then use main power supply
7. Stop

VI. DESIGN AND SELECTION OF COMPONENT

INPUT SECTION

1.	Solar panel	**Photovoltaic BLD240-60P**	Thermal SW 250 mono / Version 2.0
	Specifications	**1.Maximum power:240Wp** **2. Max. Power Voltage (Vmp): 30.18 V** **3.Max. Power Current :7.96 A** **4.Dimensions:1650x992x50mm** **5.Weight: 19.3 kg**	1.Maximum power:183.3Wp 2. Max. Power Voltage (Vmp): 28.5V 3. Max. Power Current:6.44A 4.Cell dimensions: 6.14 in x 6.14 in (156 mm x 156 mm) 5.Weight: 21.2 kg
2.	Battery	**Lithium-ion**	Zinc Carbon
	Specifications	**1.charge/discharge efficiency: 80-90%** **2.cycle durability: 400-1200 cycle** **Energy Density: 0.90-2.43MJ**	1.chargable:No 2.cycle durability: 200-800cycle Energy Density: 0.57-1.72MJ

MAIN SECTION

1	Micro controller	**PIC 18F4520**	ARM-LPC 2148	89c51
	Specifications	**1.Program Memory: 32Kb**	1.Program Memory: 64Kb	1.Program Memory: 4Kb
		2.Flash Memory: 16 K byte	2.Flash Memory: 512Kb	2.Flash Memory: 4K byte
		3.Package: 40-pin DIP	2.Package: 64-pin Quad	2.Package: 40-pin DIP
		4.Operating Frequency: 12MHz	3.Operating Frequency: 12MHz	3.Operating Frequency: 11.0592MHz
		5.Cost: Medium	4.Cost: High	4.Cost: Low

OUTPUT SECTION:

1.	**LCD**	**DMC-16202**	DMC-16433	DMC-20434
	Specifications	**1.Display format characters * line:16*2**	1.Display format characters * line:16*4	1.Display format characters * line:20*4
		2.character format Horizontal * vertical:5*8	2.character format Horizontal * vertical:5*8	2.character format Horizontal * vertical:5*8
		3.duty:1/16	3.duty:1/16	3.duty:1/16
		4.View Area:64.5*13.8	4.View Area:61.8*25.2	4.View Area:76.0*25.2
		5.Character Size:2.95*4.35	5.Character Size:2.95*4.75	5.Character Size:2.95*4.75

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POWER SU1PPLY DESIGN:

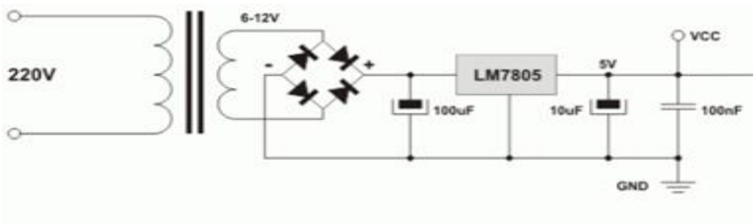

Fig 4.5.1: Circuit Diagram of Power Supply (i)

The +5 V power offer relies on the industrial 7805 transformer IC. This IC contains all the electronic equipment required to just accept any input potential unitage from eight to eighteen volts and turn out a gradual +5 volt output, correct to at intervals 5-hitter (0.25 volt). It conjointly contains current-limiting electronic equipment and thermal overload protection, so the IC will not be broken just in case of excessive load current; it'll scale back its output voltage instead.
The advantage of a bridge rectifier is you don't would like a middle faucet on the secondary of the electrical device. An additional however vital advantage is that the ripple frequency at the output is double the road frequency (i.e. 50Hz) and makes filtering somewhat easier.
The use of capacitance c1, c2, c3 and c4 is to form signal ripple free. The 2 capacitance used before the regulator is to form ac signal ripple free so later that we have a tendency to square measure mistreatment is for safety, if just in case there's a ripple left once regulation, then c3 and c4 can take away it.

We need +5V o/p.
The drop-out voltage of regulator is 2V (As per
Datasheet).
V DC = 5+2 = 7V
So at the regulator input minimum 7V ought to be applied.

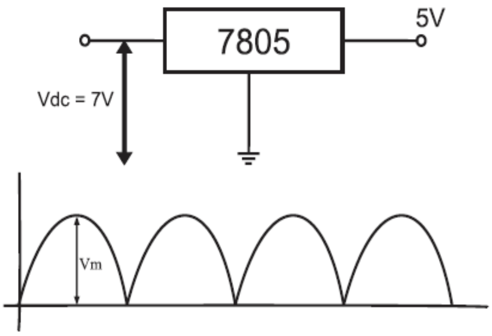

Fig 4.5.2: Regulator IC

According to formula,
VDC= 2Vm / pi.
Assuming there is no Ripple Capacitor
From
VM = VDC .pi / 2
= 7 x 3.14 / 2
= 10.99V
VM = 10.99V
During one cycle, two diode are conducting.
Drop of voltage of one diode = 0.7V
Drop of voltage of two diode = 1.4V
Vim = VM + 1.4V
Vim = 10.99 + 1.4 = 12.39V
Vrms = Vim / Sqrt (2)
=12.39 / Sqrt (2)
= 8.76V

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Vim = 12.39V
Vrms = 8.76V
So we select transformer of 9V
Similarly Im = Idc x pi / 2.
Im = 400m x 3.14 / 2
= 628ma
Irms = Im / Sqrt (2)
= 628m / Sqrt (2)
= 444.06 ma
Irms = 444.06m

So we select transformer with current rating of 500ma.
Considering voltage and current transformer
We take **0-9V / 500mamp**
Transformer - 0-9V / 500ma Step
Down transformer

PIV of diode = Vm = 12.39 V
Im = 628 mamp

So we select bridge IC of 1 Ampere rating.

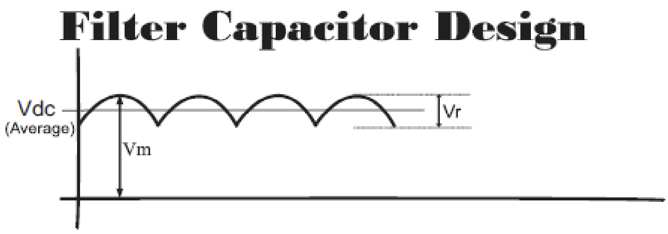

Fig 4.5.3: Filter Output

R = VDC / Idc
= 7 / 400m
= 17.5 Ohms
Vr = 2 (Vim - VDC)
= 2(12.39 - 7)
= 10.78V
C =VDC / (fxrxvr)
= 7 / (100x17.5x10.78)
=371.05uf
So for safe working we select capacitor 0f 1000uf
C1 - 1000uf/35V **-** Electrolytic Capacitor
C2,C4 -0.1uf Ceramic Capacitor
C3 -220uf/25V Electrolytic Capacitor

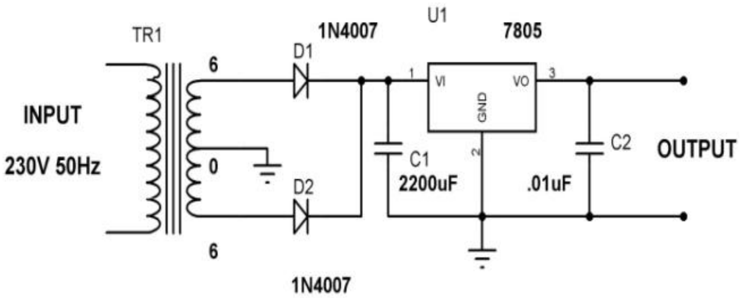

Fig 4.5.4: 5V Power Supply Circuit using 7805 Voltage Regulator

The power supply section is that the necessary one. It ought to deliver constant output regulated power offer for triple-crown operating of the project. A 0-12V/500 ma transformer is employed for this purpose. The first of this electrical device is connected in to main offer through on/off switch& fuse for shielding from overload and contact protection. The secondary is connected to the diodes to convert 12V AC to 12V DC voltage. And filtered by the capacitors, that is more regulated to +5v, by victimization IC 7805.

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CAPACITOR SELECTION:
Reduce Input Ripple Voltage:
The first objective in choosing input capacitors is to scale back the ripple voltage amplitude seen at the input of the module. This reduces the rms ripple current to A level which may be handled by bulk capacitors. Ceramic capacitors placed right at the input of the regulator scale back ripple voltage amplitude. Solely ceramics have the very low ESR that's required to scale back the ripple voltage amplitude. These capacitors should be placed near the regulator input pins to be effective. Even a number of nanohenries of stray inductance within the electrical device current path raise the resistivity at the change frequency to levels that negate their effectiveness.

Diode Selection:
1N4007

Features:
- Low forward dip
- High surge current capability

DC motor:
A generator consists of a stationary portion referred to as the mechanical device and also the rotating portion referred to as the rotor. A flux is created once an on the spot current is applied to windings of the coil within the mechanical device. These coils square measure referred to as field windings. The rotor contains the electrical switch and also the conductors across that electrical phenomenon (electromagnetic field) is iatrogenic. This part is named coil.

Advantages of DC motor:
- Ease of management
- Deliver high beginning torsion
- Near-linear performance

LCD:
LCD is employed during a project to envision the output of the applying. We've used 16x2 alphanumeric display that indicates 16 columns and a couple of rows. So, we are able to write sixteen characters in every line. So, total thirty two characters we are able to show on 16x2 digital display.
LCD can even use during a project to see the output of various modules interfaced with the microcontroller. So digital display plays a significant role during a project to envision the output and to rectify the system module wise just in case of system failure so as to rectify the problem.

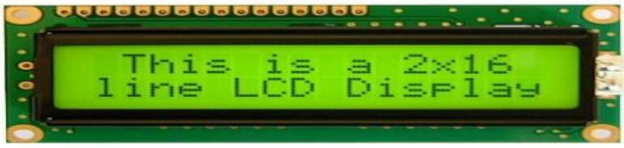

Fig 4.5.5: LCD Display

VII. CONCLUSION

The mechanism that we have a tendency to victimization doesn't given excepted potency. This efficiency are often raised by victimization another mechanism like wind-solar technology. Through the wind-solar technology the charging time of battery are often scale back and also the additional electricity are often generated and thus the upper potency are often achieved. This may cause the most use of power by renewable sources

ACKNOWLEDGMENT

The heading of the Acknowledgment section and also the References section should not be numbered. It offers us nice pleasure in presenting the preliminary project report on ‘HOME ENERGY MANAGEMENT USING HYBRID POWER’ . I might wish to take this chance to impart my internal guide for giving me all the assistance and steering I required. I'm very grateful to them for his or her kind support. Their valuable suggestions were very useful. I am additionally grateful to Head of Electronics and Telecommunication Department, NMIET for his indispensable support, suggestions. In the finish our special due to different Person Name for providing numerous resources like laboratory with all required software system platforms, continuous internet association, for Our Project.

ISSN (Online) 2278-1021
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