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SIMULATION OF SOLAR ENERGY SYSTEM FOR HOME AUTOMATION

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Abstract: In the research work, the devices are managed remotely using intelligent home automation system. System is supporting internet features. Such system is beneficial to manage domestic devices remotely. This would reduce the user effort. Such systems are used industrial automation too. Such system can be extended in future to provide fire safety system to the organizations. This system could be extended to keep record of unit consumed in case of hydro power and power generated from other sources. Such system could be used to manage big data remotely in future. This type of system would be useful in organization where remote observation is must.The problem within tradition system was that there was no scope to add record related to solar system managed device. Even in traditional solar systems devices were managed manually & on site. Solar Energy Electric Power System Simulation represents a small 4 KiloWatt solar energy system. In a real Solar Energy Electric Power System, a single quality multi-function meter is able of displaying all readings of first 4 meters in Simulator. In order to program & control flow of information in Internet of Things, a predicted architectural direction is required. It is being called BPM. Everywhere that is a blending of traditional process management and special capabilities to automate control of large numbers of coordinated devices.[8] In an Internet of Things, significance of an event will not necessarily based on a deterministic approach but would instead be based on framework of event itself: this is also be a semantic web.

Keywords: Solar portal, Photovoltaic Systems, MATLAB, Solar Panels, Inverter, Switch Board

[1]INTRODUCTON

Solar power is the conversion of energy from sunlight into electricity, either directly using photovoltaics (PV), indirectly using concentrated solar power, or a combination. Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. Photovoltaic cells convert light into an electric current using the photovoltaic effect.

Photovoltaics were initially solely used as a source of electricity for small and medium-sized applications, from the calculator powered by a single solar cell to remote homes powered by an off-grid rooftop PV system. Commercial concentrated solar power plants were first developed in the 1980s. The 392 MW Ivanpah installation is the largest concentrating solar power plant in the world, located in the Mojave Desert of California.

[2]PHOTOVOLTAICS

A solar cell, or photovoltaic cell (PV), is a device that converts light into electric current using the photovoltaic effect. The first solar cell was constructed by Charles Fritts in the 1880s.[4] The German industrialist Ernst Werner von Siemens was among those who recognized the importance of this discovery. In 1931, the German engineer Bruno Lange developed a photo cell using silver selenide in place of copper oxide, although the prototype selenium cells converted less than 1% of incident light into electricity. Following the work of Russell Ohl in the 1940s, researchers Gerald Pearson, Calvin Fuller and Daryl Chapin created the silicon solar cell in 1954.[7] These early solar cells cost 286 USD/watt and reached efficiencies of 4.5–6%.

One clear advantage of home automation is unmatched potential for energy savings, and therefore cost savings. Your thermostat is already "smart" in sense that it uses a temperature threshold to govern home's heating and cooling system. In most cases, thermostats could also be programmed within different target temperatures in order to keep energy usage at a minimum during hours when you're least likely to benefit from heating and cooling. At most basic level, home automation extends that scheduled programmability to lighting, so that you could suit your energy usage to your usual daily schedule. Within more flexible home automation systems, electrical outlets or even individual devices could also be automatically powered down during hours of day when they're not needed. As within isolated devices like

thermostats and sprinkler systems, scheduling could be further broken down to distinguish between weekends and even seasons of year, in some cases. Set schedules are helpful, but many of us keep different hours from day to day. Energy costs could be even further reduced by programming "macros" into system and controlling it remotely whenever needed. In other words, you could set up a "coming home" event that turns on lights and heating as you're driving home after work, for example, and activate it all within one tap on your smart phone. An opposite "leaving home" event could save you from wasting energy on forgotten lights and appliances once you've left for day.

[3]OBJECTIVE

The objectives of research are as follow.

1. To implement this expert system for home automation.
2. Domestic devices could be managed remotely easily by user.
3. The power consumption and status of devices must be easily accessible to user.
4. User could be able to access home automation system to using graphical user interface

[4]PROBLEM STATEMENT

The problem within tradition system was that there was no scope to add record related to solar system managed device. Even in traditional solar systems devices were managed manually & on site. Here in our research we have managed devices remotely using intelligent remote controlled home automation system. System is supporting internet features. Records related to status of devices would be stored on remote database server.

[5]TOOLS AND TECHNOLOGY

MATLAB

It is widely used in all areas of applied mathematics, in education & research at universities, & in industry. MATLAB stands for MATrix LABoratory & software is built up around vectors & matrices. This makes software particularly useful for linear algebra but MATLAB is also a great tool for solving algebraic & differential equations & for numerical integration. MATLAB has powerful graphic tools & could produce nice pictures in both 2D & 3D. It is also a programming language, & is one of easiest programming languages for writing mathematical programs. MATLAB also has some tool boxes useful for signal processing, image processing, optimization, etc.

Dot Net Framework

NET Framework (pronounced dot net) is a software framework developed by Microsoft that runs primarily on Microsoft Windows. It includes a large class library known as Framework Class Library (FCL) & provides language interoperability (each language could use code written in other languages) across several programming languages. Programs written for .NET

Framework execute in a software environment (in contrast to a hardware environment) known as Common Language Runtime, an application virtual machine that provides services such as security, memory management, & exception handling. As such, computer code written using .NET Framework is called managed code. FCL & CLR together constitute .NET Framework.

[5]INSTRUCTIONS FOR SOLAR ENERGY ELECTRIC POWER SYSTEM SIMULATION

Solar Energy Electric Power System Simulation represents a small 4 KiloWatt solar energy system. Solar panel collection is eight 100 watt panels or 800 watts total. An average solar day of 5 hours, 800 watts times 5 hours equal 4000 watts or 4 KiloWatts (4KW). Battery bank capacity was 1000 AmpHours at 12 volts. The Simulation may run at 5 different speeds include real time (1 second = 1 second sim time). At fastest speed, it may be a real challenge to keep things in control. The default speed of 1 second = 1 minute of Simulator time is good starting speed. Click drop down arrow to change speed. If you like things to run along a little faster try 1 second = 10 minutes speed.[4] In a real Solar Energy Electric Power System, a single quality multi-function meter is able of displaying all readings of first 4 meters in Simulator. What is happening, Simulator display all the readings at similar time.

[6]Simulation in Different Cases

CASE 1

Refrigerator is on & sun intensity is 3

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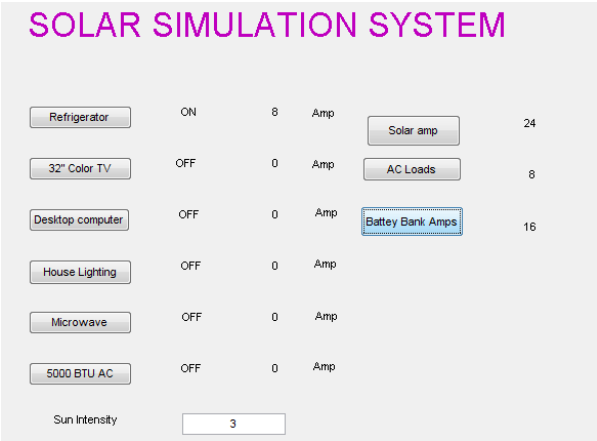

Fig 1 Refrigerator is on & sun intensity is 3

Case 2
Refrigerator & tv is on & sun intensity is 3

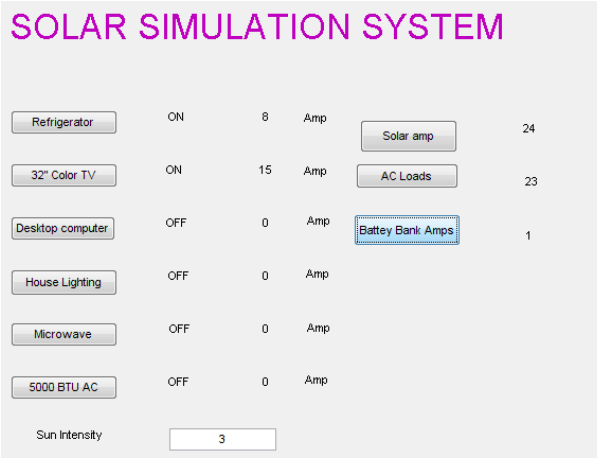

Fig 2 Refrigerator & tv is on & sun intensity is 3

Case 3: Refrigerator,tv,Desk computer is on & sun intensity is 3

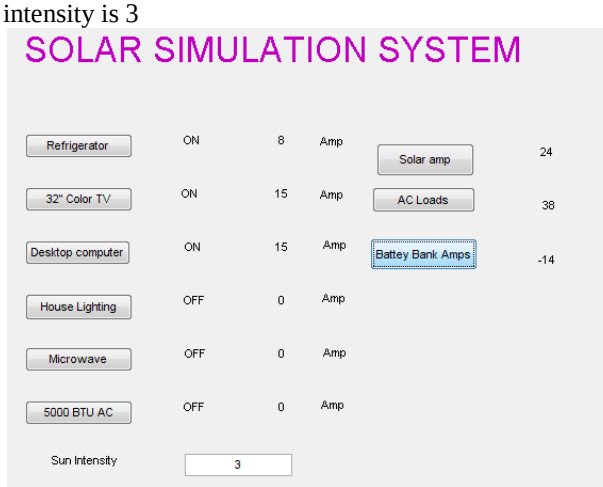

Fig 3 Refrigerator,tv,Desk computer is on & sun intensity is 3

Case 4 : Refrigerator,tv,Desk computer & house lighting is on & sun intensity is 3

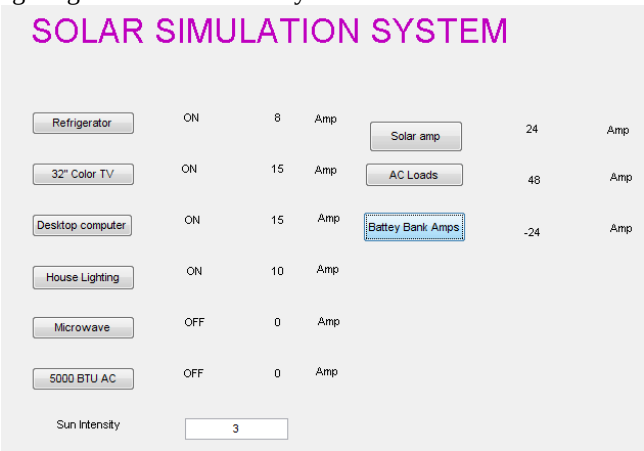

Fig 6 Refrigerator,tv,Desk computer & house lighting is on & sun intensity is 3

Case 5: Refrigerator,tv,Desk computer, House lighting, microwave is on & sun intensity is 3

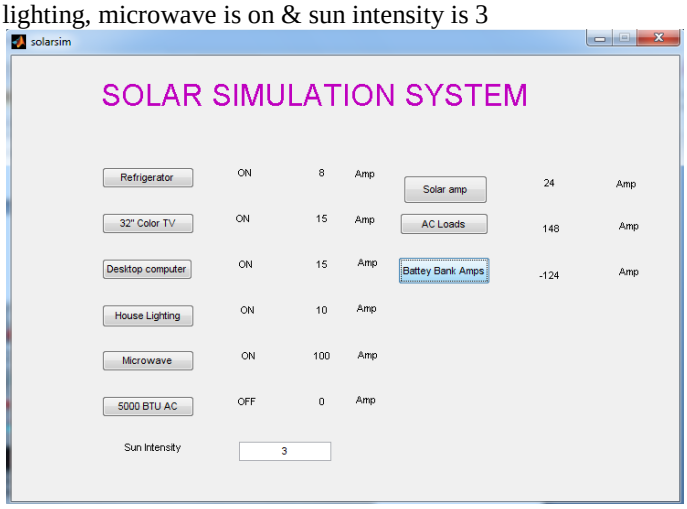

Fig 5.5 Refrigerator, tv, Desk computer, House lighting, microwave is on & sun intensity is 3

Case 6: Refrigerator,tv,Desk computer,House lighting,microwave,5000 BTU AC is on & sun intensity is 3

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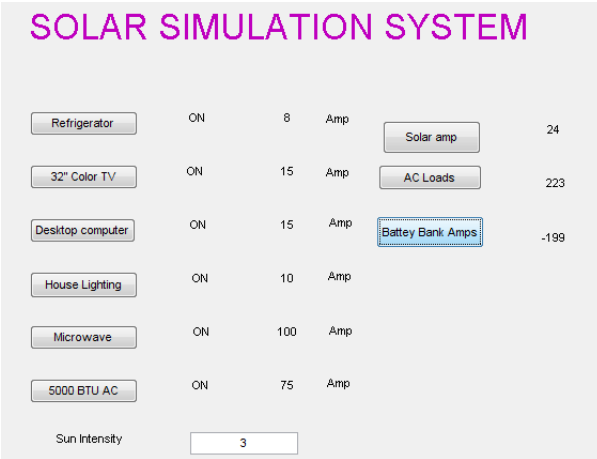

Fig 5.6 Refrigerator, tv,Desk computer, House lighting,microwave,5000 BTU AC is on & sun intensity is 3.Solar Panel Amps, Battery Bank Amps when Refrigerator is on

Refrigerator is on

Sun intensity	Solar Panel Amp	Battery Bank Amps
0	0	-8
1	8	0
2	16	8
3	24	16
4	32	24
5	40	32
6	48	40
7	56	48

Table 5.1 Solar panel Amp

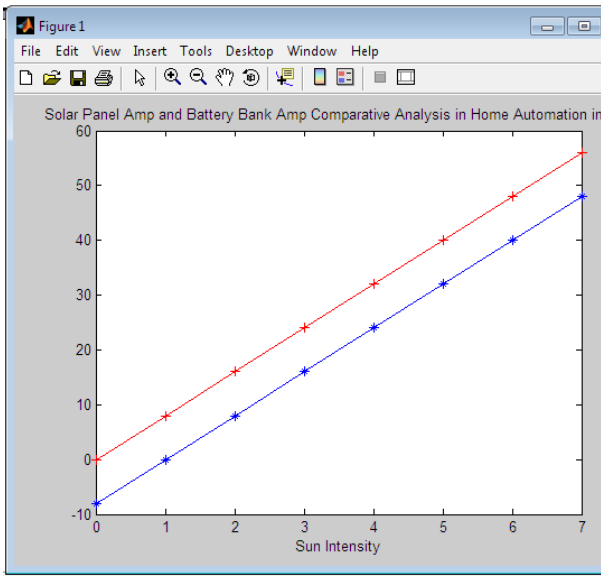

Fig 5.7 Solar Panel & Battery Bank Amp

The work is better than traditional because proposed system has introduced IOT interface to simulate the power consumption by sun. The simulation of power consumption in different cases has been simulated here to represent the power load, power usage in domestic environment. And this management could make remotely.

Sno.	**Traditional**	**Proposed**
1	Remote device management was not possible	Manages devices remotely
2	Unable to represent status of all domestic devices	The status of all domestic devices with their influence on battery backup has been shown.
3	Ignores the various intensity level of solar energy	Capable to simulate solar energy at multiple intensity levels.
4	Limited cases have been discussed	Lot of cases of AC load, power usage in solar system is considered.
5	Does not allows simulation to make power management plan	Allows to perform simulation without using actual devices to perform power management.
6	Does not influence the cost factor	It is influencing the cost of b using simulated environment.

[]CONCLUSION

In order to program & control flow of information in Internet of Things, a predicted architectural direction is required. It is being called BPM. Everywhere that is a blending of traditional process management and special capabilities to automate control of large numbers of coordinated devices.[8] In an Internet of Things, significance of an event will not necessarily based on a deterministic approach but would instead be based on framework of event itself: this is also be a semantic web. Consequently, this will not necessarily require common standards that will not be able to prefer every context or use: some actors (services, components, avatars) accordingly be self-referenced and if ever needed, adaptive to active common standards (predicting everything no more than defining a global finality for everything is just not possible with any of top-down approaches and standardizations). Some researchers give that sensor networks are most essential component of Internet of Things.

[]FUTURE SCOPE

Such system is beneficial to manage domestic devices remotely. This would reduce the user effort. Such systems are used industrial automation too. Such system can be extended in future to provide fire safety system to the organizations. This system could be extended to keep record of unit consumed in case of hydro power and power generated from other sources. Such system could be used to manage big data remotely in future. This type of system would be useful in organization where remote observation is must.

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