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Efficient Online Solar Energy Monitoring and Electricity Sharing in Home Using Cloud System

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ABSTRACT

This paper promotes monitoring the electrical home appliances using cloud computing. Here, the solar power is the source of electricity. Monitoring and management system collects the data through the internet and controls the power supply to the electrical and electronic home appliances via mobile phones. The wastage of electricity in one home can be rented to another user, who is in need of. Rental can be done one and only if the user belongs to a particular monitoring and management system. It also generates the cost report daily, monthly, as well as yearly in Kilowatt per Hour. Thus, it makes useful to the people to consume power and thereby they can save cost. The proposal of this paper involves the monitoring of each and every home appliances through internet (cloud computing) and thereby we can reduce cost and electrical energy.

Index Terms – Solar Energy, Electricity, Cloud Computing, Power Monitoring, VPN.

I. INTRODUCTION

Nowadays, web technology places a vital role to control electronic devices with the support of internet which is also allowed to control by the users. Upcoming technologies are widely based on cloud computing and managing smart home. Cloud computing provides services in various platforms such as resources, software and information to the computers over the internet. Most of the MNC organizations uses this technology to reduce costs [1]. Cloud computing gives resources and infrastructure as a source with minimum cost rather than spending much cost of resources [2]. And also, IBM said, Cloud computing will decrease 40% of payments in maintenance of hardware and software, which in turn minimizes 30% of the corporation's cost [3]. On the other hand, handling home appliance through networks involves communicating with electrical appliances and services and allows them to access, control and monitor using remote control [4]. Only few researches are concentrating on cloud computing and managing smart home. For example, a research of Al-Ali and Al-Rousan on Java based Automation System uses Cloud computing And Managing Smart Home concepts. It monitors and controls the electronic home appliances through the internet, but it fails to concentrate in the consumption of electrical energy that connected to the devices [5]. The other project done Liang, Fu, and Wu which explained the same theory that the home appliances can be

Organized and supervised through embedded microprocessors and that can be viewed on terminals.[6]

II. LITERATURE SURVEY

A project of Ado, Antunes and Grilo was Alarmed notification for home appliances to the owners via web-based control, but they were not focused on accessing through remote-control [7]. To the next, Khiyal, Khan, and Shehzadi conducted a similar study that is based on Short Message Service (SMS) but they just involved in controlling of home appliances and thereby offers security when the users are away from their home[8]. However, the fullest of Cloud Computing and Managing Smart Home is not used completely yet[8]. A study of Marvin R. G. Garcia, Hannah R. B. Chan was on Smart Home Electricity Organization system using cloud computing, which indicates on consuming the electrical power and thereby they can save energy for the summary of all the home appliances done web based remote control [9].

As solar is the source of electricity, solar management techniques are important. Everyone in the universe knows solar energy is the purest of all. It is widely used for industrial, commercial and military purpose [10]. solar power is the cheapest power. Solar energy cannot be used as a source directly. So, Solar panels are used on the top of every home to supply electricity from solar power [11]. Since solar panels absorb solar energy at certain days, the storage area is necessary to back up some electric power. The storage area is the battery, which is a lead acid battery store electric power [12]. But their study lacks in finding the power generated by each and every home appliance and sharing the wasted electric power to the neighbours, So that, we can reduce wastage of electrical power and energy.

III. EXISTING SYSTEM

The existing scheme covers of Web server, Website, interfaces of hardware and software applications, solar panel and solar energy. The system also consists of electricity flow control switch which controls the home appliances switching on or off remotely. The electricity consumption of the appliances is Calculated in terms of Kilo Watt per Hour. The server won't allow the un-authenticated persons to use it, without using any recognized code. Since the server system contains a Virtual Private network (VPN), it authenticates the remote access and applies encryption technique to detect security.

Electricity can be accessed using solar panels. Solar energy is converted into electrical energy using these panels. The Solar panel is used to increase the utility of electricity when it is available. Here, the incremental conductance algorithm is used to track high electricity, according to the atmospheric conditions. This algorithm absorbs about 97% of power. Though the existing system pays security and easy access through remote control, it doesn't have the capability to calculate the power consumption of all the home appliances in sum. It also doesn't explore the need of automatic switching on and off of all the home appliances when the usage of electricity increases above the normal strategy. Another drawback of this system is, it needs more storage to store the details of all the updates in billing the cost of power consumption. The system needs more power to calculate the power consumption. Hence wastage occurs.

Sun is the main source of solar energy and it is the cheapest source of energy. We can access solar energy anywhere at any time. Sun light covers a colour called chlorophyll, which helps to convert solar energy into electrical energy. It is the renewable energy. Earth receives Almost 17400 terawatts of solar energy is received by the Earth. The volume of solar energy attainment the surface of the planet is so vast that in one year it is about twice as much as will ever be found from all of the Globe's non-renewable resources of coal, oil, natural gas, and mined uranium combined. Solar technologies are largely pigeonholed as either Static or dynamic depending on the way they capture, convert and issue sunlight and permit solar energy to be connected at different levels around the world, mostly depending on distance from the equator.

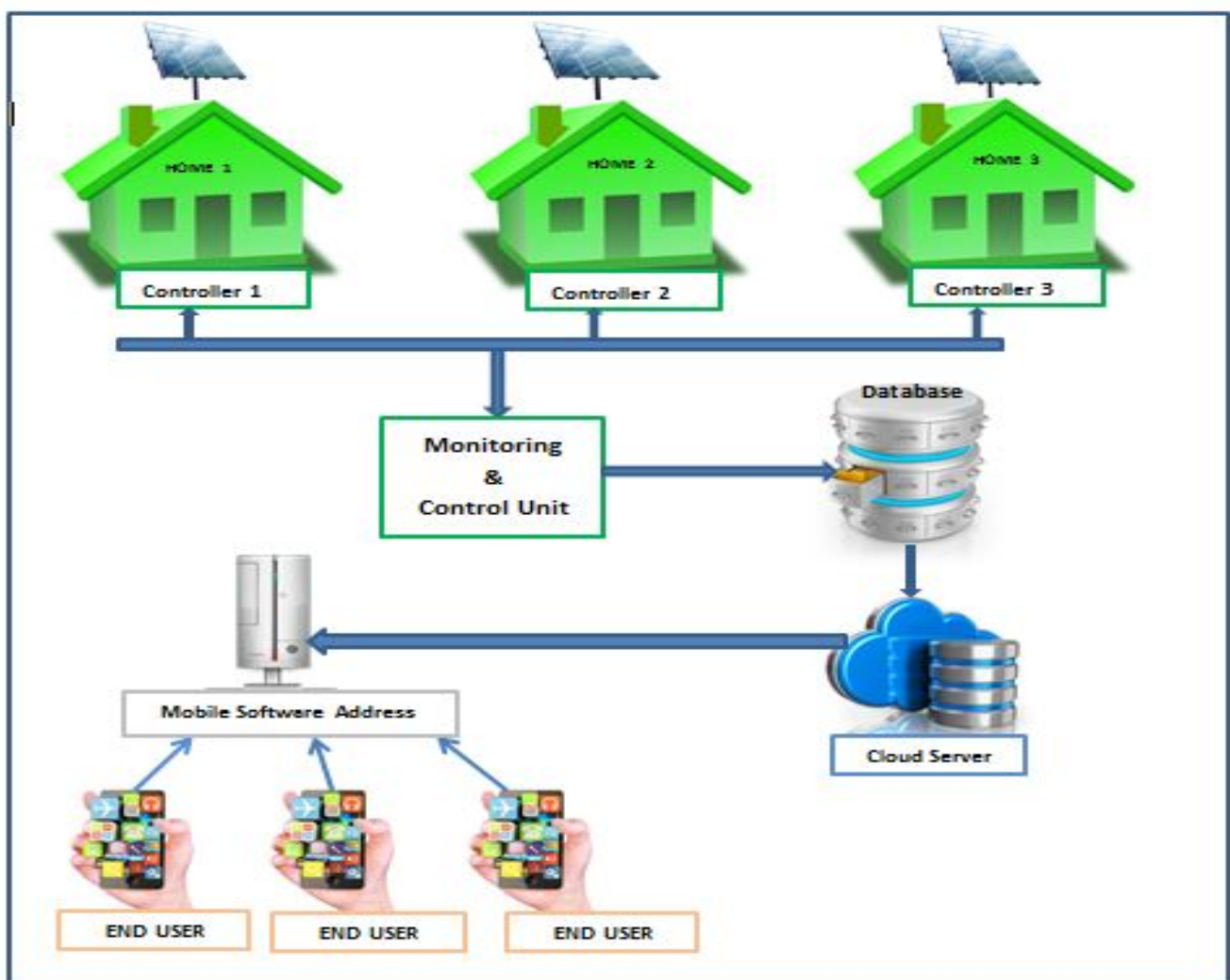


Figure 1: Solar Energy Sharing Working Model

Active solar techniques use photovoltaics, concentrated solar power, solar thermal collectors, pumps, and fans to change sunlight into valuable productions. Passive solar techniques include selecting materials with favorable thermal stuffs, manipulative spaces that obviously mix air, and referencing the position of a building to the Sun. Energetic solar system rises the source of energy and are considered supply side technologies, while passive solar system decreases the need for other resources and are generally considered demand side technologies. Solar energy is the alteration of sunlight into power, whichever directly using photovoltaics (PV), or indirectly using concentrated solar power (CSP). CSP schemes use lenses or mirrors and tracking systems to focus a large area of sunlight into a small ray. PV converts light into electric current using the photoelectric effect.

IV. PROPOSED SYSTEM

The proposed system consists of controller, website, software application, database, smart phones, solar panel and Monitoring and Control Unit (MCU). MCU is to monitor the home appliances, whether the electricity is in ON condition. If the software application is turned open, Monitoring and Control Unit starts to track the data received from the controller which stores the up-to-date database of the power consumption in that area. Hence, the wastage occurred in every home appliance can be calculated and it also generates bill for the used electric power.

a. MONITORING AND CONTROL UNIT (MCU)

Monitoring and Control Unit has non-volatile memory and the data are retrieved from the controller every 60 minutes. It stores the data in cloud to retrieve their home electricity consumption details from anywhere. It also controls the solar panel. The Solar panel is used for solar energy to electrical energy conversion. During rainy seasons and due to some atmospheric conditions, sunlight is not available. Hence battery is used to save power for future use. Battery used is a lead acid battery.

b. LEAD ACID BATTERY

The lead acid battery consists of a container made up of hard rubber or glass or celluloid. The container holds dilute sulphuric acid, which performances as the electrolyte. Spongy lead performances as the negative electrode and lead oxide performances as the positive electrode. The electrodes are divided by suitable insulating materials are assembled in a way to give small inner resistance.

When the cell is linked in the circuit, due to the oxidation reaction that takes place at the negative electrode, spongy lead responding with dilute sulphuric acid yields lead sulphate and two electrons. The electrons movement in the exterior circuit from the negative electrode to positive electrode. This makes the straight current to flow from the positive electrode in the external circuit.

C. Controller

The controller notices every 5 seconds that any home appliances get turned ON. If it is ON, then the controller simulates to monitor power consumption of home appliances. The controller controls each device by managing them to access the electric power with its range. The controller is maintained by the Monitoring and Control Unit through wires where it controls up to 5 controllers. Controller stores the data that the power consumed by each and every home appliance separately. It has volatile memory and so the details are stored until then the Monitoring and Control Unit retrieves the information from the controller. When the controller goes down, Monitoring and Control Unit has the capability to act as a controller. Each home contains controller to monitor and control all the home appliances.

d. SOFTWARE APPLICATION

Software application is the key to find all the databases of home appliances. When the users enrolled in the application with their residential address, they have allowed this application. The users can view the power consumption and the power wastage of each home appliance and also the bill of each device and also the whole. Hence this software is helpful to reduce the wastage of electric power. And also it is used to reduce accidents since the controller controls each device to maintain with their static voltages.

e. RENTING OF SOLAR POWER

Firstly, renting is simply known for giving one's property to others to use it for a period of time for some cost. So renting of solar power means that funding solar power to the users for a particular time. Renting can be done if it satisfies the following conditions. The Request must be given by the needed user to the owner and the owner can rent only when the requested user belongs to that group. The main advantage is Wastage of the electrical energy can be reduced, Electricity bill is lowered and Payment for rented power reduces the bill of each user.

V. CONCLUSION

The existing system does not concentrate on power wastage and high cost, the difficulties will be quite high. Hence, this proposal helps in the reduction of power wastage, using solar energy and also it helps to minimize the expenditure of electric power. Monitoring of home appliances using controller helps the Monitoring and Control Unit to monitor and maintain the maximum number of home appliances at the same time. In future, this method can be implemented to improve our society.

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