SOLAR TUBE WELL USING SOLAR TRACKING AND CONTROLLING WITH MOBILE

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Abstract

In modern days, we must use various high-tech machineries and equipments to get our jobs done and make the life easier. These machineries should be controlled by the solar tube well owner from any location as the homeowner might be away from at workplace or traveling in a different place in the weekend. Thus a system of remote monitoring and controlling are very much necessary. Smart technique is one of these types of system equipped with agriculture appliances which we wish to control smartly from anywhere. Mobile phones have become almost an inseparable part of civil lives today and increase the efficiency of solar panel to produce large amount of energy. In this paper we introduce a new mechanism so that the ordinary services of the mobile phones can be leveraged to communicate with and control the agriculture appliances (i.e. solar tube well) and make our irrigation a really smart one.

Key words: smart technique, leveraged, willing, thermonuclear process,

1. Introduction

With resources quickly diminishing, it is up to this generation to begin to investigate new forms of energy. The city's residents are open to new ideas and are willing to change to benefit the environment. Solar energy is amount of sunlight that it receives each year. Solar energy is quite simply the energy produced directly by the sun and collected elsewhere, normally the Earth. The sun creates its energy through a thermonuclear process that converts about 650,000,000 tons of hydrogen to helium every second. The process creates heat and electromagnetic radiation. The heat remains in the sun and is instrumental in maintaining the thermonuclear reaction. The electromagnetic radiation (including visible light, infra-red light, and ultra-violet radiation) streams out into space in all directions. Only a very small fraction of the total radiation produced reaches the Earth. The radiation that does reach the Earth is the indirect source of nearly every type of energy used today. The exceptions are geothermal energy, and nuclear fission and fusion. Even fossil fuels owe their origins to the sun; they were once living plants and animals whose life was dependent upon the sun. More and more energy from sunlight strikes the earth in one hour (4.3 * 10^{20} J) that all the energy consumed on the planet in the year (4.1 * 10^{20} J).Due to which of solar energy is not properly useful in our planet, it's time to serious about solar energy. This is only energy which form electricity or as fuel in modern planet in less amount of money. All the natural fuel is decreasing with well structure. In solar tube well lots of fuel and electricity is going consumed but it is less amount in our planet. In so many rural areas there is not electricity and not sufficient money to purchase a fuel for the agriculture there is only one way to face this problem i.e. is solar panel to generate electricity from the radiation of sunlight.

Solar tube well is a agriculture equipped with special facilities to enable occupants to control or program an array of automated irrigation electronic devices. For example, at a home owner on vacation can arm a home security system, control temperature gauges, switch appliances on or off, control lighting, program a home theater or entertainment system, and perform many other tasks. Smart solar tube well became smarter if the controlling can be done from any mobile place. Our main focus is to control the solar tube well from mobile phone. The motivations behind the goal to phone control of irrigation appliances are simple. It's not always feasible to be physically near to the tube well still sometimes it's very important to control the appliances for many purposes and from anywhere, So the mobile controlling takes the control of the one place to another place and to the hands on hand of the people. If a simple mobile phone takes the added responsibility to control the smart home then the control is reachable from almost everywhere people travels and lives on earth. This sort of high end technology is supposed to facilitate the different life easing utilities to a new age and bringing things out of the box to as near as one's palm. There exists a number of available media for remote communication but controlling with mobile easy to do work. Internet is a good example of this type of remote communication. Internet places virtually no bounds on geographical placement and is thus considered "enough" remote by our definition. But the Internet is a place crowded with various types of traffics, often hostile to each other.

Security vulnerability is the most striking alert point of the Internet. Whenever a web based application goes live, a lot of efforts have to take place before it can be said to be secured, if at all. When we say remote control, we want to make sure no malicious party ever gains control and abolishes everything. Also to use web, it requires resources like flawless internet connections and hosting servers, which may not always fit to the concept of remote controlling.

Another candidate solution to this remote communication problem is the use of mobile telephony. Mobile telephony offers a wide range of communication services like voice and data transfer through SMS and other enhanced data transfer protocols like GPRS, EDGE at a relatively low price and at a wide variety of places on the earth. On the other hand, these curity is better achieved by the use of strict traffic control. We adhered to this method of remote controlling of home appliances because of its unparallel availability and modest security at the affordable price. In this research we produce different feasible ways to leverage the mobile telephony using the existing services but redefining the trivial purposes they serve. So, We have investigated the different ways we could use the cell phones to go beyond making calls and sending SMS and devised some ways to implement the remote control, which is 'Remote' and can be used to control the home appliances of a smart home . There are two approaches for controlling home appliances. One is to make a custom build controller from scratch for controlling the home appliances using wired connection. The main problem is that the connections of this controller become clumsy as well as not reliable. We find out it's better to use the available home controllers than to devise one from scratch to aid this goal as there are standardized home controllers in the market and they offer wide coverage of controllable appliances. X10, Insteon, Z-Wave and ZigBee are the available candidates for the home controller manufacturers. We left the home appliances controlling part to the X10 and concentrated on the communication between the mobile phone and the X10 controller for remote controlling of the X10 controller. We choose X10 over others due to its wide availability. This paper is organized as follows. Section 2 and 3 describes the backgrounds and related works respectively. Section 4 provides a detailed description of the X10 technology we used for prototype. Section 5 describes the prototype of the application we developed and its advantages over the existing solutions. Section 6 and 7 provides descriptions of two possible Medias (Bluetooth and AT Command) of our application. Finally Section 8 and 9 depicts on the future expansion possibilities and references.

2. Experimental Section

The power incident on a PV module depends not only on the power contained in the sunlight, but also on the angle between the module and the sun. When the absorbing surface and the sunlight are perpendicular to each other, the power density on the surface is equal to that of the sunlight (in other words, the power density will always be at its maximum when the PV module is perpendicular to the sun). However, as the angle between the sun and a fixed surface is continually changing, the power density on a fixed PV module is less than that of the incident sunlight.

The amount of solar radiation incident on a tilted module surface is the component of the incident solar radiation which is perpendicular to the module surface. The following figure shows how to calculate the radiation incident on a titled surface (S_{module}) given either the solar radiation measured on horizontal surface (S_{horiz}) or the solar radiation measured perpendicular to the sun ($S_{incident}$).

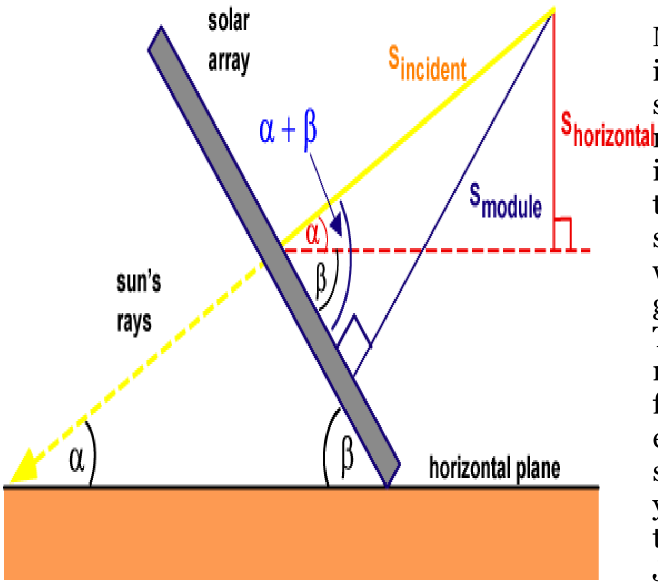

figure1:Tilting the module to the incoming light reduces the equations relating S_{module}, S_{horiz} and $S_{incident}$ are:

$$S_{horizontal} = S_{incident} \sin\alpha$$

$$S_{module} = S_{incident} \sin(\alpha + \beta)$$

Where
α is the elevation angle; and β is the tilt angle of the module measured from the horizontal.

The elevation angle has been previously given as:

$$\alpha = 90 - \phi + \delta$$

Where ϕ is the latitude; and δ is the declination angle previously given as:

$$\delta = 23.45^{\circ} \sin\left[\frac{360}{365}(284 + d)\right]$$

Where d is the day of the year.

From these equations a relationship between S_{module} and S_{horiz} can be determined as:

$$S_{module} = \frac{S_{horizontal} \sin(\alpha+\beta)}{\sin\alpha}$$

Module output. The tilt angle has a major impact on the solar radiation incident on a surface. For a fixed tilt angle, the maximum power over the course of a year is obtained when the tilt angle is equal to the latitude of the location. However, steeper tilt angles are optimized for large winter loads, while lower title angles use a greater fraction of light in the summer. The simulation below calculates the maximum number of solar insulation as a function of latitude and module angle. The effect of latitude and module tilt on the solar radiation received throughout the year in $W.h.m^{-2}.day^{-1}$ without cloud. On the x-axis, day is the number of days since January 1. The Module Power is the solar radiation striking a tilted module. The module tilt angle is measured from the horizontal. The Incident Power is the solar radiation perpendicular to the sun's rays and is what would be received by a module that perfectly tracks the sun. Power on Horizontal is the solar radiation striking the ground and is what would be received for a module lying flat on the ground. These values should be regarded as maximum possible values at the particular location as they do not include the effects of cloud cover. The module is assumed to be facing south in the northern hemisphere and north in the southern hemisphere. For some angles, the light is incident from the rear of the module and in these cases the module power drops to 0.

As can be seen from the above animation, for a module tilt of 0°, the Module Power and Power on Horizontal are equal since the module is lying flat on the ground. At a module tilt of 80°, the module is almost vertical. The Module Power is less than the Incident Power except when the module is perpendicular to the sun's rays and the values are equal. The module is orientated to the equator so it faces north in the Southern Hemisphere and south in the Northern Hemisphere. As module moves from the Northern to Southern Hemisphere (latitude = 0°), the module is turned to face in the opposite direction and so the Module Power curve flips. When the light is incident from the rear of the module the Module Power drops to zero . Try setting the latitude to your location and then varying the module tilt to see the effect on the amount of power received throughout the year. The solar panel was of crystalline silicon type with surface area of 0.19m2 and capacities of 9.0V and 2.5A, respectively.

Power = VI (Watts) (1)

Efficiency = power of solar panel 100 %
(2)/ Area of solar panel x 1000W/m2 1

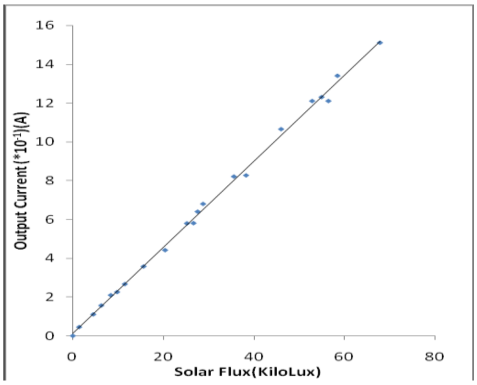

Figure 1. Graph of Output Current against Solar Flux in Port Harcourt

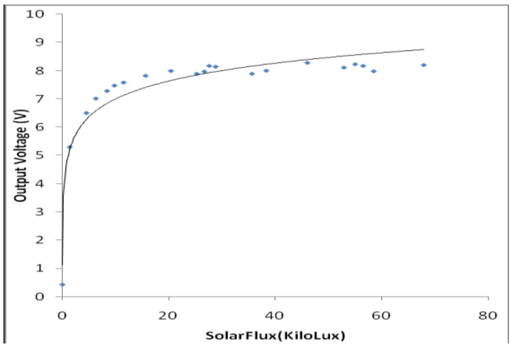

Figure 2: Graph of Output Voltage against Solar Flux in Port Harcourt

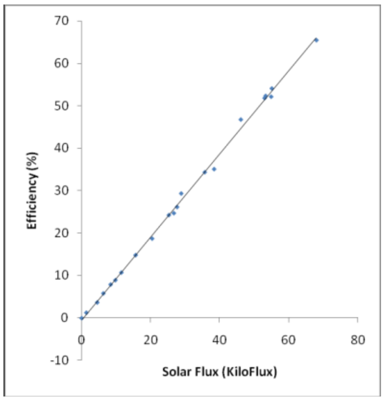

Figure 3: Graph of Efficiency against Solar Flux in Port Harcourt

3. Discussion

Solar panel output current is directly proportional to solar flux since the graph is a straight line. This means that when solar flux increases solar panel output current increases that is when there is less clouds cover, less dust, haze and low air pollution, fig 4.1 shows that output current of about 10.6 x 101-1A was recorded when solar flux was 46.7 kilolux, 15.1 x 10-1A when solar flux was 67.9 kilolux show an increase of 4.6 x 10-1A. Increase in solar flux has little effect on output voltage of solar panel, the graph in fig. 2 shows that output voltage is stable despite increase in solar flux, for instance solar flux from 20.4 kilolux to 67.9 kilolux, produced output voltage between 8.0V and 8.2V with a difference of 0.2V which is very small. Solar flux is directly proportional to output current and also proportional to efficiency, this means that output current is directly proportional to efficiency; therefore output current and solar flux directly determines the efficiency of panel as in fig. (1 and 3)

4. Conclusion

A direct linear relationship has been observed in this study between solar flux and efficiency fig (1 and 3). However, a rise in solar flux may have little effect on voltage output from the solar panel. A positive linear relationship was found with current, efficiency with solar flux increase.

5 References

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