

BIO SOLAR CELLS MANAGEMENT SYSTEMS

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Abstract: Utilization of Solar PV Panels Innovation for housetop establishments in private and also business foundations is ending up increasingly well known as an option reasonable eco-accommodating, non-dirtying wellspring of power. India's Objective: 175GW from sustainable power sources by 2022 Break up:100 GW from sun oriented, 60 GW from the breeze, 10 GW from biomass and 5 GW from little hydroelectric ventures. 100GW = 60 GW of utility-scale ventures (both solar based PV and CSP) like solar powered parks + 40 GW of housetop solar oriented applications for business clients and family units, together with some little scale plots and off-lattice limit. While Solar oriented Photovoltaic Frameworks do have a few advantages, there are additionally different issues which become an integral factor at the season of establishment, upkeep and amid crisis circumstances, for example, amid a fire,etc.

Keywords: Theft prevention, Dust cleaning, PV Dust cleaning, Solar panel performance, Bio solar cells

INTRODUCTION

India's overall electricity generation is mainly from fossil fuels or natural products and is around 70% exhaustion. India is to a great extent reliant on natural resources like fossil fuel imports to meet its vitality requests. Solar energy in recent years has attracted more attention as an alternate source of non-polluting and sustainable form of energy for homes and industries. Sun oriented panels burglary is a noteworthy issue in the business markets. Panels are in reality quite simple to take down since they essentially sit on rooftops or at ground level where somebody could easily dismantle it with simple nuts and bolts. This has brought about the need to explore other means of power generation from nonconventional renewable energy resources such as solar energy.

Most panels are stolen from establishments in remote regions or corporate parks purge on ends of the week. Solar oriented homesteads are considered as simple or easy targets for cheats in view of lacking assurance or insufficient measures.

Existing hostile to burglary approaches depend on framework level and are not extremely preventive and productive in light of the fact that these can be circumvent with some specialized learning.

Anything that obstructs the daylight, is diminishing the practicality of the photovoltaic system. Reducing the light through clean or distinctive administrators like tree sap, winged creature droppings or environmental toxic substances, will achieve a decreasing in imperativeness age or generation. Earth that hinders all light in segments of the board could have an extensively more than basic effect. The reaction to the greater part of this is clear, clearly. Keep your structure clean, and keep it working at most extraordinary capability. As amassing of tidy on the PV board lessens its transmittance which brings about the decrease of the power yield, in this manner bringing about loss of energy age. As accumulation of dust on the PV panel reduces its transmittance which results in the reduction of the power output, thus resulting in loss of power generation. Most generally utilized strategy for cleaning the sunlight based boards is through the physical work. Aside from being time taking and lumbering, there is likewise a danger of harm to the costly sun based boards by the untalented work.



Fig no.1: Solar panel

As of late, microbial energy components, otherwise called microscopic organisms controlled power modules, which is fundamentally used to breakdown natural material and make electric present and used to create power from it. Eco-accommodating, shoddy and fascinating power devices, otherwise called the Microbial Energy units, are considered today, to be utilized as sunlight based cells or in sun oriented boards. Utilization of this hindrance rising above headways in bio-sunlight based cells that could encourage higher power/voltage age with self-manageability, discharging bio-sun based cell innovation , and making an interpretation of it to reasonable applications in genuine.

EXISTING WORKS

Earlier some advancements, some inventions have been made on theft prevention of solar panels, solar panel maintenance, etc. Various technologies, being developed around the world for cleaning of solar panels, have been discussed like removal of dust using Mechanical Methods (Methods like mechanical vibration, ultrasonic cleaning, scrubbing and mopping) or using Nano-Films (Modules having a layer of pellucid nano films capable of self-cleaning) or by Electro-Static Methods (Technologies for removal of dust using electrostatic methods are mainly based on the “Electric Curtain Concept” by F.B. Tatom and NASA in 1967). OCS Energy presents SolarWash– The Automated Solar Panel Cleaning System.

Securing sunlight based panels is simple with the line of solar oriented panels clasp/fasteners. Heliotex offers the exceptionally finest in against burglary latches, uniquely cut security fasteners, security screws and then some. ProSolar and Unirac security clasp are far better than sunlight based panels/boards cautions. The Raptor fastener incorporates high-security burglary insurance, quality, and better establishing for solar based mounting frameworks. Private, profoundly controlled keyways shield unapproved workforce from rupturing the board, while bigger head style and stick give 30% more noteworthy torque quality than standard fasteners.

PROPOSED WORK

Government of India for the current Indian Solar market has many curious and ambitious plans which are under evaluation right now and is set to unleash its full bloom by 2022 for 100GW of Solar Power. But Photovoltaic systems have a performance problem of panel ruining (tidy or ash from nearby air contamination). It can decrease board output essentially and fast. Concentrates on panel dirtying in contestible a normal yearly muscularity loss of 5% for unveil that are not intermittently cleaned. It can reduce energy output significantly. Studies on module soiling show an average annual energy loss of 5% for arrays that are not periodically cleaned. Also because of movement of the sun energy is not produced effectively. We can use the solar energy until it is available but because of sun’s rotation it is not possible. So in order to tackle these problems, firstly, we have to be very smart about it and secondly, logically think and apply it.

However, on the flip side, there are a few issues plaguing the fast penetration of the technology in the home and industrial sectors.

BIO-HYBRID CELLS

A biohybrid sun based cell is a sun based cell influenced using a mix of normal to issue (photosystem I) and inorganic issue. Biohybrid sun arranged cells have been made by a gathering of researchers at Vanderbilt University. The gathering used the photosystem I (a photoactive protein complex arranged in the thylakoid film) to duplicate the basic system of photosynthesis to get a more noticeable viability in sun controlled imperativeness change. These biohybrid sun situated cells are another sort of reasonable power source.

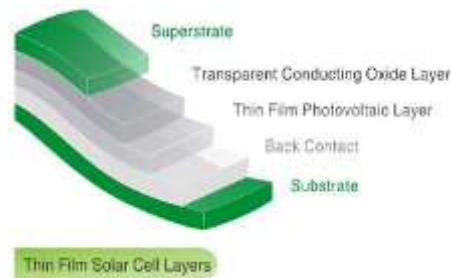


Fig no.2: Solar film

ADVANTAGES

The greatest advantage the biohybrid sun oriented cell has is the way it changes over sun based vitality to power with right around 100% percent proficiency. This implies no power is lost through the change of compound or conversion to electrical power. These numbers are extraordinary contrasted with just a 40% productivity customary sun powered cells. Cost is likewise significantly less to produce biohybrid in light of the fact that separating the protein from spinach and different plants is less expensive contrasted with the cost of metals expected to create other sun oriented cells.

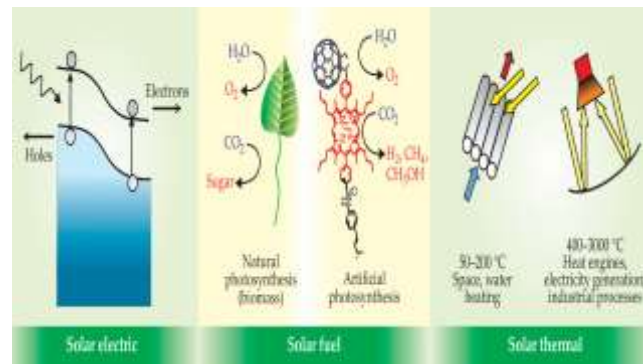
DISADVANTAGES

While the effectiveness of the biohybrid cells are significantly more noteworthy they additionally have numerous drawbacks. Much of the time some sun based cells have the favorable circumstances over a biohybrid sunlight based cell. For one, conventional sun based cells create more power than those right now being accomplished by biohybrid cells. The life expectancy of biohybrid sun based cells is additionally extremely short, enduring from fourteen days to nine months. The sturdiness of the cells turn out to be an issue since current sun powered cells can work for a long time.

HOW ENERGY IS CONVERTING?

Solar oriented photons change over normally into three types of vitality—power, compound fuel, and warmth—that connection flawlessly with existing vitality chains.

The cost-viability canny additions in the sunlight based situated vivacious changes are engaged by our creating ability to understand and control the main nanoscale wonders that direct the difference in photons into various sorts of exuberance. Such fascinating ideas have, as yet, been past the traverse of our best assistant and spectroscopic tests. The climb of nanoscience is giving us new techniques in perspective of ourselves, sharp new trial of structure and components at ever-more miniature length and time scales, and the new theoretical ability to reproduce thousands of molecules.



LINKIT-ONE BOARD

The LinkIt ONE improvement pack includes an advancement board, a Wi-Fi and Bluetooth antenna apparatus, GSM (2G) antenna and GPS/GLONASS antenna and in addition a Li-battery. Utilizing the included speedy begin control we can be run evidence of-ideas in a matter of seconds.

The LinkIt ONE board is basically an open source, used mainly for prototyping IoT contraptions. It has SoC for Wearables, MediaTek Aster (MT2502) joined with Wi-Fi (MT5931) and GPS (MT3332) chips to make it MediaTek LinkIt board. It also gives near features to Arduino, making it easy to interface sensors, peripherals, and Arduino.

LinkIt One is a prototyping board for IoT/wearables contraptions. Joining GSM, GPRS, Wi-Fi, GPS, Bluetooth features into a Arduino. LinkIt ONE is designed by Seeed Studio and MediaTek. It joins two social events' development in open hardware and mechanical driving reference gets ready for Wearables and IoT contraptions to influence a skilled progression to board.



Fig no.3: LinkIT ONE Board

By adding Grove sensors or any peripherals compatible with the extensive pin and interface standards supported by the board, we can use it to its maximum benefit.

Key features

- All-in-One connectivity: Supports GSM, GPRS, Wi-Fi, Bluetooth (2.1 SPP and 4.0 GATT profiles), GNSS (GPS, GLONASS and BeiDou), Audio out and SD card connectors.
- Pin-out similar to Arduino UNO, including Digital IO, Analog IO, Pulse With Modulator, I²C, SPI and Universal A Receiver and transmitter Open hardware board reference design including schematic, layouts and pin details.

UBIDOTS

Imagined as a private outlining organizations firm in 2012, Ubidots worked in related hardware and programming answers for remotely screen, control, and automate shapes for social protection clients at particularly financed new organizations and Fortune 1,000s in the American Southeast and transversely finished Latin America.



In the region of 2012 and 2014, Ubidots broadened our assistance wanders and accomplished limitless web related expands transversely finished – Healthcare, Energy /Utilities, Manufacturing, Transportation, and Retail – taking in the various little characteristics of IoT and Cloud enablement that modernized change masters can't address unless they have gotten their hands tarnished in the field.

Ubidots has ended up being known inside hardware, programming, introduced outlining, and maker floats as the sensible, strong, and most useable stage in an IoT organize condition stacked with strong competition.

There is therefore a need to provide smart solutions to counter the problems. The solutions for these problems are:

THEFT PREVENTION: Theft prevention of the solar panels can be accomplished by using or deploying the GPS and GPRS in connection with the LinkIT One board and the accelerometer. So, when the module moves in accordance and a variation in the hub estimation of the accelerometer is seen, that change is deduced by the LinkIt One. The board will process the information and send some information to the GPS area of the module and the information will be reported on the webserver and on the web application. Ready activity is signaled on webserver like email alarm or sms.

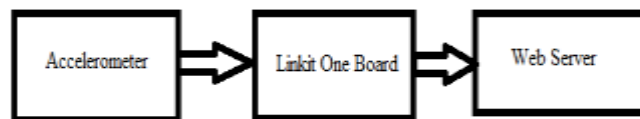


Fig no.4: Theft Prevention

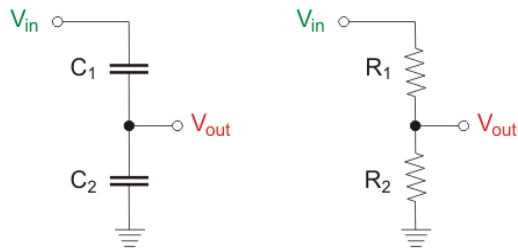
MAINTENANCE OF SOLAR PANELS: For the maintenance of the solar panels, we use Dust, Voltage and Current Sensors. So when the deposition of dust on Panel elevates, the coherence start to reduce, this can be surveiled by LinkIt ONE board using the detector values. It will refurbish this data on web server which can be viewed to know the time for preservation of Panel.

Dust Sensor:-

Dust clean Sensor gives a fair indication of how their quality is in an area by assessing the clean core interest. The Particulate Matter level (PM level) observed all around is calculated by counting the Low Pulse Occupancy time (LPO time) in given time unit. The main sensor will give data to air purifier structures.

Voltage Sensor:-

A voltage sensor can mainly choose, screen and can scrutinize the supply of voltage given to it. It can scrutinize AC level or/and DC voltage level. That is, some voltage sensors can give sine or pulse gets ready as output to be given and others can convey Amplitude Modulation, Pulse Width Modulation or Frequency Modulation output. In voltage sensors, the estimation depends on the voltage divider. Substantially two composes are of voltage sensors are penetrable.



$$V_{out} = \frac{C_1}{C_1 + C_2} \times V_{in}$$

$$V_{out} = \frac{R_2}{R_1 + R_2} \times V_{in}$$

Fig no.5: Voltage Sensor

Current Sensor:-

A present sensor is a device that perceives electric current in a wire, and makes a banner relating to that present. The made banner could be basic voltage or present or even an electronic yield. The made banner can be then used to demonstrate the consider current in an ammeter, or can be secured for empower examination in a data acquisition system, or can be used with the ultimate objective of control.

The recognized current and the yield banner can be:

Pivoting current data,

straightforward yield, which duplicates the wave condition of the distinguished current.

bipolar yield, which duplicates the wave condition of the recognized current.

unipolar yield, which is in respect to the typical or RMS estimation of the identified current.

Facilitate current data,

unipolar, with a unipolar yield, which duplicates the wave condition of the identified current

automated yield, which switches when the identified current outperforms a particular edge.

For successful working of the panel, we utilize Dust, Voltage and Current Sensors. So when the dust starts accumulating and its efficiency gets reduced, this can be checked by LinkIt ONE by using the sensor systems. It will refresh this information on webserver which can be perceive to know the ideal opportunity for upkeep of Panel. So also if there is any adjustment in voltage and current the sensors will recognize the change and by utilizing board will send the signs to web server and quick moves will be made.

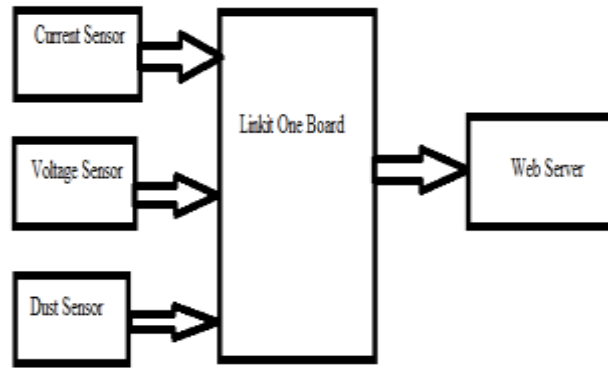


Fig no.6: Maintenance of Solar panels

MAXIMUM INTENSITY: This can be achieved by rotating the solar panels towards sunlight. Increasing the sun ray's intensity on the solar panels by rotating the solar panels towards the direction of sun by using the Stepper Motor.

Mainly, increasing the cell efficiency, maximizing the power output and employing a tracking system with solar panel are three ways to increase the overall efficiency of the solar panel. Improvement of solar cell efficiency is an ongoing research work and people throughout the world are actively doing research on this. Maximizing the output power from solar panel and integrating solar tracking system are the two ways where electronic design methodology can bring success.

Maximum power point tracking (MPPT) is the process to maximize the output or yield from solar panel by keeping the solar panel's performance on the point of P-V attributes. MPPT technology only offers the maximum power that can be accepted from a immortal array of solar panels at a particular time; it cannot, however, enlarge the yield generation when the sun is not facing the direction of the system.

Unmanned solar tracker or Automatic Solar Tracker builds the proficiency of the sunbeam based board by keeping the sun based board lined up with the turning sun direction. Sunlight based board is used to track the sun's position that builds control output of sun powered board 30% to 60% than the immobile panels.

Whenever there is a change in position of the sun the tracker will track it and through LinkIT ONE board will send signal to the web server. Now through stepper motor the angle of bio solar cell will get change and hence we can achieve maximum intensity of the solar panel.

The engine's position would then be able to be summoned to move and hold at one of these means with no position sensor for criticism, as long as the engine is deliberately measured to application in regard to torque and speed.

The Step Angle of the Stepper motor connected to the LinkIT ONE board may be found from the following:

$$S_a = 360 / S_p$$

S_a = Step angle in degrees

S_p = Steps per revolution

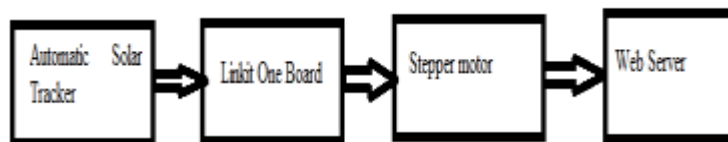


Fig no.7: Maximum intensity

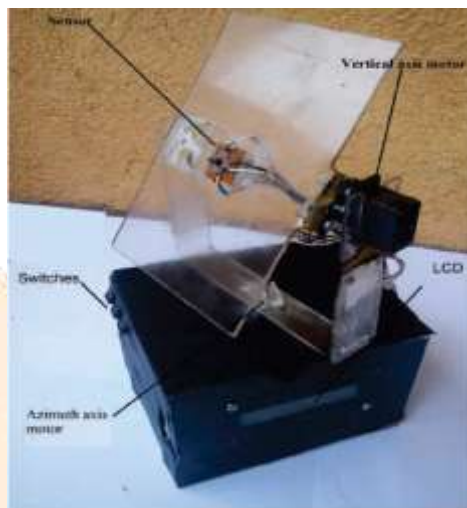


Fig no.8: Automatic Solar Tracker

CONCLUSION AND FUTURE SCOPE

The Sun has the colossal undiscovered potential to supply our developing vitality human needs. The boundary to more noteworthy utilization of the sun powered asset is its high cost in respect to the cost of petroleum derivatives. So, we have proposed an innovative idea using bio solar cells for its application in many departments, as a measure off its cost-efficient, eco-friendly nature. This method can be run in real-time operation. The proposed is basically created to help the disadvantaged/rural sections of our country, who are not liable to afford the solar panels. Also, this method reduces the crime rate of solar panels. It is easy and cheap to install.

In future, we have decided to add GPS or GPRS system for better tracking of the solar panels. If this in installed in all households, we can conserve electricity or in short save the consumption of fossil fuels or non-renewable resources.

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