

Implementation on Solar Power Plant Electricity Sensor Reads Using IOT Devices to Get a Data in Mobile App

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Abstract— the present situation of today's sun based vitality biological community is that, it is exceedingly unstructured and restricted. There are around 50 sun based power plants in India however none of them are associated in a way that there would be a strategy to perform systematic examination of the sun oriented vitality created. Today, with the progressions in sensor innovation it is an exceptionally practical alternative to interface the sun oriented vitality frameworks to the cloud (web) with the assistance of Internet of Things. Once these frameworks are associated with the cloud, the investigation of the execution, profitability and effectiveness can be figured effortlessly. With the product innovation of Big Data it is likewise conceivable to foresee conceivable issues and disappointments easily. When, all the known sunlight based vitality frameworks are associated with the web it can then be utilized to screen these frameworks at a worldwide level. This paper goes for finding a conceivable and practical strategy to interface the Solar based frameworks to the Cloud and perform explanatory operations to expand proficiency of Solar Energy. By utilizing sun based electric power sensors we can gauge the measure of electric power utilized, and unit of electric power devoured can be displayed in the portable application.

Index Terms— Solar Energy, Cloud Services, Internet of Things (IoT), Mobile App.

I. INTRODUCTION

A sun based power plant depends on the transformation of daylight into power, either straightforwardly utilizing photovoltaic (PV) or in a roundabout way utilizing concentrated sun based power (CSP). Concentrated sun powered power frameworks utilize focal points, mirrors, and following frameworks to center a huge zone of daylight into a little shaft. Photovoltaic changes over light into electric current utilizing photoelectric impact. Starting at 2011 the

world's

Vitality utilization is assessed to be 10 terawatts every year, and by the year 2050, it is relied upon to be around 30 terawatts.

With such appeal for vitality it is basic that sun powered vitality will be a noteworthy player in the vitality race. We will fabricate an ever increasing number of sun oriented homesteads and we will associate them to the networks. With worldwide sunlight based organization together of around 120

Nations in the COT 21 Paris summit there will be a considerable measure of sun based tasks that will come up. Starting at now more than 12.67 MW of sun based vitality have so far been introduced for voltage support of feeble networks, and for pinnacle stack sparing and as diesel sparing and sun based gadget based mechanical generation has touched a level of 7 MW/year.

With such an expansion in sun based innovation, a framework must be produced that can be utilized to screen and investigations the whole sun oriented foundation in order to build productivity and benefit of the sun based vitality.

Around 14% of sun oriented vitality frameworks confront a noteworthy blame each year and quit working all together prompting the greater part of all private galaxies a centrality execution issue. Presently in the event that we can learn these sorts of disappointments or if nothing else make sense of the patterns that prompt such disappointments then we can mindlessly endeavor to building more vigorous and capacity, however starting today these sort of operation is exceptionally troublesome for the absence of continuous logical information about where vitality is surplus and where it is inadequate. The most recent advancement in the field of miniaturized scale gadgets and Internet of Things gives us the capacity to associate the majority of the to the web at a low power utilization and modest cost. Foundation of assorted types with a capacity to convey data about their status to different frameworks, making the chance to assess and act in this new

wellspring of data. The electric utility industry utilization of IOT application has nearly taken after the curve of innovation accessibility.

Sun powered photovoltaic (sunlight based cell) is an immediate transformation of the sun's electromagnetic radiation to power, and is not restricted via Carnot cycle effectiveness contemplations. Photovoltaic (PV) cells utilize a strong state diode structure with a substantial range on a silicon wafer. The surface layer is thin and straightforward with the goal that light can achieve the intersection locale of the silicon sandwich. In that area the photons are consumed, discharging charges from their nuclear bonds. These charges relocate to the terminals, raising the potential. A solitary cell has an open circuit the voltage of around 0.6-1.0 volts and a short out current of a couple mA. With a specific end goal to increment both current and voltage, the individual cells are put into (sun based) clusters where cells might be associated in arrangement to raise the voltage and current yield can be raised by parallel association of cells.

The sun based cell structure comprises of two layers of material: one layer is doped with a polluting influence, for example, boron to make it negative (n-sort), and the other is comparably doped to make it positive. The zone where the two layers touch is known as the p-n intersection. At the point when daylight enters to the p-n intersection, positive and negative charges from the two layers cross the intersection, making a stream of electric current. The layers must be to a great degree thin to guarantee light entrance. For silicon cells, these thin layers have been gotten at high cost by cutting a costly silicon ingot; a great part of the silicon is lost in observed cuts.

Different substances, for example, cadmium sulfide and gallium arsenide, are likewise used to make sun based cells. Cadmium sulfide, albeit generally shoddy, has a low effectiveness. Gallium arsenide is extremely proficient additionally expensive. Extra techniques for delivering silicon cells--, for example, utilizing nebulous, instead of crystalline, silicon- - offer significant guarantee.

Shapeless silicon cells, created on a layer of film 1.5 μ thick and sandwiched between fortified glass, have been introduced in tremendous clusters. A California intricate, worked in 1992, covers five sections of land and produces 500 kW at a cost of about \$0.25 per kilowatt hour. Thin-film cells are half as proficient as crystalline cells, however they cost impressively less to create. New creation techniques may build change proficiency to gem cell levels.

Regular efficiencies for sunlight based cells right now keep running from 10 to 15%; efficiencies of 30% have been accomplished, be that as it may, and analysts trust in the end to reach as high as 40%. Utilizations of photovoltaic cells incorporate

II. CLOUD AND BIG-DATA

The measure of information which will be created from a completely practical framework is tremendous and it's inconceivable for any regular database to store such colossal measure of information. For a 500MW power plant with each sun oriented board producing around 200W we get around 25,00,000 sun powered boards.

MQTT has littlest bundle impression of around 60 bytes and alongside payload information it would add up to around 200 bytes. On the off chance that the inertness of the framework is set to 1s then the aggregate sum information that is created ads up to 8 GB/s.

The answer for such an issue originates from cloud administrations like the Google Cloud BigTable, which is quick, completely oversaw, enormously adaptable NoSQL database benefit which is improved for web, versatile, and IoT applications and which include terabytes to petabytes of information. A Bigtable is a scanty, conveyed, constant multidimensional sorted guide. The guide is filed by a line key, segment key, and a timestamp; each incentive in the guide is an un-deciphered cluster of bytes. Every arbitrary read including the exchange of a 64 KB hinder over the system from Google File System to a tablet server, just utilized a single 1000-byte esteem.

(Row: string, column: string, time: int64) \rightarrow String

The Big Table uses the above capacity example to store its information. The line is a special string which distinguishes every informational collection, the section contain the distinctive parameter information alongside the timestamp. The timestamp is utilized for forming of the information in light of time.

This characteristic property of Big Table is adept for putting away Solar information in a significant way under a vast dataset as the information is sorted lexicologically by the line key ,it has a technique for putting away huge number of parametric sections and backings time

Ordering. The three way line, section, and time based ordering alongside load adjusting makes it exceptionally proficient to manage information produced from IoT sensors and gadgets as they create information at an unfaltering state over a drawn out stretch of time along which are characteristically multi-parametric.

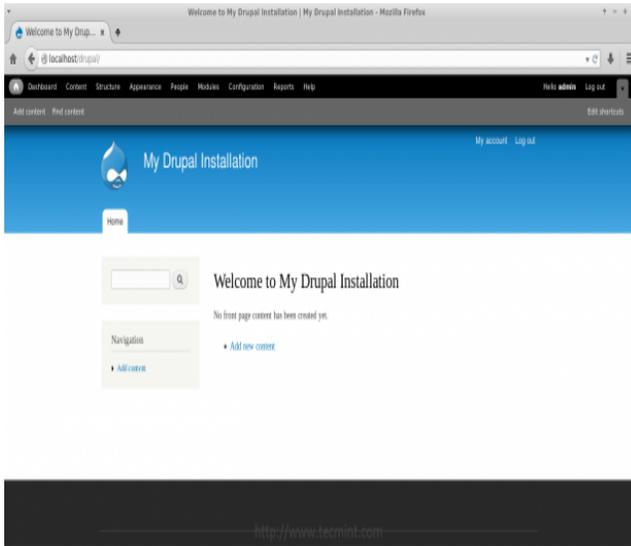


Fig. 1. Drupal

III. DATA MODEL

The organization in which information is sent over the system and the model in which it is put away and took care of have as significant impact in building a versatile application. Thinking about the utilization instance of sun powered vitality framework, JSON (JavaScript Object Notation) can be picked as one of the best configuration for correspondence between the hubs and cloud. As the framework is extremely adaptable and contains a great deal of factors, what we have attempted to do is to detail a diagram that can be utilized as a standard to convey between the hubs and the server in a sunlight based examination framework. Alluding to Fig 2, the model involves JavaScript objects which store data in a compact key-esteem match hash table frame. Each information bundle which is sent by the unconstrained hub has these substances - uid: A one of a kind id which recognizes the specific hub over the whole system. This is can be produced by the general uuid4 calculation.

```
{
  uid: {
    type: Integer,
    required: true,
  },
  gid : {
    type: Integer,
    required: false
  }
  os :{
    name: {type: enum,required: false},
    version : {type: Integer, required: false},
    error : {
      code: {type: Integer},
      message : {type: String},
    }
  }
  sensor :[
    {
      id : {type: Integer, required: true},
      type: {type: String},
      value: {type: Float},
      unit: {type: String}
      timestamp: Date,
      error:{
        code: {type: Integer},
        message : {type: String}
      }
    }
  ]
  location :{
    name: {type: String},
    type : {type: String},
    longitude:{type: Integer},
    latitude: {type: Integer}
  },
  meta :{
    type: Object,
    required: false
  }
}]
```

Figure 2: JSON Data Model

- Gid: A gathering id which will be utilized to join together different hub end focuses to a solitary intelligent substance.
- Os: This contains the data prematurely end the Operating Software that is capable to interfacing the hubs to the Cloud and the Sensors
- Sensor: It contains a variety of sensor items which partner to each of the sensor that is associated with the hub

The following stride in the process is to characterize a BigTable structure that will have the capacity to store the information got in the effective way.

The way in which the information will be put away. The line name relates to the uid of the end point hub. The contents segment family contains the distinctive properties in particular, the gid, os, sensor exhibit, Meta and area.

The substance sections will have different renditions, at timestamps T1 and T2 et cetera. The path in which the information store works is that at whatever point another hub is associated with the framework another line is made and embedded into the table alongside every one of the segments. What's more?

At whatever point a current hub sends new information, then it is put away into the current hub with another time stamp. Utilizing this sort of a database we don't lose any information about the state and can store time based data in total way diminishing the perusing and composing time.

IV. CONCLUSION

Sun powered boards and solar vitality has been winning from a decade alongside their deficiencies. In the current years, the blasts in small scale hardware has had a tremendous effect in expanding computational power and cost of inserted gadgets. With the advancement of ARM based stages like Raspberry Pi and Intel Galileo, it has turned out to be anything but difficult to prompt knowledge to things. Remembering this we have attempted to locate a plausible model for associating the Solar Energy framework with these miniaturized scale electronic frameworks to bring forth the Web of Things.

We have composed a design for associating the individual sun powered units to the web alongside furnishing them with sensors that can be utilized to gauge their effectiveness. As a general outline these boards turn into the part of a gigantic system of boards that can converse with each other and act in a smart mold.

This would prompt continuous information about the operations and distinguish disappointments in an early arrange With the definition of a standard information pattern we ought to be ready to make an ever increasing number of gadgets that speak with cloud administrations without stressing over any exclusive convention.

The Schema would help us focus what on the information is about progressively that how to send the information. In this way that Cloud servers likewise thinks less about what arrange the information is going to come in and commit additionally preparing power towards the examination and information and gain from the information.

With cloud particular Big Data calculations like the Map Reduce would offer assistance us to break down colossal measure of information easily and at a high speed.

Advance an ever increasing number of calculations can be figured to comprehend the information so gathered and help

in expanding the productivity of the sunlight based vitality framework. At long last we would express the if the motioned system is taken after to setup an explanatory framework then an extremely proficient Sunlight based investigation framework could be worked requiring little to no effort and at a high productivity rate.

V. REFERENCES

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