IOT BASED SOLAR MONITORING SYSTEM USING ARDUINO

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Abstract— A controller of photovoltaic panels was designed to take advantage of solar electric power. In the most basic form of the controller, it works by managing the solar electric energy, determines when solar electric power is supplied to the load and when to switch a circuit to provide power from the conventional electric grid. A conventional controller has the function of charging the storage battery with solar electric energy obtained from a photovoltaic panel, it also has an output to supply the energy from the battery to the load, when the voltage level in the battery is lower than 12 volts in direct current, the controller stops providing power to the load.

Keywords— photovoltaic panels, controller, solar electric energy, urban zones, Internet of Things, hysteresis

I. INTRODUCTION

Solar power plants should be observed for ideal power yield. This recovers productive power yield from power plants while checking for defective solar boards, associations, dust amassed on boards bringing down yield and other such issues influencing solar execution. So here we propose a computerized IOT based solar power observing framework that considers mechanized solar power checking from anywhere over the web. We use ARDUINO based framework to screen a 10Watt solar board boundaries. Our framework continually screens the solar board and sends the power yield to IOT framework over the web. Here we use IOT to send solar power boundaries over the web to IOT worker.

Solar energy is free and isn't being utilized, there is a requirement for a gadget that utilizes this energy proficiently, can be utilized effectively, keeps up its independence so its activity doesn't rely upon the mediation of a human, advance the enormous utilization of solar electric energy in urban zones and cause an extraordinary effect on the energy investment funds of the regular power framework.

II. THE LITERATURE REVIEW

Sustainable energy supply remains a main requirement of recent society so as to reply to the increased demand caused by the larger consumption and increase. For a longtime, the energy boom was based on fossil fuels. Not only that the supply of oil, coal, and natural gas is limited, but there are also major pollution and environmental concerns associated with such traditional energy sources. Renewable energy technologies are seen as a number of the foremost important solutions for the longer term and that they got to be further developed during this century so as to require over most of the energy production. Many emerging technologies exist and they have different levels of maturity. The scale of implementation is not the same either. Most of the renewable technologies are dependent on weather conditions and are challenging in respect of the integration into the grid system. This issue that needs to be fully solved – how to make a power system which is able to cope with a very high penetration of renewables – involves the development of smart grid systems. Such systems may include micro-grids, energy storage facilities, and, in many cases, may combine the electric power system, with heating/cooling and transportation and thereby represent complex energy systems. They provide an overview of the penetration of renewable energy generation as well as schematically illustrates the basic principles of state of the art technologies. Emphasis is placed on power electronics as a major enabler of the on-going transformation of electric power systems. The presentation is complemented with examples of recent research developments, and significant achievements world-wide. The paper also summarizes possible trends for the next decade and includes a final section with suggested further readings. [1]

Solar power plants should be checked for ideal power yield. This recovers effective power yield from power plants while monitoring for broken solar boards, associations, and residue aggregated on boards bringing down yield and other such issues influencing solar execution. So here we propose a mechanized IOT based solar power monitoring framework that considers robotized solar power monitoring from anywhere over the internet. We use ATmega regulator based framework to screen solar board boundaries. Our framework continually screens the solar board and communicates the power yield to IOT framework over the internet. Here they use IOT THINGSPEAK to communicate solar power boundaries over the internet to IOT THINGSPEAK worker. It currently shows these boundaries to the client utilizing a viable GUI and furthermore cautions client when the yield falls underneath explicit cutoff points. [2]

They proposes an answer and technique to monitor the residue amassed on the solar panels to get the most extreme force from for powerful use. Continuously the yield intensity of the solar panel relies upon the radiation came to the solar cell. The framework likewise shows the failed solar panels records and whether the electrical apparatus is working legitimately on the solar panels or the heaps is on the battery. All the panels are associated, and sensors are legitimately associated with the focal controller which monitor the panels and loads. By fusing the IoT technology the information got from the panels and machine are send to the cloud from through web for the future.
use too far off client can monitor the boundaries of the associated gadgets. The client can see the current, past, and normal boundaries, for example, voltage, current, temperature and daylight utilizing a graphical UI GUI. The controller is customized with predefined conditions with client cautions when it falls underneath the predetermined conditions. Hub MCU is utilized as a controller. [33]

The Internet of Things empowers to gather, analyse, and respond upon the dew purpose of information from things. Things or articles can be sensors or actuators. Devices are gigantic assortment of gadgets along with solar checking, coronary heart observing inserts, electric, wearable, household mechanization and vehicles with worked in sensors, or subject activity gadgets that help smoke jumper in look for and show signs of improvement tasks. This sensor appended to gadgets will recover the ecological information for client prerequisites. Solar vitality is the daylight that arrives at the Earth; this solar vitality is likewise called as solar radiation. For instance, having created sun radiation for a huge number of years by means of atomic combination, the stalwart creates so much quality that the measure of daylight that arrives at the earth in a solitary hour should meet the power needs of the total worldwide for a whole twelve months. Sun power is utilized to immediately change over to warmness water or space. On this technique, the force inside the type of sun radiation is changed over into warm or heat power. Solar power additionally can be changed over into power through photovoltaic or solar power vegetation. This application characterizes, the portrayal of the force from the solar panels that can be checked distantly for example The Internet of Things unites everything and permits us to cooperate with our panels. Utilizing this we can:

- Create a channel and gather boundaries from solar panels
- Analyze and Visualize boundaries.
- Act on the dew focuses.

The assortment of informational indexes from the customer for example solar panels by means of the correspondence media through remote or wired medium. The information translation between the panels and the spoke to qualities will be in the HTTP design. The panels will be with exceptional sensor called hubs, that gathering of hubs is shaped groups where each bunch can contain limit of 25 hubs and the of the hub data is sent to the passages where every door can contain limit of 5 groups and that of every client can contain limit of 100 passages. This gathered information will be spoken to as the table that of where you can speak to the gathered information record as the any truck structure and that of where all will be perused informational index and of that is destined to be suitable move will be made if any required.[4]

III. SYSTEM DESIGN

A. Problem Statement

Solar energy during the day time is varied in accordance with the direction of the sun light. The direction of the solar panel is to be adjusted in a proper direction so as to obtain maximum energy from the sun light. To overcome all these problem this project come up with an idea of solar tracking system to get maximum power from the sun. In this the solar panel is made to read the maximum power from the sun. Whenever the power is reduced the solar panel will rotate to the direction where it gets maximum power.

B. Proposed System

The main objective of this project is to urge an optimum power output from the solar panels during dust is accumulated there on. Also, if there's any malfunctioning of the solar panels are going to be displayed on and that we also can get information about whether the solar or battery connected for the loads. A photovoltaic cell is used that keeps the recording of the sunlight.

C. Block Diagram

In this system two LDR sensors connecting to the Arduino board and based on LDR value will rotate the solar cell left or right or middle for collecting more energy from sunlight and energy will be store into the battery and voltage sensor will check the voltages from the battery. Voltages will be uploaded to the thing speak (IOT). So we can analyse the data of the voltage when it was high and when it was normal.

The system consists of a photovoltaic panel to receive solar energy, a battery to store the energy, a controller that manages the energy. A conventional controller has the function of charging the storage battery with solar electric energy obtained from a photovoltaic panel, it also has an output to supply the energy from the battery to the load, when the voltage level in the battery is lower than 12 volts in direct current, the controller stops providing power to the load.

The Internet of things refers to the concept of extending Internet connectivity beyond conventional computing platforms such as personal computers and mobile devices, into any range of non-internet-enabled physical devices and everyday objects. Embedded with electronics, Internet connectivity, and other forms of hardware, such as sensors, these devices can communicate and interact with others over the Internet, they can be remotely monitored and controlled. This is the case when the photovoltaic panel and battery are sensors, the controller based in a microcontroller permits
communications to server and another controllers for collaboration. Many controllers can collaborate with each other to improve their efficiency and autonomy.

D. The Algorithm

1. Compute the light intensity value of the left and right LDR sensor

2. Check if left LDR intensity value is greater than right LDR intensity value
   2.1. If it is greater, then find the difference between the left LDR value and right LDR value
   2.2. If difference is greater than 150 then,
      2.2.1. Rotate left
   2.3. Else rotate middle

3. Check else if right LDR intensity value is greater than left LDR intensity value
   3.1. If it is greater, then find the difference between the right LDR value and left LDR value
   3.2. If difference is greater than 150 then,
      3.2.1. Rotate right
   3.3. Else rotate middle

4. Check if voltage is more than 12V then,
   4.1. Take action

5. Upload the data to the CLOUD

IV. EXPERIMENTAL RESULT
V. CONCLUSION

It is possible to design controllers can collaborate with each other, in that way they can improve their efficiency and autonomy. Electric energy savings from the conventional electric grid and savings in the user's economy have been achieved.

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REFERENCES


