Solar Power Monitoring System Using WIFI Module

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Abstract- *The Internet of Things has a vision in which the internet extends into the real world, which incorporates everyday objects. The IoT allows objects to be sensed or controlled remotely over existing network infrastructure, creating opportunities for pure integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. This technology has many applications like Solar cities, Smart villages, Micro grids and Solar Street lights and so on. As Renewable energy grew at a rate faster than any other time in history during this period. The proposed system refers to the online display of the power usage of solar energy as a renewable energy. This monitoring is done through raspberry pi using flask framework. Smart Monitoring displays daily usage of renewable energy. This helps the user to analysis of energy usage. Analysis impacts on the renewable energy usage and electricity issues.*

Keywords- Renewable energy, IoT, flask, Cloud.

I. INTRODUCTION

The Internet of Things (IoT) is a system of related computing devices, mechanical and digital machines, objects, people or animals that are provided with unique identifiers and also the potential to transfer data over a network without requiring human to-human or human-to-computer interaction. Physical items are no longer disconnected from the virtual world, but can be controlled remotely through Internet services. In fact – due to their diminishing size, constantly falling price and declining energy consumption – processors, communications modules and other electronic components are being increasingly integrated into everyday objects today. Smart devices. Smartphones. Smart cars. Smart homes. Smart cities. A smart world. "Smart" objects play a key role in the IoT vision, since embedded communication and information technology would have the potential to revolutionize [12]. With the growing presence of Wi-Fi and 4G-LTE wireless Internet access, the evolution toward omnipresent information and communication networks is already evident [13]. According to the International Energy Agency (IEA), Renewable will be the fastest-growing source of electricity, in which wind and solar PV are technologically mature and economically affordable. But still there is increase in world's demand for energy. Adopting Renewable Energy technologies is one advance way of reducing the environmental impact. The latest edition of the IEA's Medium-term Renewable Market Report now sees renewables growing 13% more between 2015 and 2021 than it did in last year's forecast. The share of renewables in overall electricity generation will rise from over 23% in 2015 to almost 28% in 2021. Solar energy is widely available throughout the world and can contribute to minimize the dependence on energy imports. In 90 minutes, enough sunlight strikes the earth to provide the entire planet's energy needs for one year. Solar PV entails no greenhouse gas (GHG) emissions during operation and does not emit other pollutants. Solar has many benefits like system-friendly deployment, improved operating strategies, like advanced renewable energy forecasting and enhanced scheduling of power plants and also investment in additional flexible resources, comprising demand-side resources, electricity storage, grid infrastructure and flexible generation The traditional focus on the levelized cost of electricity (LCOE) – a measure of cost for a particular generating technology at the level of a power plant – is no longer sufficient. About a million solar panels were installed every day around the world last year. Solar PV leads providing almost 40% of global renewable electricity capacity growth over the medium-term. Finally, in analysing the likely evolution of electricity and energy-consuming sectors – buildings, industry and transport – it explores the prime role solar energy could play in the long-term future of our energy system. Applications of the monitoring system are in the Rooftop Solar, Ground mounted Solar, Solar cities, Smart villages, Micro grids and Solar Street lights. Consumer Products like solar water heating systems; Solar home lighting systems; solar lanterns; solar pumps; solar mobile chargers; solar cookers; LED solar torch; solar RO plant; solar fan, solar Inverters, etc. can be monitor through this project. Commercial Products like Solar traffic signals, solar road studs/blinkers are also to be monitor through the proposed system. India, where frequent power cut is very common. Due to which it is important to use renewable energy and monitoring it. By monitoring the energy forecast, households and communities using solar power can time their energy production and consumption during good weather.

II. LITERATURE SURVEY

[1] Development of an online monitoring and control system for distributed Renewable Energy Sources (RES) based on Android platform. This method utilizes the Bluetooth interface of Android Tablet of Mobile phone, as a communication link for data exchange with digital hardware of power Conditioning Unit.

[2] Introduction to an instant monitoring infrastructure of renewable energy generation system that is constituted with a wind turbine on current and voltage measurements of each renewable source. The related values are measured with the developed sensing circuits and processed by 18F4450 microcontroller of Microchip. The processed parameters are then transmitted to personal computer (PC) over universal series bus (USB) to be saved in database and to observe the system instantly. The Coded visual interface of monitoring software can manage the saved data to analyse daily, weekly and monthly values of each measurement separately.

[3] Goto, Yoshihiro, explained about an integrated system that manages and remotely monitors telecommunication power plants has been developed and has started operations. The system is used to operate and maintain more than 200,000 telecommunication power plants which includes devices such as rectifiers, inverters, UPS's and air-conditioning plants installed in about 8000 buildings. Feature of the system are to integrate the management and remote monitoring functions into single system and improved user interfaces which uses information and communication technology.

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III. PROPOSED SYSTEM

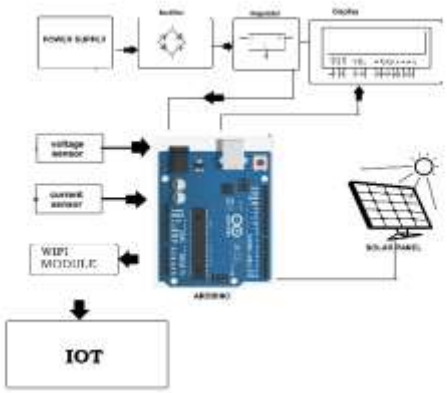

Figure1- Working of Solar power monitoring system using IoT

3.1 Atmega 328

The main purpose of using AT mega 328 is its high functionality with simplicity and familiarity. AT mega 328 bridges the gap between solar panel and IoT (Internet of Things). AT mega 328 is powered with 5 volts dc supply for its operation.

3.2 Voltage And Current Sensor (Ina 219)

As INA219 is current and power sensor which gives the total power consumed by shunt load and gives respective reading in digital form to AT mega 328. AT mega 328, with programme loaded in it, calculates the current and voltage reading of shunt load.

3.3 Liquid Crystal Display (Lcd)

LCD is used for displaying the product name& total cost. When product is put into cart after scanning, it will show the cost and name and if second product is scanned, then second product cost will get added and it will be displayed on LCD.

3.4 Wi-Fi Module (Esp8266)

All the calculated data by AT mega 328 is further processed by Wi-Fi Module in order to store on IoT (Internet of Things) Server or Cloud. In order to analyse this data on daily, weekly and monthly basis we are using popular IoT platform Gecko.

3.5 System Implementation

Figure 2: Implementation picture

3.6 How Does It Work?

Internet of Things (IoT) platform integrates data from the different solar panels and applies analytics to share the most valuable information with applications built to address specific needs. These powerful IoT platforms such as IOT Gecko Microsoft Azure and Google cloud platform etc can pinpoint exactly what information is useful and what can safely be ignored. This information can be used to detect faults, make recommendations, and detect possible problems before they occur. The information picked up by connected sensors enables to make smart decisions based on real-time information, which helps save time and money.

IV. CONCULSION

As this system keeps continues track of solar power plant, the daily weekly and monthly analysis becomes easy and efficient also with the help of this analysis it is possible to detect any fault occurred within power plant as the generated power may show some inconsistency in data of Solar power plant.

V. FUTURE SCOPE

Since the system requires external power supply of 5 volts and 3.3 volts for its operation which can be taken rid of by utilising the power generated by solar panel only. Also, with the help of motor and controlling it is possible to track the sun for better power generation. Apart from that by using various Machine Learning algorithms and model it is possible to make system smart enough to take decision about data and performance.

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