SOLAR REMOTE MONITORING SYSTEM USING IoT.

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Abstract: *The purpose of this project is to design and implement an open source monitoring system for a remote solar power system that can deliver diagnostic information to system overseers.*
We have described an effective implementation of an intelligent remote monitoring system for solar Panel (PV). The proposed system architecture can be set up in solar PV. We have designed a smart remote monitoring system based on the internet of thing for monitoring Solar PV. This system had incorporated remote monitoring for solar PV through the internet using the host, embedded system gateway and other components. The outcome of our demonstration shows that the system can monitor, store and manipulate data from solar PV. Thus, the remote monitoring functions are obtained in real-time.

Keywords- **Solar panel, Remote Monitoring, live Streaming, solar PV, Real time.**

I. INTRODUCTION

Integrating web and embedded technology, embedded equipment monitoring and controlling. The system based on web management can be done. Managers can remotely access, monitor, and maintain the on-site devices through the network and using a web browser without the border of region and time. It can realize the inter-access between the heterogeneous devices.

The function of the Web-based device monitoring system is to collect real-time data of the on-site devices, publish it through a Web form, and remotely send the data in the form of the user-defined data transmission style. It will provide flexible remote monitoring and diagnosis function combining the configuration software based on the standard browser. The data will be published through web page form by the web server in various user-defined setups. If the parameter value is different from the original set value by the user, a corrected signal will be sent to the control unit automatically by the processor.

The limit value can be set by the user through the web browser at any remote area. Thus the defined parameter can be controlled through the processor via the internet. With the increasing popularity of the Internet and the development of embedded technology, Web technology has been enlarged to the development and application of an embedded system. It is the end of the network era which takes PC equipment as the primary network node. How to use Embedded and Web technology to do remote monitoring, analysis, management, and controlling and maintenance operation of embedded devices from various sub nets and physical regions is a problem that needs to be solved. Embedded Web-based equipment condition monitoring and controlling system directly connect the equipment to the network as a node. The clients do not need to install special software and may monitor and control the current condition of equipment through the browser.

II. LITERATURE REVIEW

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.[1]

The projects architecture consists of two parts. The first part being power electronics, designing of a prototype of solar inverter and the second part being wireless communication, sending the observed data wirelessly over internet. A small prototype of solar inverter is designed using MOSFET's whose DC i/p as well as AC o/p is to be monitored. The MOSFET's are driven by using a CD4047 MOSFET's driver IC. The Solar Inverter is monitored using a Data Acquisition Device. The DAQ consists of an Arduino, Wi-Fi module (ESP8266) sensors and HTML or Cayenne platform. The data from the inverter is provided as an analog input to the Arduino. Arduino is connected to internet using ESP8266. The data received by Arduino is displayed and analyzed online by Cayenne.[2]

The current and voltage generated by the 10Wp solar panel are monitored using ACS712 current sensor and voltage sensor. The ambient temperature around the solar panel is also measured using the DHT11 temperature sensor. The sensors are connected with the Arduino AT Mega 2560 which is also connected to the ESP8266 Wifi module as a connection to the smartphone to display the results of measurement of ambient temperature, output current and output voltage of solar panel through Blynk application.[3]

III. PROPOSED SYSTEM

Proposed System allows the user to monitor real-time values of parameters like current, power, frequency, and voltage and keep a track of it. There is a website through which real-time monitoring of parameters can be done. The website is openly available to everyone accessing it. It consists of three modules namely HOME, ABOUT US, HISTORY. The parameter values are taken from the inverter and displayed on the website. The home page will display live values and generate a graph of the previous month values. The about us page consists of the information about the website. History module will display a table having the parameter values of the last few months. The front end is done using HTML and the back end using PHP.

3.1 Software Requirements:

HTML:HTML stand for Hyper Text Markup Language. It is a standard markup language for creating web pages and web applications.

CSS: CSS stands for Cascading style sheets. It is used to display how HTML elements are to be displayed on the screen.

JS: JS stands for JavaScript. It is used for live streaming of data. we're using JS so we need not click on refresh button again and again. The web page will automatically refresh.

IV. IMPLEMENTATION

V. Work Flow

The fig.1.1 shows the process of monitoring system from load to monitoring system. The work flow of the system is presented in the form of steps below:

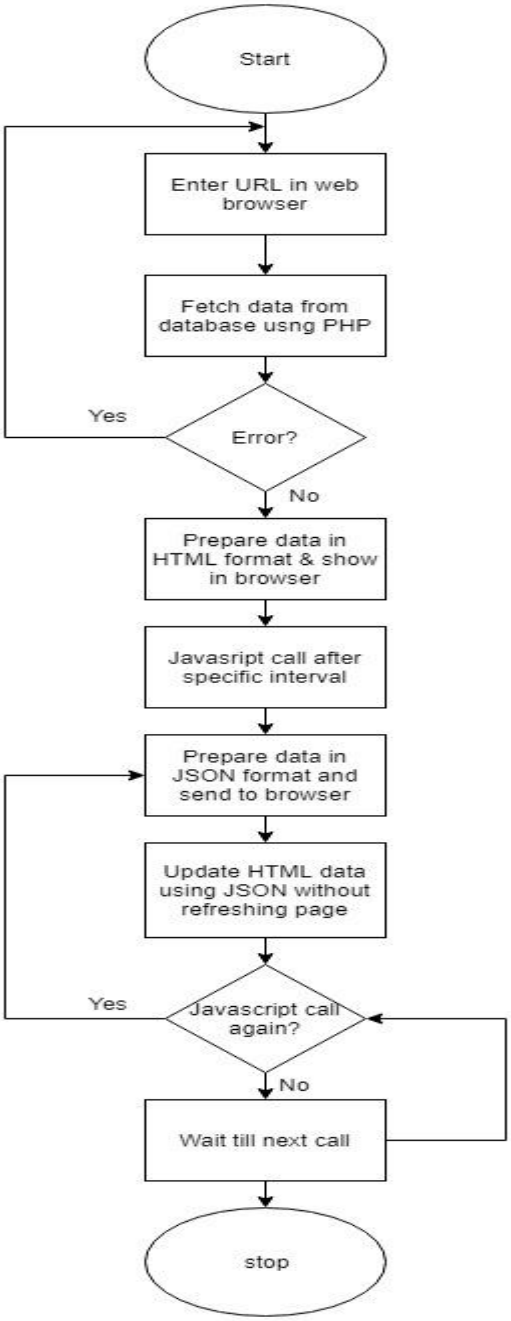

Fig. 4.1 Flowchart

Step 1: Embedded system will send data to our website by post method.
Step 2: After getting data it will first get saved in the database. And will send a response of getting data to Raspberry Pi in JSON.
Step 3: Firstly, the user has to enter the URL in a browser.
Step 4: After entering URL into the browser it will fetch data from the database using a web service.
Step 5: Next to that the internal process will prepare data in HTML format and will be shown in the browser.
Step 6: JavaScript will call in a specific interval. So, there is no need to click on the refresh button it will refresh automatically.
Step 7. This is how data will stream live without delay.

IV. RESULT

The proposed system consists of following web pages:
1.Home:
The home page consists of the graph generated based on the previous month values of parameters and live streaming of the four parameters namely frequency, voltage, power, currenThe values of the parameters will be fetched from the embedded system with the help of web service and will be stored in the database. The fetched values will then be streamed live on the website.

Fig. 5.1: Home Page

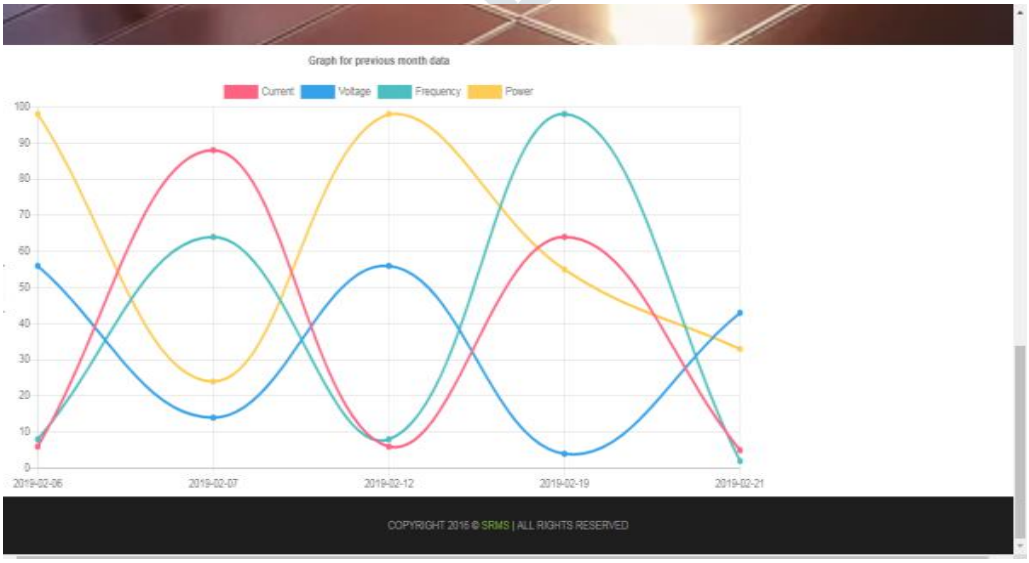

Fig. 5.2: Graph

2.History.

The history page consists of a table which displays the values of parameters. The table will contain the data for the last few months.

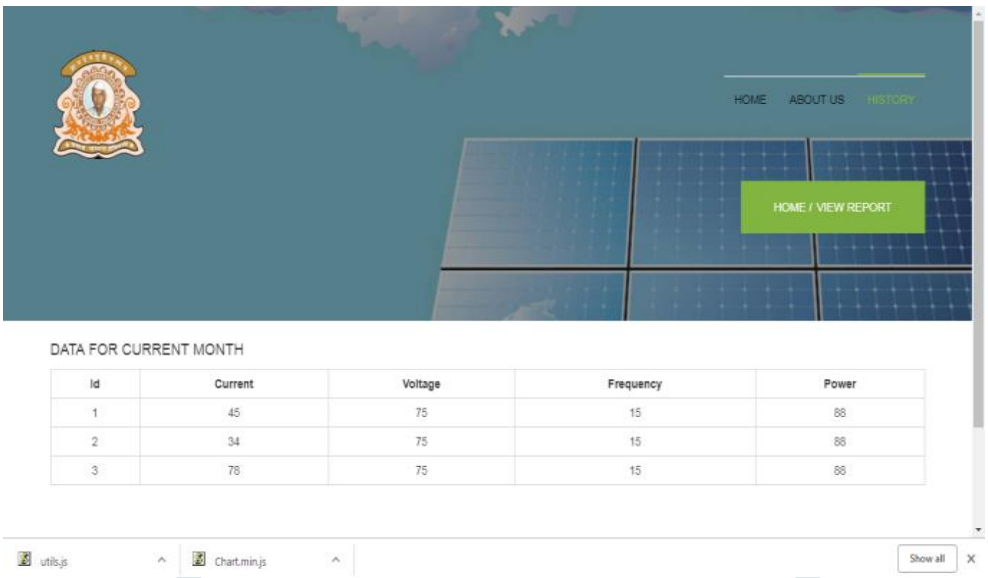

fig. 5.3: History Page

VI. ACKNOWLEDGMENT

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