

3D Solar Tracking and Monitoring System over IoT

Shaikh Ejaj¹ Patel Zakriya² Ratna Marathe³ Zoheb Sayyed⁴

^{1,2,3,4}B.E. Student

^{1,2,3,4}Department of Electrical Engineering

^{1,2,3,4}Jamia Institute of Engineering & Mgmt. Studies, Akkalkuwa, Maharashtra, India

Abstract— The hybrid strength device is a clever-self regenerative power era machine through lamp illumination-sun strength primarily based hybrid model. This hybrid energy era gadget is possible via lamp illumination and solar energy; it is an opportunity supply of electrical energy, wherein ever the traditional power generation is not feasible to put in in exercise. In this model consists of lamp illumination-solar strength primarily based hybrid power generating system and storage battery device is blended together. This hybrid electricity generation system is a simple and price-effective control, and Maximum Power Point Tracking (MPPT) manipulate has to extract more electricity. also, this hybrid system is evolved thru an experimental version.

Keywords: Renewable Energy, IoT, Flask, Cloud

I. INTRODUCTION

This painting proposes a model and layout analysis of the Self-Regenerative Lamp Illumination-Sun Energy based Hybrid Power Generation (SRLSHPG) machine. the world's energy demand involved that increase the need for electrical energy, the traditional strength structures is combined with renewable electricity structures and met the strength demands. the brand new possibilities for usage of renewable electricity assets: particularly, solar energy and wind electricity technologies have been improved, and their usage via PV panel and wind generator primarily based hybrid configurations. In a hybrid power machine comprising 3 electricity resources; namely PV panel, wind generator, and gasoline cells, has been included; and each of these three power resources is managed and to supply the power at finest performance. A wind generator and PV panel-primarily based hybrid device are modeled, with MPPT controller, and blade pitch attitude manages techniques are applied and to enhance the performance of the system below exclusive environmental situations has been provided.

Applications of the monitoring device are in the Rooftop solar, ground-set up the sun, solar cities, smart villages, Micro grids, and sun avenue lights. client products like solar water heating structures; sun domestic lighting fixtures systems; sun lanterns; solar pumps; solar cellular chargers; sun cookers; LED solar torch; solar RO plant; solar fan, solar Inverters, etc. may be monitor via this task. commercial products like sun traffic indicators, solar avenue studs/blinkers are also to be revealed through the proposed gadget.

India, in which frequent energy cut is very commonplace. because of which it is important to use renewable electricity and tracking it. via tracking the strength forecast, families and groups using sun strength can time their strength production and consumption at some point of excellent climate.

II. LITERATURE SURVEY

Purusothaman, SRR Dhiwaakar, et al. [1] explain about the focal point is on the DG sellers, grid agent and Mu dealers. DG sellers like the Distributed Energy Resources (DERs), load, garage, and grid retailers. The Mu agent acts as the communication channel among the DG agents to the higher level sellers including the manipulate agent. The implementation of the device has been finished using an Arduino microcontroller.

Author Kabalci, Ersan, Alper Gorgun, and Yasin Kabalci introduces an on the spot tracking infrastructure of a renewable power era system this is constituted with a wind turbine and solar panel arrays. The tracking platform is primarily based on the present day and voltage measurements of every renewable source. The related values are measured with the developed sensing circuits and processed via a 18F4450 microcontroller of Microchip. The processed parameters are then transmitted to a personal computer (pc) over the general serial bus (USB) to be saved in a database and to study the machine right away. The coded visible interface of tracking software program can control the saved information to analyze daily, weekly and monthly values of each size one at a time. [2],

Jiju, K., et al.[3] describes the improvement of internet tracking and manipulate machine for disbursed Renewable energy sources (RES) based totally on the Android platform. This technique makes use of the Bluetooth interface of Android tablet or cellular telephone, as a communication link for information change with virtual hardware of Power Conditioning Unit (PCU).

Goto, Yoshihiro, et al [4] explained about an incorporated machine that manages and remotely video display unit's telecommunications power flora has been developed and has begun operations. The device is used to function and hold greater than 200,000 telecommunication strength flora, which such as gadgets which include rectifiers, inverters, and united states of America, and air-conditioning flowers hooked up in about 8,000 telecommunication homes. functions of the system are the combine the control and remote monitoring features, into one machine and progressed consumer interfaces, which use records and communicate technology consisting of net generation.

Nkoloma, Mayamiko, Marco Zennaro, and Antoine Bagula. [7] are proposes a novel tracking, manage the system for reaching actual-time tracking and manipulate of a hybrid 'wind PV battery' for the renewable power system. The proposed device constitutes a Supervisory Control and Data Acquisition (SCADA) system, which employs a campus community of countrywide Cheng Kung university incorporated with a programmable common sense controller (percent) and virtual electricity meters. The proposed system is able to appear actual-time measurement of electrical records that may be successfully transferred to the far off

monitoring center using the intranet. it may be concluded from the simulated and experimental outcomes that the proposed monitoring and manage gadget can acquire actual-time supervisory control and statistics acquisition of far off diverse varieties of the renewable strength system.

III. PROPOSED WORK

The main goal of this proposed work is to the energy of the system can monitor the usage of the current and voltage price sensed by means of the Arduino. The display of the sun strength device suggests electricity and power utilization. This device enables to enforce in the clever grid for green utilization

IV. METHODOLOGY

In this section, we present the system design of the solar strength monitoring device. The proposed machine is for monitoring of solar power the use of IOT. A sun panel allows storing the energy inside the battery. The battery has energy that's useful for electrical appliances. A battery is attached to the Arduino. Arduino is a microcontroller which is used to examine the sensor values. present-day sensor and voltage divider are connecting to the Arduino. Stem layout. Arduino is connected to Raspberry pi through USB cable. Raspberry pi(RPi) is working as a server. Arduino is connected to Raspberry Pi thru the USB cable. Raspberry Pi(RPi) is running as a server. The records from the Arduino is shown at the net web page via RPi. The tracking statistics upload to the cloud thru RPi as proven in the Fig.

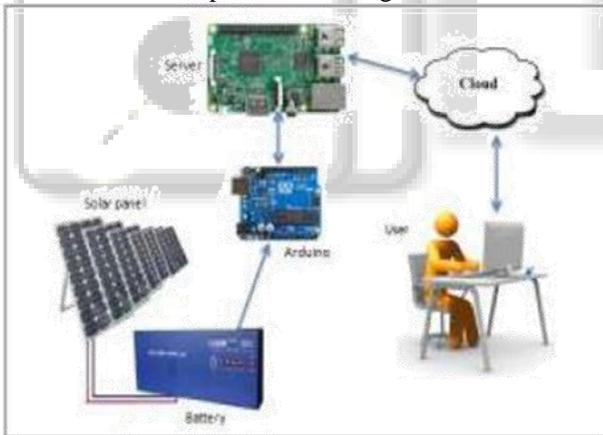


Fig. 1: System Design

A. Arduino:

Preserving in mind the financial constraints and the simplicity of the machine, Arduino Uno has been used which abates the programming complexity. Arduino feels the contemporary and voltage value thru Analog pins. With the help of those values, Arduino programming calculates the energy and power.

B. Raspberry Pi:

Raspberry Pi is used within the assignment as a central monitoring machine. because the Raspberry Pi board is a portable and occasional cost, it reduces the system cost. As python is a widely used high-degree, well known-cause, interpreted, dynamic programming language, this task use python because of the programming language within the

Raspberry Pi. Python web programs have one central callable object that implements the real utility. In Flask that is an instance of the Flask elegance. With the assist of python application monitoring information is upload to the cloud. Flask is a light-weight internet software framework,that is written in Python and primarily based on the WSGI toolkit and Jinja2 template engine. Flask using the bendy Python programming language and offers an easy template for internet development. Rpi has the inbuilt Wi-Fi. With the internet, RPi presentations the statistics on the net web page and stores the statistics at the cloud. The cloud has public get entry to the person can get right of entry to the monitoring. The person can estimate the usage and availability of the battery.

C. Cloud Setup:

Thing Speak is associate degree open supply IOT application and API to store and retrieve knowledge from things victimization the HTTP protocol over the net or via a neighborhood space Network. Thing Speak allows the creation of sensing element work applications, location chase applications, and a social network of things with standing updates. The user ought to produce the account 1st. The account contains channels that are separate for various comes. Channel has fields that are different for the various parameter within the observance system. when distribution the parameter the system uploads the values thereto. The cloud has intrinsic functions in it that represent the values within the variety of graphs.

V. IMPLEMENTATION

A. Work Flow:

The process of the projected system from load to the observation system. The workflow of the alternative energy observation system is conferred within the variety of a step below: Figure 4: workflow of the system

- 1) Step 1: Arduino displays the ability usage mistreatment perceived values through current device and resistor.
- 2) Step 2: Raspberry pi fetch the Arduino output knowledge through an interface and show on the online page through a python script.
- 3) Step 3: Raspberry sends the observation knowledge on the cloud.
- 4) Step 4: Cloud displays the information within the variety of the graph, that is visible to the whole user.

B. Hardware Setup:

Equipment setup of the proposed framework. The sun based vitality put away in the battery by the sun based board is DC current. So we use DC knob as the wellspring of intensity use. One terminal of the knob is associated with the battery for power supply. Another terminal is associating with the present sensor for current perusing. The breadboard is utilized for the mind boggling circuit to construct. It likewise constructs voltage divider.



Fig. 2: Hardware configuration setup

Arduino facilitates the current and voltage esteem through Analog pins. With the assistance of these qualities, Arduino programming computes power and vitality. The yield is sent to the Raspberry through a USB link. Raspberry Pi is considered as the server. The screen shows the website page and cloud information.

Components	Specifications
Operating system	Raspbian OS.
External Hard disk	500GB
Microcontroller	Arduino UNO 3
Processor	Raspberry Pi 3
Current sensor	ACS712(30Amp)
Registers	10kohm and 100k ohm

Table 1: Hardware Requirements

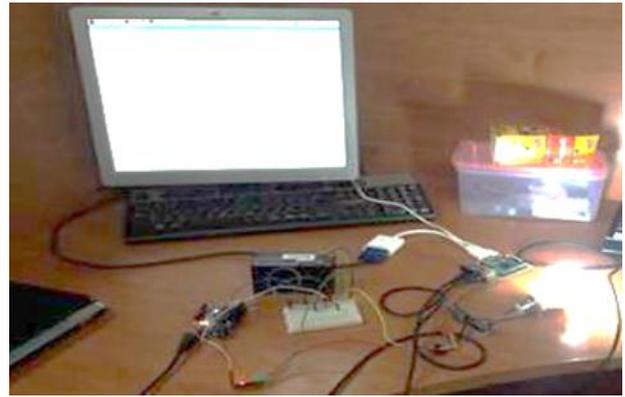
The ASCII text file Arduino Integrated Development surroundings - or Arduino software package (IDE) is employed in an exceeding system for transfer the code on to a board. The device AND gate are connecting to the Arduino for human activity with them to sense current and voltage. we tend to write the code in c for the sensing and calculative the ability and energy.

As python could be a widely used high-level, general, taken, the dynamic artificial language is employed within the system. Python2 is employed for taking Arduino knowledge. Python net applications have one central owed object that implements a particular application. In Flask this can be associate degree instance of the Flask category.

With the assistance of the python program watching knowledge is transfer to the cloud. factor Speak cloud is employed during this project. it's associate degree open supply net of Things(IoT) application and API to store and retrieve knowledge. during this cloud, we tend to create the social network of things withstanding updates.

VI. RESULTS AND DISCUSSION

The projected work illustrates results for the solar power watching System. snap of solar power watching System Setup. Fig three represents the whole hardware setup of the projected system



Utilizing Python and Flask, we make a site page of the observing framework. Cup structure code is utilized to make a website page that can be found in Intranet utilizing the IP address of the Raspberry Pi framework. Fig demonstrates the observing page showed on the PC associated with the intranet. The aftereffect of the framework is shown on the website page as the table contains current in amperes, the voltage in volts, control in watts and vitality in watt-hours as for date and time.

Sl. No.	Data	Unit
1	Current	Amperes
2	Voltage	Volts
3	Power	Watt
4	Energy	Watt hour

Table 2: Power Monitoring Table

VII. CONCLUSION AND FUTURE WORK

Implementing Renewable Energy technologies is one suggested method of reducing environmental impact. as a result of the frequent power cut, it's vital to use renewable energy and watching it. watching guides, the user within the analysis of renewable energy usage. this method is price effective. The system potency is regarding ninety fifth. this allows the economical use of renewable energy. therefore, it's reducing electricity problems. This project is additional increased, by mistreatment the results of this current project, i.e. the watching values obtained square measure useful in predicting the longer term values of the parameters thought-about. Then information holds on within the cloud also can be analyzed mistreatment the MatLab. The CSV file from the cloud is taken for analysis in R. the net application is developed for interaction with the top user; the user also can predict values of the longer term events. within the same method, we will select humanoid application additionally. throughout the prediction 2 or a lot of models is used for identical dataset, to seek out the accuracy of every model.

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