

Smart Energy Network

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Abstract—This report portrays the smart energy network construction of environmentally friendly power sources dependent on the WoT(Web Of Things).The smart energy network inspires the execution of computerized innovation and data the executives rehearses also, is a center fixing in the constant modernization of the force movement structure. The supportable force source that is sun arranged energy uses a photovoltaic cell. This structure includes three huge subsystems. Force age and capacity framework, power observing framework, and charging framework.energy control and overseeing by using Web Of Things. Web Of Thing advancement can satisfactorily unite the establishment resources for increment the nature of force framework and augmentation the utilization usefulness of the current force framework. The potential of a brilliant energy network to enable taught assistance by consumers, making them a critical component of the electrical energy framework, is the goal of a brilliant energy network.

Keywords:

Web of things, Smart energy network, Power Handling and Management, reconstruction of electric power .

I. INTRODUCTION

A. *Motivation*

Expansions as of late in power costs and in related dis- charges of ozone harming substances are affecting social or- ders to embrace business and way of life procedures dependent on maintainability rehearses. The rise of the Smart Energy Network works with the two providers and customers of power in diminishing carbon impression and improving the dependability and proficiency of power age, dissemination and utilization[]. A Smart Energy Network conveys power from supplier to purchasers utilizing full-duplex computerized innovation to control gadgets at buyer's homes to save energy, decrease cost and increment dependability and transparency .

B. *Objective*

- Maximize the utilization of solar power than that of MSEB.
- To monitor different Smart Energy Network System pa- rameters.

- Power source selection, Current status of load (ON/OFF) selection of power source w.r.t scheduling, Billing.
- Wired and wireless network architectures designed for communication between the control unit and operation unit
- Use the Make and break process for switching between sources.
- Users can create schedules for switching. (Automatic mode of operation).
- Monitor and control system using GUI provided by WOT technology.
- Decreased the operations and management costs for utilities and eventually lower power costs for the end use

C. Problem Definition

Our flow electric framework was imagined over 100 years prior when power needs were straightforward electric force was restricted and worked around networks. Most homes had just little energy requests like lights and radio. The network was intended for utilities to convey power to end-clients homes and afterward fabricate them once every month. This restricted single direction communication makes it hard for the network to react to the constantly changing and rising energy requests of the 21st century. The smart energy network presents a two-way discourse, where power, too as data, can be traded between the utilities and their clients. It's building up an organization of correspondences, controls, PCs, computerization, and new innovations and instruments cooperating to make the network more proficient, more reliable, safer, and greener. This smart energy network empowers new technologies to be

coordinated like sun based energy creation. With our interest as educated buyers, this smart network will supplant the aging infrastructure of the present network and utilities can more readily speak with us to help deal with our power needs. The smart home speaks with the network and empowers shoppers to deal with their power utilization by estimating a home's power utilization all the more often through keen meter utilities that can furnish their client with much better data to deal with their power bills.

II. LITERATURE SURVEY

The Web of Things is made up of a number of Web organisations that have been placed on top of a number of Internet-connected gadgets. Any PC with a Web browser may serve as an interface to the organisations provided by the Web of Things. (Saswat Mohanty, Bikash Narayan Panda, 2014).

According to the document, "The Web interfaces provide us with consistent information on every energy metre that is installed on the spot and granted to Embedded Internet contraptions utilising the MODBUS association convention." Constant force source association, power source determination, power affiliation, and detachment are just a few of the advantages that an online recognised client receives.

For hardware testing of new portions, the TIFAC CORE Embedded Systems Lab Substructure for 3G/4G Communication at the National Institute of Science and Technology was utilised. We were greatly aided in the organisation of Webapplications and UI for the creation of our own Web of Things by software experts at NIST Technology Consultancy Services. Professor Manoranjan Kumar, Mahesh Hiremath (2012). The energy supply of IoT (Internet of Things) by managers is designed by employing harmless ecosystem capacity to provide the buyers continuous energy supplies to the shrewd metering data on current sensors and store them in the cloud. According to Liu Hua¹, Zhang Junguo, Lin Fantao [3], application in the development of keen energy network which is endless supply of things are made, and the arrangement and execution in like manner application linkage, including wind power appraisal, condition seeing of overhead transmission lines, power examination, brilliant home and asset the board are surveyed tenaciously.

The Melike Erol-Kantarci (IEEE Member) and Hussein T. Mouftah characterise the energy organisation as sharp, and WOT describes as the smart organisation which, by brilliant recognition, also regulate the regular flow of the network, managed, delivery, assigns and uses force.

Force is a crucial tool for society and organisations provided via advancements in data and correspondence (ICTs). A number of brilliant energy organisations viewed the movement of ITC organisations, specifically correspondence frames and information hubs inside and out as a compelling costing, dispersion of the start and the supervision of solicitations.

S. Ramakrishna (2013) examines a method to work with the administration of electrical energy concerning the creating brilliant energy network thought processes that are unsurprising with legitimacy techniques.. The approach reflects the genuine digital programming technique, which breaks apart current RESTful APIs and web-enabled devices to check and regulate electric family gadgets.

The A.R. Al-Ali, Raafat Aburukba (2015) set forth a concept in the Internet of Things for the dazzling energy grid. As the foundation of the shrewd network association layer, the planned model depends upon IPV6.

III. SYSTEM DESIGN

A. *Hardware Design*

1) Battery:

- To discover Battery Specification:

$$\text{Battery Backup} = \text{Output Load} * \text{Load Backup} \quad \text{Battery Backup} = 50 * 10 = 500$$

$$\text{Current} = \text{Battery Backup} / \text{Input} = 500 / 12 = 41.66 \text{A} \quad \text{Battery} = 12\text{V}, 42\text{A}.$$

2) Solar Panel:

- Solar plate design calculation:

$$\text{The current of System} = 42\text{A}$$

Battery to be charged in Hour: 7Hrs

- To discover Current of Sun powered Panel: $42/7=6A$ Power=Current*Voltage
Power=12*6=72

Solar Panel Detail: 72W ,6A,12V

3) Raspberry Pi 3:

- Specifications :
- 40 GPIO pins
- A 1.2GHz 64-bit quad-core ARMv8 CPU
- Bluetooth 4.1 (BLE)

•Wi Fi access

- USB ports
- Display interface (DSI)
- Our system requires:
- 802.11n Wireless LAN
- Ethernet port(for Internet connection)
- Wi Fi access (For Internet connection.

4) Electronics devices and IC:

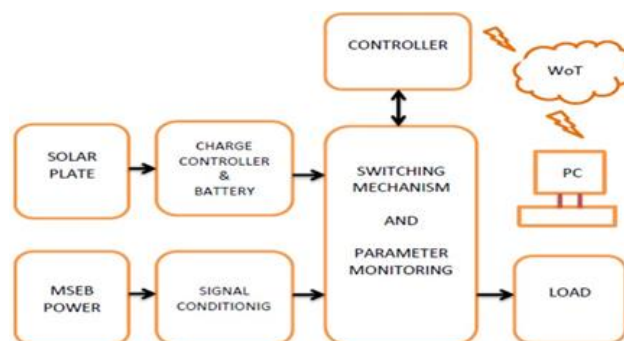


Fig. 1: Block Diagram

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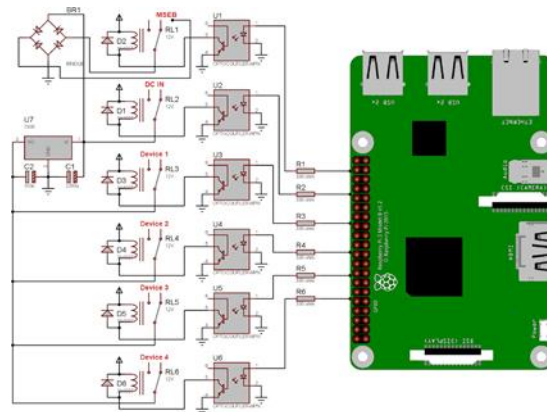


Fig. 2: Circuit Diagram

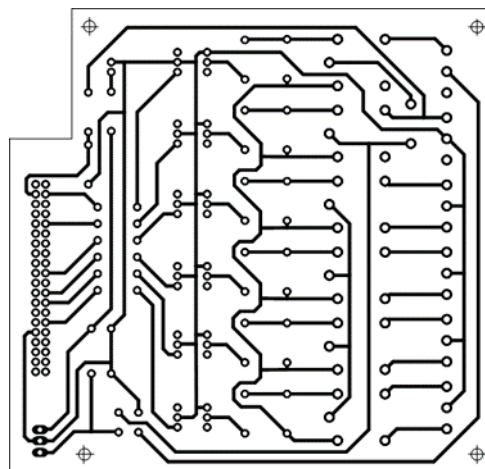


Fig. 3: Solder Side of PCB.

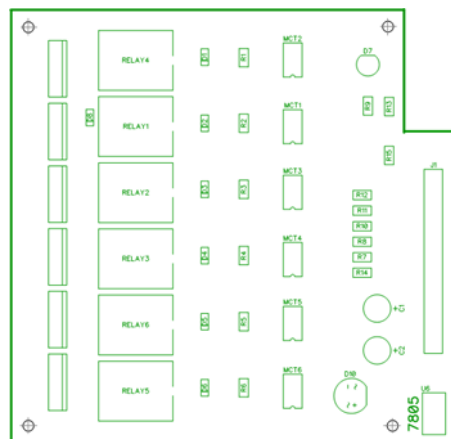


Fig. 4: Component side of PCB.

- a) Opto coupler (ICT 2E):
- Used for Isolation
 - Light Source: Gallium Arsenide infrared emitting diode
 - Light detector: NPN silicon photo-transistor

- b) Relay:
 - Relay used : SPDT 5V 1A
 - Used for switching of load
 - Used for switching power sources
- c) Power supply:
 - 5 V adapter for Raspberry Pi controller.
 - 5V DC for rest of the circuit diagram.
 - General Design of power supply:

B. *Software Design*

The programming language used:

- For web page - Hyper Text Markup language is used.
- Operating system for Raspberry pi – Raspberry Pi OS (Raspbian) is used.
- Software for PCB design - Express PCB 7.2 is used.
- Software used for Simulation - Proteus 8 Installing OS on Raspberry Pi.

IV. SYSTEM IMPLEMENTATION

Here we've utilized two diverse power sources, one is the primary force which is provided by MSEB and furthermore the other one is from the environmentally friendly power source

for example from sunlight based cells and by utilizing this environmentally friendly power source gives solid force supplies to the customers. As a result, WoT design will transition between the two power sources as needed, based on the power use of various loads at home. The power generated

by environmentally friendly power sources, such as sun-based energy, is variable. Depending on the season and the current state of the ecosystem. CT Curl current sensors can detect an individual's present movement. It will effectively reduce the risk of catastrophe, lower the working temperature, and improve the consistency of the product. The GPRS/GSM modem will periodically refresh the information gathered inside the cloud. Web of Things stage with first applications dedicated on energy data collection and control. When data is stored in the cloud and accessed through an online interface, a client may access data from anywhere in the world and analyse it for business purposes. He only need an internet connection and no data. The consumer is frequently followed by WoT on the login screen as to the situation with his application. One of the advantages is that selections are made based on a home's typical electricity use. The consumer gains the ability to track his energy requirements and, in turn, arrange the booking of his power sources. The online administrations are used to plan the swapping of power sources based on the availability of electricity. IoT is used to charge the MSEB's power usage online. WoT is used to destroy the equipment that is carried on after we have gone absent at home. All functional devices may be checked and controlled through

the web page in this way. point when satisfactory force is created by the sunlight based boards. The regulator is modified to nuke the force from sun powered boards to stream to the heaps.

The Web of Things comprises a Web empowered Implanted device(raspberry pi) that gives such an interface to the client using Web administrations. The assortment of meter readings is constrained by the raspberry pi which is in consistent correspondence with the meters. The information that is gathered from the meters is routinely refreshed into a worker. Raspberry pi can be utilized to measure and screen all that like exchanging among sun powered and MSEB by utilizing a hand-off. The Meters are associated with the Non- Renewable(electricity) and Sustainable power sources(solarenergy) straightforwardly to record the voltage and flow readings Interfacing toHand-off controllers are used to connect DC voltage regulated electrical source transformers to the Raspberry Pi.

B. SOFTWARE DEVELOPMENT MODEL

Customer Record The board :On any PC connected to the Internet, a GUI (Graphical User Interface) is provided to the consumer via a web application.

The information gathered will routinely refresh in the Internet of Things stage. When the information is put away utilizing the Internet administration, the confirmed client can get to information and can dissect the force consumption.

Power Booking Dependent on the power utilization information, the client can arrange for when and how to utilise the snare of objects to use its force sources. The online organisations let the client to arrange the switching of force resources according to a predetermined timetable.

A. Working

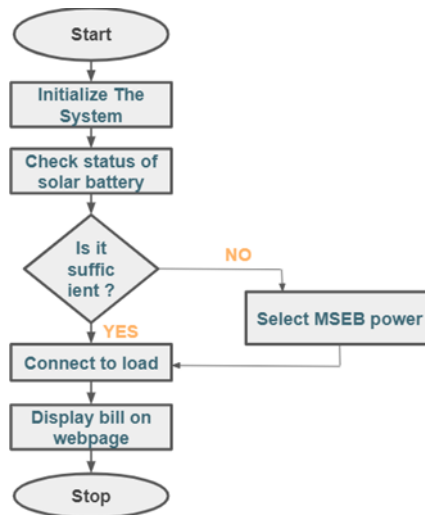


Fig. 5: Flow Chart.

RESULT AND ANALYSIS

- Maximum use of renewable energy will tend to an electricity bill reduction.
- Users can monitor the power consumption and it will reflect on software, as it will show the

average power consumption.

- Power scheduling options are going to be provided to

The house has numerous electrical loads, for example, a fan and bulb and so on. The house meets its power necessities from both the power just as a sun oriented board. The Electrical force additionally can be drawn from the capacity batteries to fulfill a few heaps of the house as and when required by the family. The contribution to that progression down transformer is 240V AC and the yield will be 12V AC. Exchanging is for sources from where we will give power for exchanging we are utilizing transfer and optocouplers. Transfers are associated with MSEB and furthermore to the sun based board. At the switch from solar energy to power supply and vice-versa.

- The proposed model isn't hard to to deploy on houses with metres already installed. This process should be im- plemented as the electrical equipment have been chosen, depending on the scope of the project.
- As a large portion of the administrations are given, through the internet of things, the methodology of an activity can be distantly reconfigured relying upon ne- cessities and client criticism.

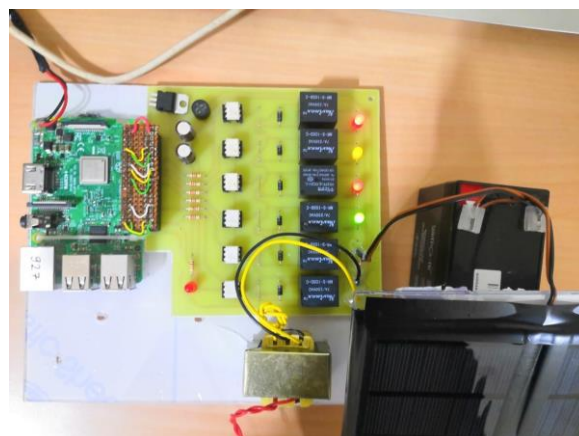


Fig. 6: Hardware



Fig. 7: Web Page.

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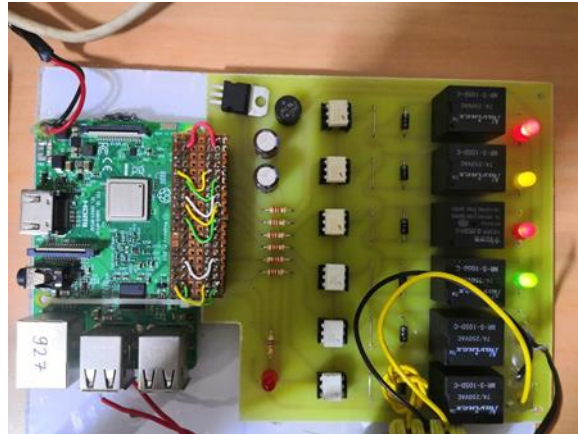


Fig. 8: Hardware Output



Fig. 9: Web Page and Hardware

V. CONCLUSION

All in all, we might want to say that our planned framework is not difficult to redo as per the necessities. It gives extremely proficient techniques for checking and controlling our sustain-able power assets. It at last saves cash and assists with limiting toxins in light of the fact that environmentally friendly power assets will diminish fossil fuel by product impression. At last, it gives an extremely powerful arrangement for executing environmentally friendly power energy procedures for a bigger scope.

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