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REAL TIME ENERGY OPTIMIZATION IN SMART HOME WITH RENEWABLE ENERGY SOURCES USING IOT

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ABSTRACT:

This project presents about the method of optimizing energy from the renewable energy resources (RES) like solar and wind energy and it is used for the home appliances and EV (Electric vehicle) load. The energy produced from RES. The voltage produced from RES is boosted by an dc-dc boost converter and inverted to a maximum point using an dc-ac Inverter. There are two types of batteries are used in the system one is used to store energy produced from RES, and another one is used for battery energy management system (BEMS), which stores the excess energy produced, from the RES given to the loads (home appliances) and also given for the EV load. Arduino microcontroller plays a major role of controlling the system. LCD display is used to display the voltage produced from solar and wind separately and percentage of battery voltage, and energy distributed to the EV load. IOT (internet of things) is deployed to show the outputs shown in the LCD display can be showed from anywhere using our mobile phones.

Keywords: Renewable energy resource, Energy optimization, energy management.

INTRODUCTION

Renewable energy resource like solar and wind energy are used as major source. We consume energy parallelly using solar panel and wind turbine and store the energy produced from RES using battery, alternatively we store excess energy produced from RES is stored in another battery for electrical vehicle and it is also used, when there is no supply produced from RES it automatically can switch the supply from BEMS using a relay. Arduino controller is used to control the operation using an atmega328p microcontroller. The microcontroller is connected in all pins and it does a specific function controlled by the microcontroller.

1.1 EXISTING SYSTEM:

An energy management system (EMS) can function either autonomously or with the transmission and distribution system operators. Precise and reliable operation in the electrical network requires control tools and functions, such as supervisory control and data acquisition (SCADA), generation control function and production forecasts, network security analysis, and advanced user interfaces, as per Guard. In the reported work, EMS is used in the integration of nonconventional sources through the smart grid for balancing energy sustainability as well as controllability. According to smart grids could be classified as smart arrangement, smart administration, and smart security systems. Power, information, and communication infrastructures are designed under a smart infrastructure. The smart energy subsystem, the smart information subsystem, and the smart communication subsystem are three different types of smart infrastructure. The smart management system includes management with new technology, control services, and functionalities. Smarter protection systems become more commendable and are capable of supporting failure security tools, addressing cyber security issues, and preserving privacy. Nowadays, there is a widespread increase in power plants with the latest technology and with high-grade equipment to increase productivity as well as to improve the quality of power. However, the overall power system has encountered several environmental issues as well as power quality related issues. As a result, the conventional energy sources have been replaced by renewable energy sources in the modern power system.

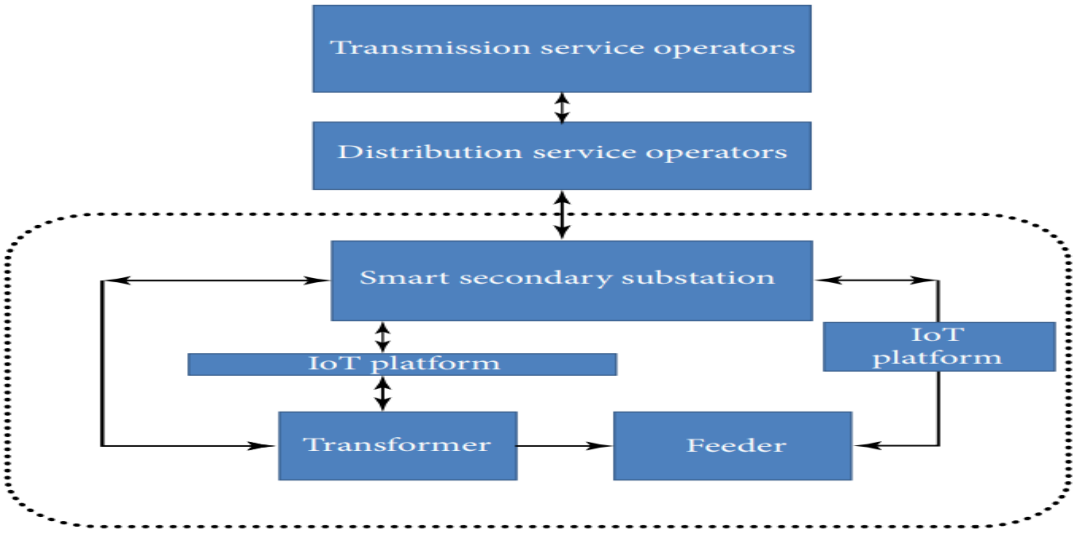


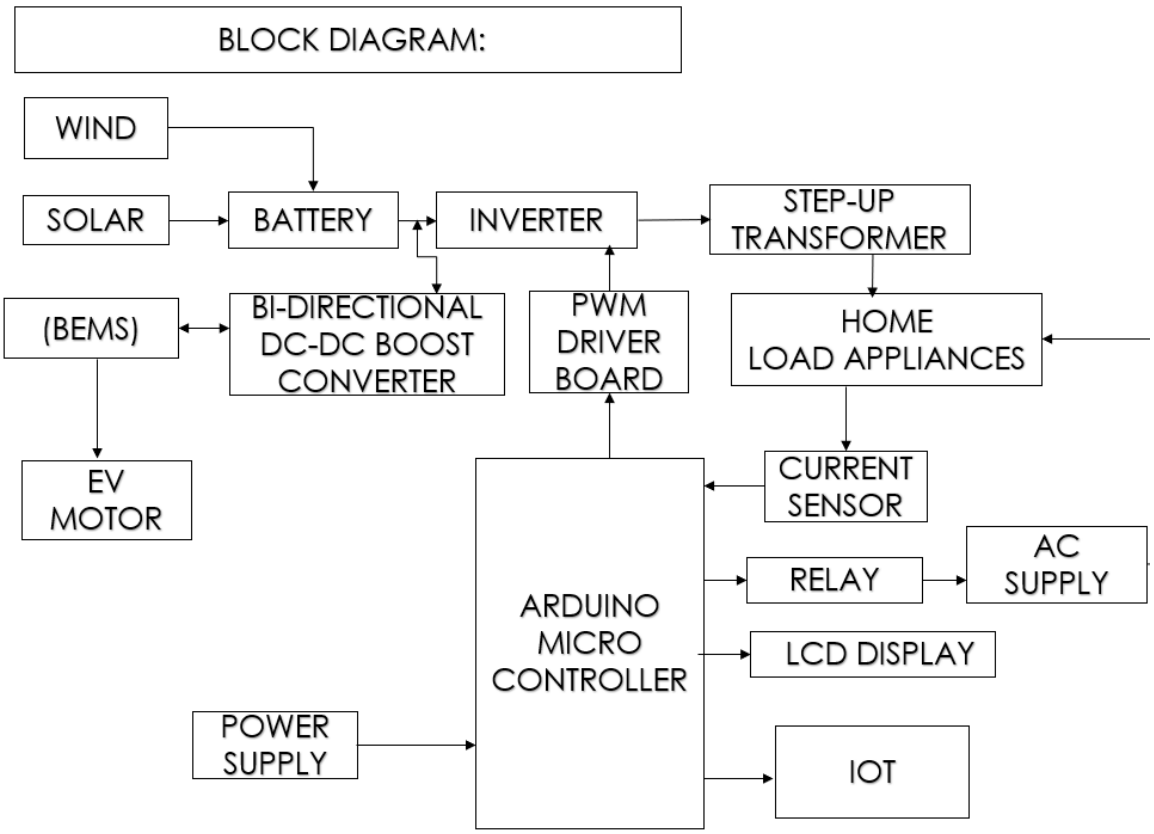
Fig 3.2.1 Existing system block diagram

DRAWBACK IN EXISTING SYSTEM:

- Using the batteries of low capacity is a major drawback
- No proper tracking of energy passing through the system
- Less efficient system, because of no energy monitoring and storage is not properly used

PROPOSED SYSTEM:

The proposed system IOT logic-based algorithm is implemented for power management and monitoring solar and wind system with grid parallel power system is deployed on this system. In parallel system solar is the main source, according with IOT power control the sources of power is activated on this system. To hybridize power generators such as solar-based and wind based power plants for demand satisfaction. Using BEMS, we can store energy from the renewable sources and for later use and EV motor. The power generated is transmitted through the Smart grid, IOT is deployed for monitoring the power.



COMPONENTS DESCRIPTION:

WIND TURBINE

- The energy from the wind turbine is consumed from the wind turbine , which is placed at a distance from the home .
- AC supply is produced from the turbine and it is used for energy consumption
- We transfer the energy to the system using transmission lines from the wind turbine.

i)Wind turbine

SOLAR PANEL

- Solar energy is the major power source of the system.
- 12 watts – 5 volts solar panel is used in this system.
- It is placed in the top (or) roof of the building.
- It produces DC power supply which is inverted to AC supply using a DC-AC Inverter.
- The energy produced is stored in the battery using BEMS (battery energy management system).

ii)Solar panel

BATTERY:

There are two batteries used in the system:

- **BATTERY 1**: (12 volts 5 A) battery is used for storing energy produced from renewable energy for inverting and boosting the voltage and current produced from wind and solar energy.
- **BATTERY 2**:(12 volts 1 A) used for storing excess energy produced from the system for BEMS (battery energy management system) used for EV (electric vehicle) and, when there is a power cut or no energy produced from wind and solar energy, the stored energy is used for load

iii)Battery

ARDUINO MICROCONTROLLER:

- ATMEGA328P Arduino microcontroller is used.
- It plays a major role in the system to controls the overall operations.
- An external power supply of 5v is used for the working of Arduino microcontroller.

iv)Arduino microcontroller

CONCLUSION:

Without forecasting any system characteristics or knowing the HVAC power requirement, we offer an online energy management algorithm for the defined problem based on the LOT framework that helps in reducing the time averaged estimated overall cost and thermal discomfort cost. Unlike other fuzzy logic power control -based energy management algorithms, the proposed approach does not need to submit unknown ANFIS system power requests to an energy queue. Comprehensive simulation findings based on fuzzy logic power control the proposed algorithm's efficacy. Also, different scenarios are created to compare the results. We want to study online ANFIS controls in a commercial building in the future, such as distributing the airflow rate within each zone or room in real-time while taking occupant thermal comfort into account. Furthermore, we intend to analyze the influence of ANFIS load aggregate on endures comfort in a residential structure, such as reducing the average thermal discomfort of these homes during a demand response event while still meeting the total power reduction/increase requirement

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