FUZZY LOGIC BASED AUTOMATIC HYBRID RENEWABLE ENERGY MANAGEMENT SYSTEM

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Abstract— *Right now input fluffy rationale controller based bidirectional DC-DC converter is actualized. It comprises of a straightforward circuit structure. The two windings of the proposed converter comprise of a coupled inductor with indistinguishable windings turns. The windings of the coupled inductor are worked in equal charge and arrangement release to accomplish high advance up voltage gain in step-up mode. Thus, the proposed converter has predominant advance up and step-down voltage gains than the anticipated bidirectional DC-DC buck-support converter. The proposed converter topology is actualized with Multisim reenactment programming.*

Keywords— fuzzy logic; arduino UNO nano ;buck-boost converter; Multisim simulation software

1. INTRODUCTION

Renewable Energy Sources (RES) becoming an important part of power generation. Among available RES technologies, wind and solar energy sources are the most promising options, as they are freely available, and environmentally friendly. Although these technologies are improving in various aspects, Hybrid power system with energy storage can enhance system reliability, power availability, quality, and operational efficiency.

The buck converter, boost convertors and P, PI, PID-controllers, micro controllers are used to control the prevalent energy. They are used in separate energy stored system has create a few amount of losses and circuit complexity. The buck-boost convertors is used to single battery management system to generate the hybrid model (wind, solar) thus it will make its own decision to increase efficiency, battery life span. When the hybrid energy resources are does not produce any

source of power, it will be disconnect automatically. Then load distribution will be varied by different application with the help of frequency. The DC-DC change technique has been fundamentally evolved to achieve high-productivity, prudent topology in a tough situation free structure and without extreme obligation proportion

Likewise, the premier concerns identified with the proficiency of the DC reinforcement converter; enormous information current, high yield voltage and rectifier switch recuperation inconvenience. Subsequently, circuit patterns are requiring voltage/current needs outside the effective scope of most old style converters; the obligation cycle is under 0.1 or over 0.9, and in this way inventive converter topologies must be created. So as to overcome the above issues, superior coupled inductor

DC-DC converters are proposed which gives high-effectiveness, high-voltage extend without using serious obligation proportion. Consequently, proposed Bi-

directional DC topology could be extra alluring for power vitality transformation frameworks. Force converters offer a profoundly proficient intends to convey a synchronized voltage from a standard force source. In including, these converters/controllers are dependent upon a scope of aggravations from the joined burden or the force source. These contentions, if not controlled, may ruin or shutdown gadgets joined to the converter. To keep up the yield voltage consistent, independent of burden and line unsettling influences, it is important to work the converter as a shut circle framework.

2. LITERATURE SURVEY

[1] The dynamic force and the responsive control of intensity of a (BESS) Battery Energy Storage System utilizing the fluffy rationale control to keep up repeat and the steadiness of voltage of the Islanded Micro-lattice. In the islanded miniaturized scale network structure, the force is made from feasible force source resources (BESS) sun and hydro based PV. The usage of these flawless essentialness sources has transformed into the standard issue, picturing the yield control vulnerabilities from sustainable power sources. Further, power weakness lifts control quality issues and prompts control disillusionment. To beat such issues, the proposed Fuzzy Logic Controller (FLC) approach is associated with BESS controller to propel the soundness of the islanded Micro-network.

[2] Non-ordinary vitality sources are joined into the electrical framework, diminishing the use of regular vitality source. In the electrical framework, the force the board framework is groundbreaking to acquire the greatest measure of yield power from multi-input and multi-yield sustainable power source frameworks. It focused on structuring of Adaptive Neuro-Fuzzy Inference System (ANFIS) controller in multi-input and multi-yield power the executives arrangement of little scope electrical frameworks and to show signs of improvement accomplishment of usage of electrical vitality from sustainable power source frameworks. The ANFIS having flexibility nature, because of that it diminishes blunder an incentive close to zero.

[3] The reenactment or QSS Quasi-Static-Simulation approach and a controller for smooth rationale vitality the board for Hybrid Electric Vehicle HEV. The product utilized for HEV displaying and the controller for smooth rationale power control is MATLAB/Simulink. The capacity of a delicate

rationale controller to be contrasted with an ideal enhanced controller upgraded by powerful programming. It has been discovered that the delicate register control marker shows great execution, since the last HEV State of Charge (SOC) battery is inside 2.8% of this dynamic programming. Rationale controller is awesome for HEV power among ICE and EM and furthermore included as a joined force supply (battery, super controller). It gives a successful vitality the executives organizer for the high efficiency development in HEV.

[4] Energy the board remain solitary Hybrid Energy System (HES) by the Fuzzy Logic Controller (FLC). The HES intended for country home comprises of PhotoVoltic (PV) module, wind turbine, battery stockpiling and electrolyzer. The director control points, fundamentally to satisfy the heap power request .A Maximum Power Tracking Technique (MPPT) for the PV framework and wind turbine is introduced. The reproduction results in the matlab/Stimulant show the constancy of the created system. This work is a commitment to the investigation of independent HES, which comprises of frameworks: PhotoVoltaic (PV), wind, a capacity framework and electrolyzer on a few perspectives: demonstrating, supervision and recreation
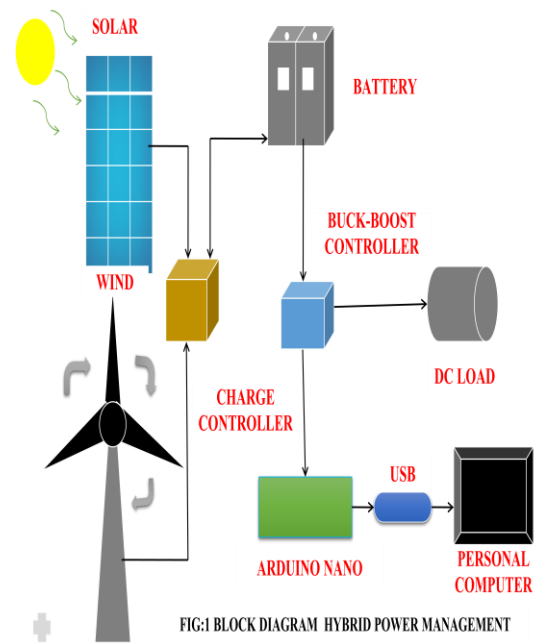
3. PROPOSED METHOD

FIG:1 BLOCK DIAGRAM HYBRID POWER MANAGEMENT

A. *Hybrid Power Management*

B.   Solar energy

Sun powered vitality is that vitality which is gets by the radiation of the sun. Sun oriented vitality is available on the earth constantly and in bounteous way. Sun oriented vitality is uninhibitedly accessible. It doesn't deliver any gases that mean it is without contamination. It is reasonable in cost. It has low support cost. Just issue with close planetary system it can't create vitality in awful climate condition. Be that as it may, it has more noteworthy proficiency than other vitality sources.

Specification of the Solar Panel

Maximum Power (P max)	– 3.0W
Maximum Power Voltage (V mp)	– 17.0V
Maximum Power Current (I mp)	- 0.18A
Short Circuit Current (ISC)	– 0.19A
Open circuit Voltage (Voc)	– 21.0V
Max System Voltage	-600V

C.   Wind Energy

Wind energy is the energy which is separated from wind. For extraction we use wind factory. Ii is sustainable power sources. The breeze energy needs less expense for age of power. Support cost is likewise less for wind energy framework.It has less emanation. Starting expense is additionally less of the framework. Age of power from wind is rely on the speed of wind streaming.
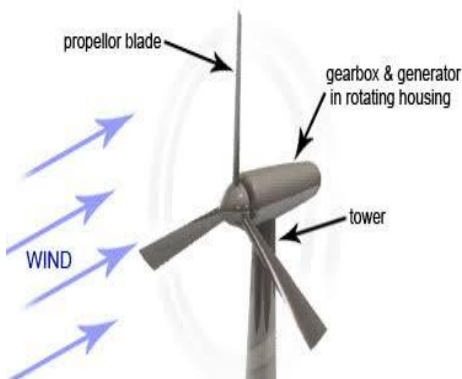

Fig 3: Wind Energy.

D.   Buck-Boost Converter

OPERATION PRINCIPEL OF CONVERTER:

Its operation principal is classified in two mode of operation:

1. STEP-UP MODE OF THE CONVERTER

The continues pulse technique is used to control the switches M1.In this mode of operation MOSFET M1 is gating gate pulse for triggering the switch. When MOSFET is trigger at the same time diode D1 also conducting and inductor L storage energy during this time capacitor C2 is discharging. When switch not conducting then whole power from battery and energy storage by inductor L will supply the power at input side of inverter.

2. STEP-DOWNMODE OF THE CONVERTER

- The direction of current flow from the high voltage 36V DC to the low voltage 24V DC Sources called buck. The direction of current flow from the high voltage 36V DC to the low voltage 24V DC   Sources called buck. Its operation is divided into two modes.

- **Mode1:** It start when MOSFET (M2) is switch on at t=0. The information current witch rise courses through inductor L, capacitor C, and battery.

- **Mode2:** It starts when MOSFET (M2) is switch off at t=t1. The freewheeling diode D2 leading because of vitality put away in the inductor; and the inductor current keeps on moving through L, C1, battery and diode D2. The inductor current fall until MOSFET (M2) is switch on again in the following cycle.
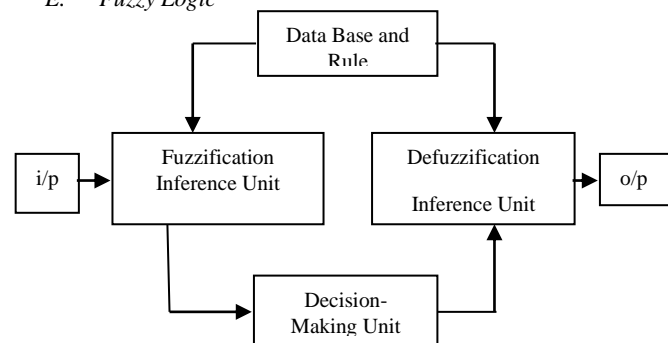
E.   Fuzzy Logic

Fig 4: Fuzzy logic

By contrast, in Boolean logic, the truth values of variables may only be 0 or 1. Fuzzy logic has been extended to handlthe concept of partial truth, where the truth value may range between completely true andcompletelyfalse. Usually fuzzy logic control is created from four major elements presented on Figure fuzzification interface, fuzzy rule grid and defuzzification interface.

F. Arduino Nano

Arduino Nano Version 3 is the open source smallest Embedded Development board launched by Arduino based on Atmega328 SMD package Microcontroller.It is a surface mount Breadboard friendly board integrated with mini USB port.DC power jack is not available on this Board,so power can be given through mini USB cable. It automatically sense and switch to the higher potential source of power , there is no need for the power select jumper.

The **Arduino Nano** is very much similar to the Arduino UNO. The Functions like pin mode and digital write are used to control the operations of digital pins while analog read is used to control analog pins.

The analog pins impulse with a total resolution of 10bits which measure the value from 0V to 5V.

Arduino Nano incorporates with a crystal oscillator of frequency 16MHZ.

Specification:

1. Operating voltage   -   5V
2. Input Voltage (limits)   -   6-20V
3. Digital I/O Pins   -   14
4. Analog Input Pins   -   8
5. DC Current per I/O Pin   -   40Ma
6. SRAM   -   2KB
7. EEPROM   -   1KB
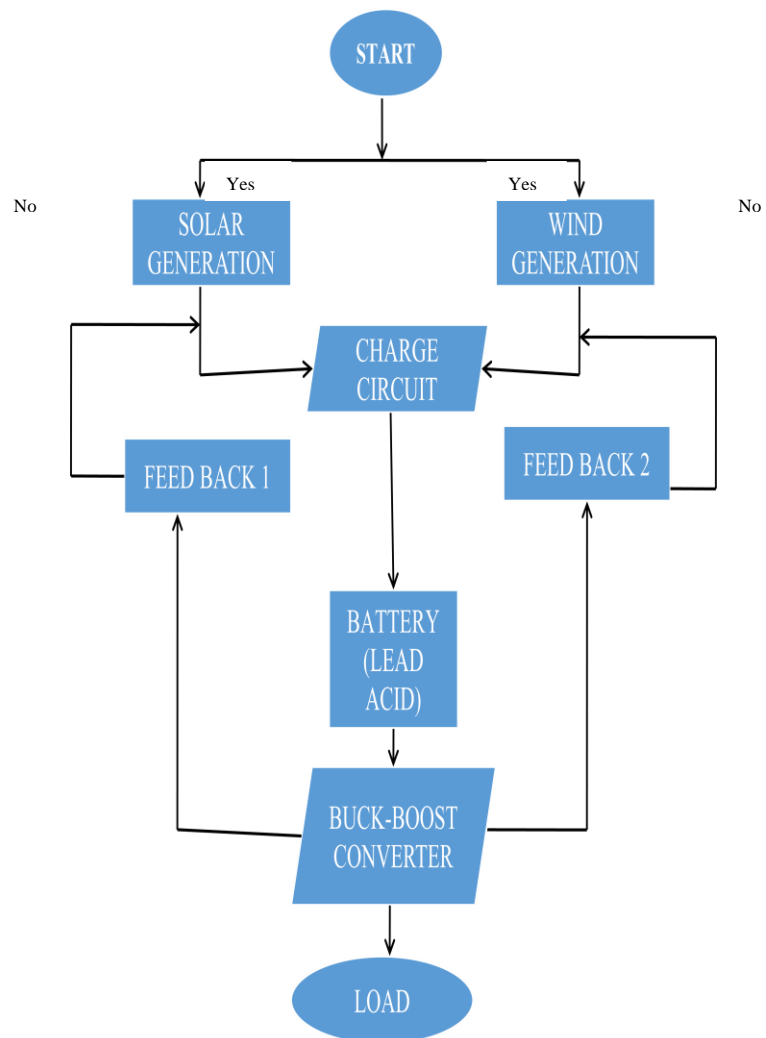8. Clock Speed   -   16KB

G.Flow Chart

Fig 5:Arduino Nano

No

Fig 6: Flow Chart of Hybrid Energy
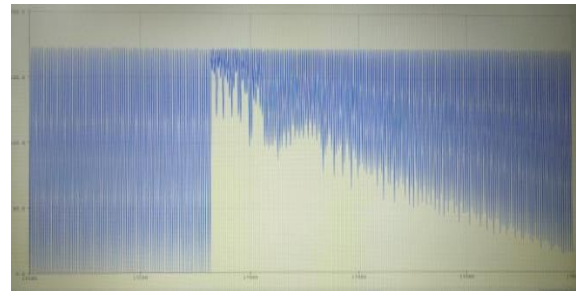
4. RESULT
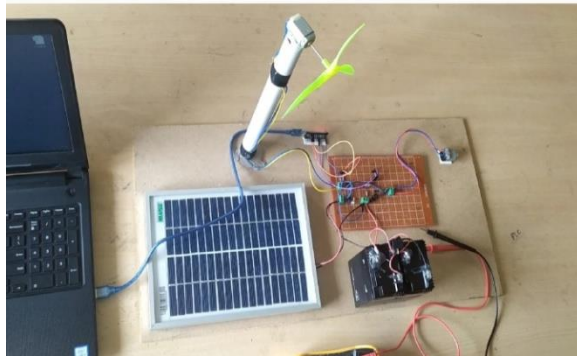

Fig 7 : Hardware Setup

The circuit being talked about utilizations fluffy rationale for the shut circle activity which has better generally execution contrasted with other customary converters. The circuit has been recreated in Multisim reenactment programming and examination of both the shut circle and open circle activities. Single battery the board framework is utilized in crossover framework which it decreases the circuit multifaceted nature, battery arrangement and diminishes the expense. The issue can be shown by utilizing Light Emitting Diode (LED).

Fig 8: Hardware Setup with System interface

Simulation Result

Fig 9: Combination of Solar and Wind Energy.

5. CONCLUSION

Apart from advantage of higher efficiency achieved by implementing fuzzy based bidirectional Buck-Boost convertor ,the mentioned topology provides and extra benefit of multiple outputs ,thus reducing the complexity as well as the expands of the circuit. The waveforms corresponding to close loop and open loop circuit as be mentioned in the above section .The closed circuit has been simulated for a 15% of load change .As discussed area earlier multi output converters are capable supporting to different application simultaneously as well as for application which required to different voltage levels like multilevel converters. We fix an LCD display to indicate the energy from the solar are an wind tubine, and we can fix an automation to clear a solar panel from an dust.

6. REFERENCES

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BIBLIOGRAPHY

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