

# Optimization of Power Grid Using Fuzzy Logic System

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**Abstract --** Power Management is the most important part of any power system which has to be taken care while generation and distribution of power. Optimization of power grid using Fuzzy Logic system will provide a better and efficient way to control the power. As we know that power can be generated by many method which are classified in two categories i.e. Renewable and Non-Renewable resources. Both these resources are being used in the management of power such that power with low costing will be provided or generated in the system and hence, than managed by the power grid. This whole process is done with the help of Fuzzy Logic System which automatically operates the system with an optimized supply.

**Index Words—**Fuzzy Logic. Power grid, Optimization, AI, Renewable Resources

## I. INTRODUCTION

Fuzzy logic is an approach to computing based on "degrees of truth" rather than the usual "true or false" (1 or 0) Boolean logic on which the modern computer is based. Power Distribution grid operates are confronted with great challenges because the number of decentralized energy generation systems, such as photovoltaic, has grown strongly through the subsidization. Power Distribution grid operators are confronted with great challenges because the number of decentralized energy generation system, such as photovoltaic, has grown strongly through the subsidization of new renewable energies will continue, and in the long term increasingly lead to fluctuations and irregular peak loads in the power grid. In order to ensure future grid stability and minimize investments in costly grid expansion. [1]

The core technology consists of several algorithms. They continuously measures parameters such as grid load, electricity consumers through artificial intelligence. Using this information, Grid sense optimizes the utilization of power consumers and generators. The technology reduces peak loads in the

power grid, balances the loads in the power grid, balances the loads and stabilizes the distribution grid.

In India, there are five territorial load dispatch focus in particular Northern district, North-Eastern area, Eastern locale, Western area and southern area. These all frameworks are interconnected shaping a national matrix. Interconnection has the monetary preferred standpoint of diminishing the hold age limit in every territory. Under the state of sudden increment in load or loss of age in one zone, it is quickly conceivable to acquire control from abutting interconnected regions. It gives limit funds via occasional trade of energy between territories having restricting winter and summer necessities. It grants limit reserve funds from time zones and irregular decent variety. It encourages transmission off pinnacle control. It likewise gives the adaptability to meet sudden crisis loads [2].

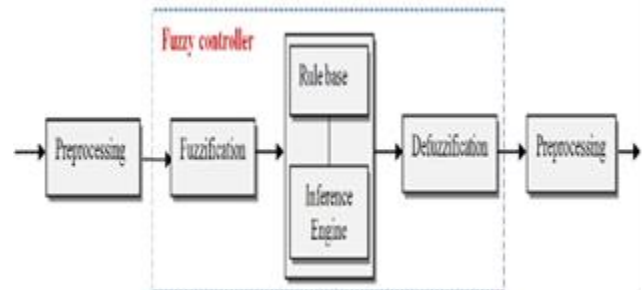


Fig.1. Block Diagram of Fuzzy Logic System

## II. ISSUE DEFINITION

In late framework there are sure weaknesses, for example, uncontrolled power stream, assets for control age are not used in proficient way, no support to foundation of smaller scale lattices at purchaser level, no shrewd basic leadership capacities in the framework.

Other issues may include Age of the grid, increased blackouts, Possibility of cyber-warfare, direct terrorist attacks on the power grids, etc. All these problems

make the grid unsafe to be used in the country, hence, some solution has to found in order to remove all these possibility of risks.

### III. PROPOSED STRATEGY

For the expressed issue, we have planned such a framework in which the lattices are associated in ring mains form and we have conjured computerized reasoning in the framework which will help us to overcome above deficiencies. The issue of uncontrolled stream of energy can be dealt with by restricting the upper and lower point of confinement of energy. The entire framework is synchronized such that need is given to the sustainable wellsprings of vitality with the goal that reliance on the non-inexhaustible sources, for example, warm power is diminished and valuable assets, for example, coal and diesel can be safeguarded for longer timeframe. The age of energy can be energized at household level so purchasers can have the capacity to offer the power which they are creating. As we are summoning manmade brainpower in the framework by utilization of fluffy rationale so the framework progress toward becoming upgraded and self-recuperating of the lattice can be accomplished. We have demonstrated the fundamental piece outline of our proposed work in fig. 1. The different power supplies in the undertaking is appeared. We have demonstrated the stick graph of microcontroller we have utilized. Fig.2 demonstrates the power supply graph for wind control plant. Fig. 3&4 demonstrates the power supply to focal lattice and also the estimations of voltages and current from sunlight based, wind, warm and atomic power plants. Various parts are utilized as a part of the proposed work.

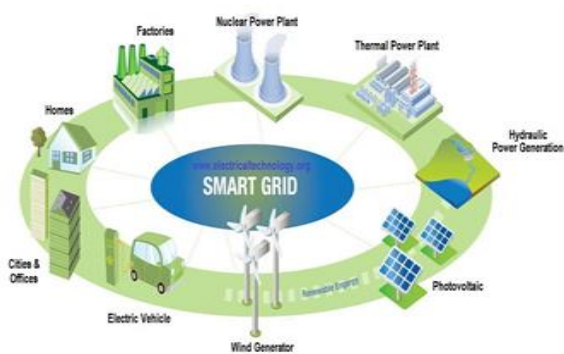


Fig.2. Diagram of Power Grid Connected

Optimization of power grid with the help of fuzzy logic controller is the solution to most of the problems in power grid.

It will have following advantages in power grid, increased efficiency, security to the system, real time decision taken by machine, reduced cost

### IV. WORKING OF THE VENTURE

In our task we have made four frameworks two sustainable and two non-inexhaustible that are sun powered, wind, warm and atomic. The power produced by all the four lattices is sent to the focal transport which is designed in Ring Mains. Need is offered first to sustainable wellsprings of vitality i.e. sun based and wind control. These two units will supply the heaps up to their most extreme limit. Presently if stack is additionally expanded and these two networks are not ready to supply the heap request non-sustainable sources i.e. warm and atomic will switch their energy on focal transport to satisfy the required request. Presently by utilizing fluffy rationale (AI) in MATLAB we have made a multi esteemed code which will choose what lattice is to be turned on/off and how much power must be drawn from every matrix. Here we have indicated LEDs as burdens. The equipment of our undertaking is associated with the PC trough hyper terminal. In PC we have customized a code in MATLAB which is fundamentally a calculation which will control and choose how the networks to be worked.

In Future, the optimization technique with the help of fuzzy logic system will automatically improves the countries problem of power need and hence, helps the country to develop more as compared to the other countries and also lead to Digital India Mission completion.

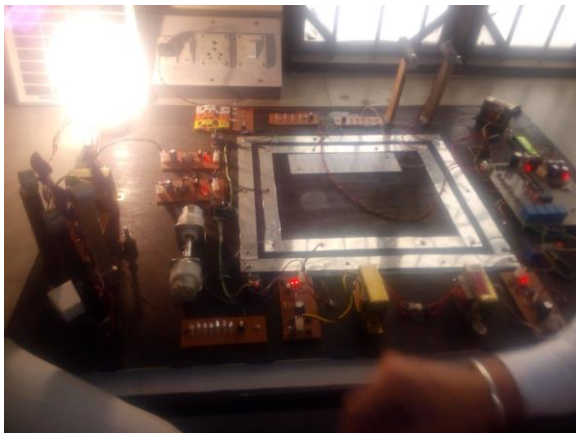


Fig.3. Future Scope of India With Optimization

## V. TEST OUTCOMES

Before Interconnection At first all lattices (sustainable and non-inexhaustible) are not associated with each other so expansive turning hold limit is required, dependability of energy supply is low, reliance on non-inexhaustible source is high, manual response to basic system circumstance, odds of power outage of individual framework is more on the off chance that and the general framework is uneconomical. After interconnection.

Presently all lattices are interconnected through ring principle so general framework wound up hearty, turning hold limit is decreased by impressive sum, there can be trade of pinnacle loads, inexhaustible wellspring of vitality are used in more productive way and reliance on non-sustainable wellspring of vitality is diminished. Power outage counteractive action via computerized counter measures, as counterfeit consciousness is utilized as a part of the frame.



## VI. CONCLUSION

For efficient and innovative reasons singular power frameworks are composed as electrically associated zones or local matrices. Every zone or local network works in fact and financially autonomously, however these are in the end interconnected to frame a national matrix with the goal that every zone is legally fixing to different territories in regard to certain age and planning highlights. Reliance on the non-sustainable wellspring of vitality is lessened apparently. The steadiness of the framework is expanded because of control stream of energy utilizing proposed work. Restrictions of sustainable source have been

overwhelmed by interconnection of network with traditional sources.

## REFERENCES

- [1] D. Chandrashekhara and J. stergaard, "Battery vitality stockpiling innovation for control frameworks a diagram," *Electric Power Frameworks Exploration*, vol. 79, no. 4, pp. 511– 520, 2009.
- [2] A. Nottrott, J. Kleissl, and B. Washom, "Stockpiling dispatch enhancement for framework associated joined photovoltaic-battery stockpiling frameworks," in *2012 IEEE Power and Vitality Society General Gathering*, July 2012, pp. 1– 7.
- [3] E. De Santis, L. Livi, A. Sadeghian, and A. Rizzi, "Displaying and acknowledgment of keen framework blames by a consolidated approach of difference learning and one-class classification," *Neurocomputing*, vol. 170, pp. 368– 383, 2015.
- [4] S.ChakrabortyandM.G.Simoes,"Pv microgridoperationalcost minimization by neural determining and heuristic enhancement," in *Industry Applications Society Yearly Gathering*, 2008. IAS '08. IEEE, Oct 2008, pp. 1– 8.
- [5] E. D. Santis, A. Rizzi, A. Sadeghiany, and F. M. F. Mascioli, "Hereditary streamlining of a fluffy control framework for vitality flow administration in smaller scale matrices," in *IFSA World Congress and NAFIPS Yearly Gathering (IFSA/NAFIPS)*, 2013 Joint, June 2013, pp. 418– 423.
- [6] Y.Riffonneau,S. Bacha, F.Barruel, and S. Ploix, "Ideal power flow administration for framework associated pv frameworks with batteries," *IEEE Exchanges on Reasonable Vitality*, vol. 2, no. 3, pp. 309– 320, July 2011.
- [7] D. Stroe, M. Swierczynski, An.- I. Stan, and R. Teodorescu, "Quickened lifetime testing procedure for lifetime estimation of lithium-particle batteries utilized as a part of enlarged breeze control plants," in *Vitality Change Congress and Work (ECCE)*, 2013 IEEE, Sept 2013, pp. 690– 698.
- [8] A. Grama, T. Patarau, R. Etz, and D. Petreus, "Simulink test seat for a mixture battery-supercapacitor control framework," in *Plan and Innovation in Electronic Bundling (SIITME)*, 2014 IEEE twentieth Global Symposium for, Oct 2014, pp. 153– 156.
- [9] S. Leonori, E. D. Santis, A. Rizzi, and F. M. F. Mascioli, "Multi target improvement of a

- fluffy rationale controller for vitality administration in microgrids," in IEEE Global Meeting on Fluffy Frameworks (Fluff IEEE 2016), July 2016. [10] F. M. Bianchi, E. D. Santis, A. Rizzi, and A. Sadeghian, "Shortterm electric load guaging utilizing reverberation state systems and pca deterioration," IEEE Access, vol. 3, pp. 1931– 1943, 2015.
- [10] B.L. Thereja, A.K. Thereja, Electrical Innovation, Vol I, 24th version , 2006, S. Chand, pp. 29
- [11] Thomas L. Floyd, Electronic Gadgets, Vol. I, sixth version, 2003, Pearson Training, pp. 135-140
- [12] Microchip Innovation Inc. PIC 16F877 Information Sheet/www.datasheetcatlog.com
- [13] ST Innovations, ULN 2801, Information Sheet/www.datasheetcatlog.com
- [14] Texas Instruments, MAX 232 Information Sheet/www.datasheetcatlog.com
- [15] Electromagnetic Hand-off, www.electrical4u.com
- [16] B.L. Thereja, A.K. Thereja, Electrical Innovation, Vol I, 24th version, 2006, S. Chand, pp. 28-31
- [17] Rocker Swich, www.electrical4u.com
- [18] SPST Switch, www.electrical4u.com
- [19] B.L. Thereja, A.K. Thereja, Electrical Innovation, Vol I,24th version, 2006, S. Chand, pp. 861-862