

AI POWER STATION

(1) *Merlin Subha.G, Assistant Professor (GRADE I)*

(2) *Kavya M, Undergraduate Student*

(3) *Priyadarshini.G, Undergraduate Student*

Department Of Electricals Engineering

Panimala Engineering College, Chennai, India

I . ABSTRACT

Now a days , all are becoming digital based , so by this technology an digital based power station .It controls all the power grid ,circuit breakers and all the damages are rectified by artificial intelligence .

There are on

- [1] “Digital technology“ based on the application of semiconductor high-speed elements ,
- [2] Intelligent substation applying IT (information technology) and
- [3] System configuration aimed at high-speed communication.

In all these are demands no man power is need all we need is intelligence and working knowledge future intelligence control substation ,protection , monitoring as shown in (fig.1) .They are with better efficiency and the functional distribution ,power distribution is managed ,communication system that have advantages in terms of high performance , information-sharing of power distribution. Today’s conventional apparatus also requires streaming of functions, improvements in sensor technology and standardize interfacing



fig no:1 future power station

II . KEYWORDS

Artificial intelligence , Expert system, artificial neural network, Fuzzy logic, Power station.

III. CONCEPT OF INTELLIGENCE SUBSTATION

In substations , the connections are based on the signals coming through the cables and substation apparatus, such as switch gear and transformer ,control ,protection and monitoring equipment is independent of every other device. In other side AI substation will share all like apparatus, control ,protection, measurements and monitoring through one bus by applying both “DIGITAL AND INTELLIGENCE” The inputs and outputs are given single line diagram as shown in (fig 2) . Moreover ,high efficiency and miniaturization can be achieved because the local cubicle contains unified control/protection and measurement equipment that is one integrated system . A bus shares information between apparatus and equipment, number of cables are sharply reduced . Telecommunication standards , equipment specification can be standardized for different vendors are adopted and the system conforms according to international standards .

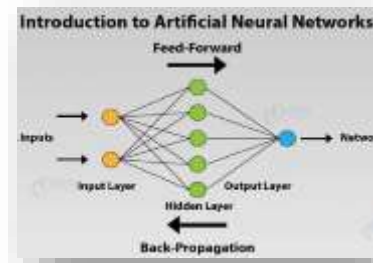


Fig.2 concept of AI

IV AI POWERSYSTEM IN

HYDRO STATION (EXAMPLE)

Hydropower is power derived from the energy of fast running water, which may be harnessed for useful purposes. In Hydro Power Plant we use gravitational force of fluid water to run the AI turbine which is coupled with electric AI generator to produce electricity. This power plant plays an important role in protecting our fossil fuel which is limited; because the electricity AI generated is due to the use of water which is a renewable source of energy. The force of water from the dam the blade spins the giant AI turbine.

And the main thing is that in these turbines and all the other components and AI implemented the components are shown below in (fig 3). The AI turbine is connected to the generator that makes electricity as it spins. After passing through the AI turbine, the water flows back into the river on the other side of the dam.

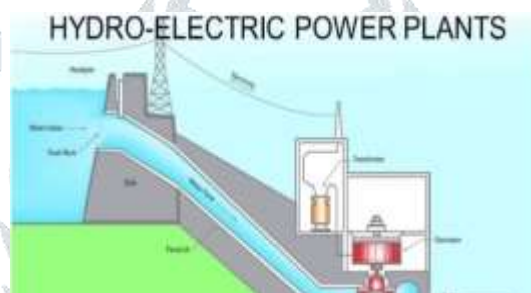


fig .3 AI implementing components in hydro power plant

V.NEED FOR AI IN POWER SYSTEM

- i) Increase in the computational ACCURACY and TIME due to vast system data handling and extensive.
- ii) versatile, large amount of information which is used in calculation, diagnosis, complex and learning.
- iii) Maintenance of the system

VI.APPARATUS MONITORING SYSTEM

An optical bus is used for HIGHER LEVEL MONITORING and measuring device and all the data are transmitted. The electricity supply company or manufacturer can monitor the apparatus provide from their remote location are current location and the required data is also accessed through the internet or intranet by the manufactures. The history, management, construction, analysis, diagnosis of database also become possible. In emergency case all the promoted action are taken well in advanced and the result of abnormalities can also be checked out.

By the time of inspecting revision, maintenance, plans, part management are also drafted, efficient maintenance planning and reliability are also realized

VII.POWER SYSTEM CONTROL

- ➔ Power system controls can be broadly classified into two categories: regional and system wide. adjusting local control parameter and set points are often implemented as area control between those two categories. to model the behavior of large parts of power and information gathered at various points are controlled by area.

➔ Based on empirical knowledge and human intervention are not limited to the automatic feedback type include these two strategies. PID controllers typically implemented using conventional automatic control which are believed to offer adequate performance in most application in local control. new methodology such as fuzzy logic controllers ,for local controls is not to discount the usefulness of method.

Higher levels of power system are classified as convinced are here:

1. Generation scheduling and automatic control: includes unit commitment, economic dispatch, and automatic generation control; in the past, well established control methods were used but this situation has been changing to deal with the new scenario created by the power industry restructuring;
 2. Voltage control: is mostly of the local type but some systems have already gone to a higher coordinated secondary control to allow a more effective use of reactive power sources and increase stability margins;
 3. Preventive security control: has the objective to detect insecure operating points and to suggest corrective actions; the grand challenges in this area are on-line Dynamic and Voltage Security Assessment (DSA and VSA);
 4. Emergency control: manages the problem of controlling the system after a large disturbance; it is an event driven type of control and includes special protection schemes;
 5. Restorative control: its main function is to re-energize the system after a major disturbance followed by a partial or total .
- Implementation of area power system controls will be great helpful in intelligent system technique. Modern telecommunication and computing technology are developed from most of these applications require large quantities of system information. Large set of raw data are extracted from the salient information by new processing technique. Importantly , they are error free and often contains various types of uncertainty .qualitative form will be translated into quantitative decisions finally .

VIII.INTELLIGENCE IS INTANGIBLE

It is composed of 1. Reasoning . 2. Learning. 3. Problem solving. 4 .Perception 5. Linguistic intelligence .

Difference between Human and Machine Intelligence:

- i. Humans perceive by patterns whereas the machines perceive by set of rules and data.
- ii. Humans store and recall information by patterns; machines do it by searching algorithms. For example, the number 40404040 is easy to remember, store and recall as its pattern is simple.
- iii. Humans can figure out the complete object even if some part of it is missing or distorted; whereas the machines cannot correctly.

IX.AREA OF APPLICATION IN POWER STATION

- i. Planning of power system like transmission expansion is planning, generation expansion planning, power system reliability, reactive power planning.
- ii. Control of power system like stability control, voltage control, load frequency control ,power flow control.
- iii. Control of network like sizing, location and control of FACTS devices.
- iv. The understanding of the working the pattern of their interconnection can be used to construct computers for solving real world problems of classification of pattern recognition and patterns.
- v. Applications of distribution system like operation of distribution system and planning, demand side response and demand side management, operation and control of network reconfiguration .
- vi. Increase the efficiency of the components used in power systems.
- vii. Forecasting application like short term and long term load forecasting, wind forecasting electricity market forecasting, solar power forecasting.
- ii. Humans store and recall information by patterns; machines do it by searching algorithms. For example, the number 40404040 is easy to remember, store and recall as its pattern is simple.
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X.ADVANTAGES

- i. Availability: Expert systems are available easily due to mass production software.
- ii. Cheaper: The cost of providing expertise is not expensive.
- iii. Reduced danger: They can be used in any risky environments where humans cannot work with.
- iv. Permanence: The knowledge will last long indefinitely.
- v. Multiple expertise: It can be designed to have knowledge of many experts.
- vi. Explanation: They are capable of explaining in detail the reasoning that led to a conclusion

XIAPPLICATIONS

- i. All of the application solve offline tasks such as settings coordination, post fault analysis & fault diagnosis.
- ii .As yet there is no application reported of the expert system technique employed as a decision making tool in an on-line operating protective relay.

XI.CONCLUSION

The field of AI gives the ability to the machines to think analytically, using concepts. The main feature of PLANNING AND POWER SYSTEM DESIGN (which is shown in fig 4) is reliability, which was conventionally evaluated using deterministic . This area of paper is based on the artificial intelligence , concept of artificial intelligence, and the artificial intelligence techniques used in the field of Power Systems .A lot of research is yet to be performed to perceive full advantages of this upcoming technology for improving the distributed control efficiency of electricity market investment ,and efficient system analysis monitoring, particularly power systems .

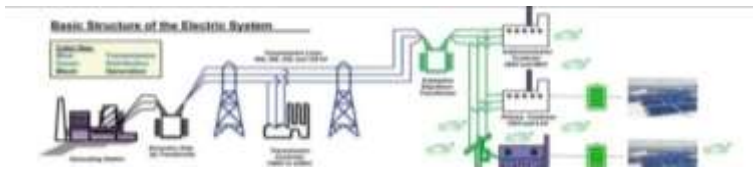


Fig 4 complete design of power plant

REFEREANCE

- [1] Stuart Russell, Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson
- [2] Jeff Heaton, Artificial Intelligence for Humans, Volume 1 : Fundamental Algorithms, Create Space Independent Publishing Platform
- [3] https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_overview.htm
- [4] Keith Frankish, William M. Ramsey, the Cambridge Handbook of Artificial Intelligence, Cambridge University Press.
- [5] Ai technique:-Jackson, Peter (1998), Introduction To Expert Systems(3 ed.), Addison Wesley, p.2, ISBN978-0-201-87686-4
- [6] MacKay 2003, p.47
- [7] jcboseust.ac.in
- [8] www.ifc.org
- [9] A virtual power plant architecture for the demand –side management of smart prosume
- [10] -scientific figure on research gate [accessed 3nov2018]
- [10] www.kolabtree.com