



## A REVIEW STUDY ON AI USED IN ELECTRICAL ENGINEERING

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### ABSTRACT

AI is revolutionizing electrical engineering by enabling machines to perform complex tasks autonomously, anticipate maintenance requirements, and optimize energy usage. AI algorithms assess vast quantities of data in order to enhance power distribution, identify challenges, and optimize system operations. AI-driven technology is utilized for creating, experimenting, and evaluating products, ultimately expediting and reducing costs in the production process. The improvement of AI technology will result in its greater application in electrical engineering, aiming to enhance system efficiency and minimize energy usage.

**Keywords:** Artificial Intelligence, Electrical Engineering, New Challenges.

### INTRODUCTION

The field of computer science AI aims to create intelligent machines capable of learning, problem-solving, understanding, and decision-making similar to humans.

AI helps to understand and recognize smart ideas, and also helps in making quicker and better decisions. AI aims to make robots act and think like humans.

Artificial intelligence is now a part of our everyday lives. Various disciplines, including computer science, cybernetics, information theory, psychology, and neurophysiology, collaborated to create this. AI is concentrated on the creation and application of time-saving technologies. Machines performing actions is an example of Artificial Intelligence.

The emergence of AI has transformed several industries, including Electrical Engineering. The inclusion of AI technologies has revolutionized the approach to developing, constructing, and managing electrical infrastructure. This summary is about AI in Electrical Engineering. It talks about how AI is being used, the good things about it, and the problems it can cause.

AI is used a lot in Electrical Engineering for things like smart grids, power systems, and managing energy. Advanced computer programs and methods for predicting have made it possible to watch and manage electrical grids in real-time. This helps make the grids work better, be more dependable, and better for the environment. Technology that uses AI can find problems, make energy use better, and guess how much energy will be needed. This helps to make the environment healthier and makes electrical systems work better.

Furthermore, AI has been very important in helping to make electric cars and renewable energy systems better. Electric cars that use artificial intelligence can use less energy, be safer, and make driving more enjoyable. In the same way, AI has helped us use solar and wind power more efficiently. This means we don't need to rely as much on fossil fuels and it helps to lessen the impact of climate change. But, using AI in Electrical Engineering comes with many difficulties. This means we are worried about keeping data safe, protecting against computer attacks, and making sure AI systems work well. Furthermore, more people are looking for rules and guidelines to make AI-powered electrical systems work together, be safe, and work well.

#### **AI is being used in electrical engineering:**

**1. Smart Grids:** AI is enhancing the improvement of power grids by predicting individuals' energy demand, organizing the distribution of energy, and minimizing energy consumption. This increases the reliability and durability of the electrical grids.



- 2. Power Generation:** The use of AI is aimed at enhancing power generation processes by anticipating energy requirements, optimizing fuel consumption, and minimizing environmental impact. This will enhance the performance and durability of power plants.
- 3. Electric Vehicles:** The integration of artificial intelligence enhances electric cars by overseeing battery management, optimizing the charging system, and enhancing safety features.
- 4. Renewable Energy:** Utilizing artificial intelligence is a way to enhance the effectiveness of renewable energy systems such as solar panels and wind turbines. This is achieved by forecasting weather patterns, optimizing energy production, and reducing energy usage.
- 5. Smart Homes:** Homes are becoming more energy-efficient and intelligent through the utilization of AI technology. It helps to use less energy, make homes more comfortable and safer, and protect the environment.
- 6. Electric Grid Resilience:** Artificial intelligence is being utilized to strengthen electrical grids by anticipating and addressing power outages, enhancing the distribution of energy, and reducing the impact of natural calamities.
- 7. Energy Storage:** Artificial intelligence is utilized to enhance energy storage systems by predicting the amount of energy required, increasing the storage capacity, and reducing energy usage.

#### LITERATURE STUDY OF AI IN ELECTRICAL ENGINEERING

The article discusses ways to improve the microgrid system through the use of shunt hybrid filters. They are looking to upgrade the power quality in the microgrid. Our study focused on the use of Adaptive Fuzzy-Neural-Network (AFNN) Control as a more efficient method to regulate the performance of SHF. This aids in SHF's ability to function more effectively and efficiently. Performing tasks in different environments with varied power and voltage levels. The effectiveness of the new controller is being assessed in comparison to alternative control techniques such as adaptive fuzzy sliding (AFS) control and adaptive fuzzy back stepping (AFBS). The research is conducted utilizing a software known as MATLAB/ Simulink [1].

The growth of artificial intelligence (AI) has made new things possible in how we use energy at home. Now, consumers can join programs that give them more control over their energy use. Demand-side flexibility is when a person changes how much energy they use based on how much it costs or if there are bonuses for using less energy. The process relies on the energy company and the customer talking to each other and the customer being willing to use less electricity. The different DSF approaches work well when we can estimate how often appliances are used. Patterns and AI methods are a good solution [2].

This study examines new ways in which artificial intelligence can be applied to diagnose issues with electrical machines and drives. The central theme of this passage is the combined application of expert systems, artificial neural networks, and fuzzy logic systems. They can all be combined and work with each other. Older methods or ways of doing things. Genetic algorithms are also being used. In most cases, a diagnostic test begins by making a fault tree based on how the electrical system works. In this stage, it's important to have good models that can simulate the electrical machine in different problem situations [3].

The focus of this paper is on the application of AI within power electronic systems. The three main parts of a product's life, planning, managing, and upkeep, are connected to certain jobs that AI can help with, like making things better, putting things in categories, estimating, and looking at how information is organized. We talk about four types of AI applications: expert system, fuzzy logic, metaheuristic method, and machine learning. Researchers have looked at over 500 articles to find out what people generally understand about using artificial intelligence for power electronics, what problems they face when trying to use it, and what research still needs to be done in this area. This document comes with a file in Excel that has a list of the important publications for statistical analysis [4].



## CONCLUSION

Artificial intelligence has had a significant impact on the field of Electrical Engineering. There have been many advantageous developments and possibilities for people in this field. Nevertheless, there are challenges that require resolution in order to guarantee the safe and effective implementation of AI in electrical systems. It is of great significance to constantly examine and generate innovative concepts in this domain, as it significantly contributes to the advancement of Electrical Engineering and the establishment of sustainable and efficient electrical systems.

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