Vector Control of Electric Machines and Drives by using Artificial Neural Networks

THE UNIVERSITY OF ALABAMA | Research & Economic Development
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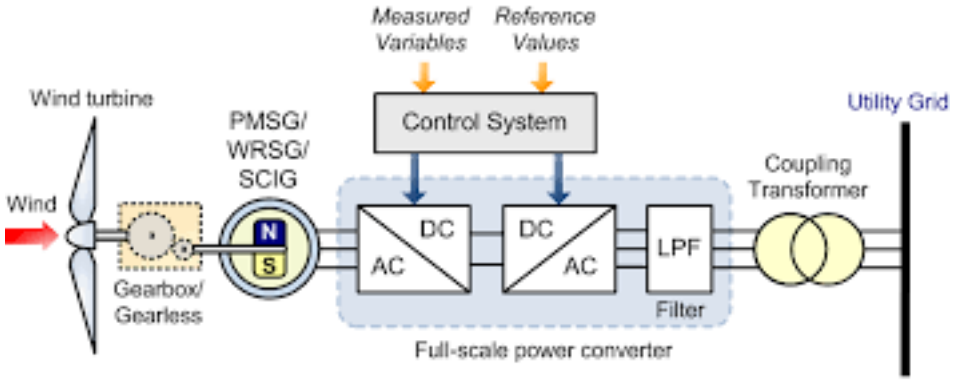
The Problem:

Traditional methods of using only vector control methods have shown limitations in adapting to varying power supply demand situations – especially if the PMSM is powered by wind or other natural energy sources. In additional, vector control technologies such as proportional-integral-derivative (PID) have shown inability to adequately handle uncertainties in the power grid to which the PMSM may be connected, resulting in inefficient, unstable, or unreliable power generation.

The Solution:

Researchers at The University of Alabama have developed an invention using neural networks to control electric machines and motor drives to obtain enhanced performance, reliability, and efficiency. In this invention, focus is on providing a neural network vector control system that is connected to the converter part of the PMSM. The neural network part of this system that is able to actively determine the necessary voltage and current inputs required to ensure that the electric machine is operating in the most optimal manner possible.



Configuration of an AC machine in PMSG wind turbine

Benefits:

- Neural network based on dynamic programming to implement optimal control principle
- Training neural network vector controllers for variable parameters and variable speed conditions
- More efficient, stable, and reliable than current technology

INVENTOR

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Dr. Li received his Ph.D. in Electrical and Computer Engineering from Texas Tech in 1999.

He is also involved with the Center for Advanced Vehicle Technologies.

His research interests include:

– Power electronics

– Power systems

– Renewable energy

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