

ANN based Maximum Power Point Tracker for a Standalone PV System - Rohitha Kurdikeri & Apeksha N Patil

About the speaker

I'm Rohitha B Kurdikeri, final year student(E&E) studying in B.V.Bhoomaraddi College of Engineering & Technology,Hubballi-580031,Karnataka,India. I use Python for scientific computing and also to develop newer techniques to solve problems related to electrical aspects. My aim is to learn & explore more about Python & also would like to contribute to this open-source platform.

Abstract

- 1)We are using an Artificial Neural Network(ANN) for maximum power point tracking using TensorFlow.
- 2)Standalone PV system has been mathematically modelled and simulated using SciPy.
- 3)Training data was taken from experimental results carried out on solar panels mounted on roof top.
- 4)The complete working of the system is analysed and simulated using Python stack.

Solar being an intermittent source of renewable energy, it is important to completely utilize the available free resource in a systematic way. Therefore, we implement maximum power point tracking controllers in order to save energy & improve efficiency of the system.

PV panel output is connected to a boost type dc-dc converter which feeds a load. The power delivered by the PV array depends on the duty cycle of dc-dc converter and load. It is known that the power output of PV panel varies with solar radiation, ambient temperature and solar cell temperature. Taking these conditions into account, ANN based model is developed which takes input as solar insolation (radiance) and gives duty cycle as the output which acts as the control signal to the boost converter so as to draw maximum power from PV array.

Accordingly, the dc-dc converter draws maximum power from the PV panel. The results obtained from the ANN model are fed to the boost dc-dc converter so as to track maximum power from PV array.

Learning outcomes:

- 1)Simulation of Boost converter involves solution of simultaneous differential equations which is implemented using ODE solver available in SciPy module.
- 2)Feed Forward Neural Network model is used to implement MPPT controller for PV array using TensorFlow library.
- 3)Graphical results are obtained using Matplotlib.
- 4)The complete mathematic model representing PV array feeding a boost converter with MPPT controller is analysed using Python.
- 5)Hence, Python is successfully used for scientific computing involving simulation of a standalone photovoltaic system.