Modeling and Simulation of Solar Photovoltaic Systems

A Course to provide a coherent and structured presentation of the fundamentals of solar photovoltaic system.

Course Code: EE-7706
Credit Hours: 3

Pre-requisite:
Undergraduate course in Power Electronics or consent of the instructor.

Target Audience
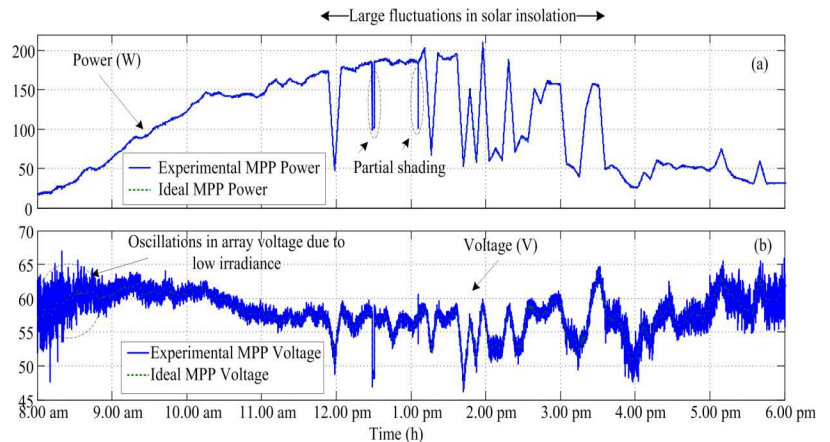MS/Ph.D students wishing to pursue research in the areas of solar PV system.

Figure: Experimental and the Ideal MPP results for a typical tropic country profile. (a) MPP power. (b) MPP voltage

Synopsis:

Solar energy is envisaged to gain substantial share of the future energy balance due to the depleting sources of fossil fuel and concerns over the environment. Photovoltaic (PV) power system is a popular renewable energy source due to due to several advantages, notably low operational cost, almost maintenance free and environmentally friendly. The main component of the system, i.e. the PV module utilizes standard semiconductor processes that can be fabricated with relatively minimum facilities. Furthermore, the power converters (DC-DC converter and/or inverter) that interface the modules with the grid or batteries are well established technologies. Despite the high installation cost, large PV systems have been commercialized in many countries due to its potential long term benefits. Furthermore, generous financial schemes, for example the feed in tariff and subsidized policies, have been introduced to by various countries, resulting in rapid growth of the industry.

Instructor:

The course will be taught by Dr. Kashif Ishaque (kashif.ishaque(*at*)pafkiet.edu.pk). **Dr. Kashif Ishaque** received his B.E. in Industrial Electronics Engineering from Institute of Industrial Electronics Engineering, NEDUET, Karachi, Pakistan, in 2007, Master of Engineering science and PhD from Universiti Teknologi Malaysia in 2009 and 2012 respectively.

Dr. Kashif is the author and co-author of more than 30 publications in international journals and proceedings. His research interests include photovoltaic modelling and MPPT control, intelligent control, nonlinear systems control and application of optimization techniques such as genetic algorithm (GA), particle swarm optimization (PSO) and differential evolution (DE).

Recommended Books:

- *Modeling Photovoltaic Systems Using PSPICE ----- Luis Castaner and Santiago Silvestre 2002 John Wiley & Sons Ltd.*
- *Applied Photovoltaics - - - S.R. Wenham, M.A. Green, M.E. Watt and R. Corkish ARC Centre for Advanced Silicon Photovoltaics and Photonics, 2007.*