My research plan for the master's program

Suresh Kumar Gadi

FIME-UT, UAdeC

20^{th} December 2016

Overview

1. Independent research
   - Some of the emerging research topics
     - Maximum Power Point Tracking (MPPT)
     - Hybrid renewable energy systems (HRES)
   - Recommended student profile for the admission
   - Compulsory courses required for the master program
   - Optional courses required for the master program
   - Target journals
2. Research support
   - Examples
     - Automation of a process
     - Statistical and numerical analysis
   - Recommended student profile for the admission
   - Compulsory courses required for the master program
   - Optional courses required for the master program

Examples of independent research topics

- Maximum Power Point Tracking (MPPT)
- Hybrid power supplies

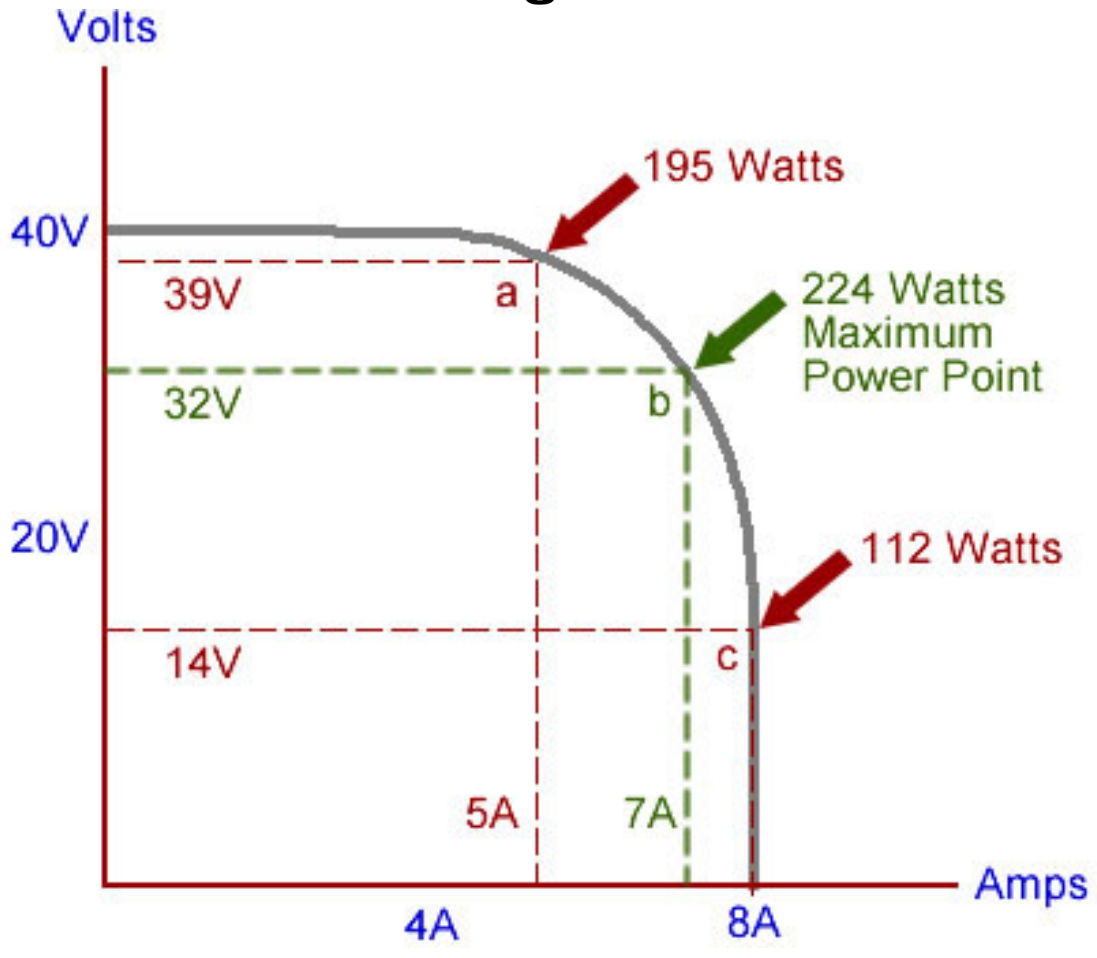
Maximum Power Point Tracking (MPPT) I

Problem statement

The renewable energy sources are not constant. MPPT is a controller, usually an electronic circuit implementing an algorithm to extract the maximum possible power from the renewable energy source at all the times.

Maximum Power Point Tracking (MPPT) II

Defining MPPT

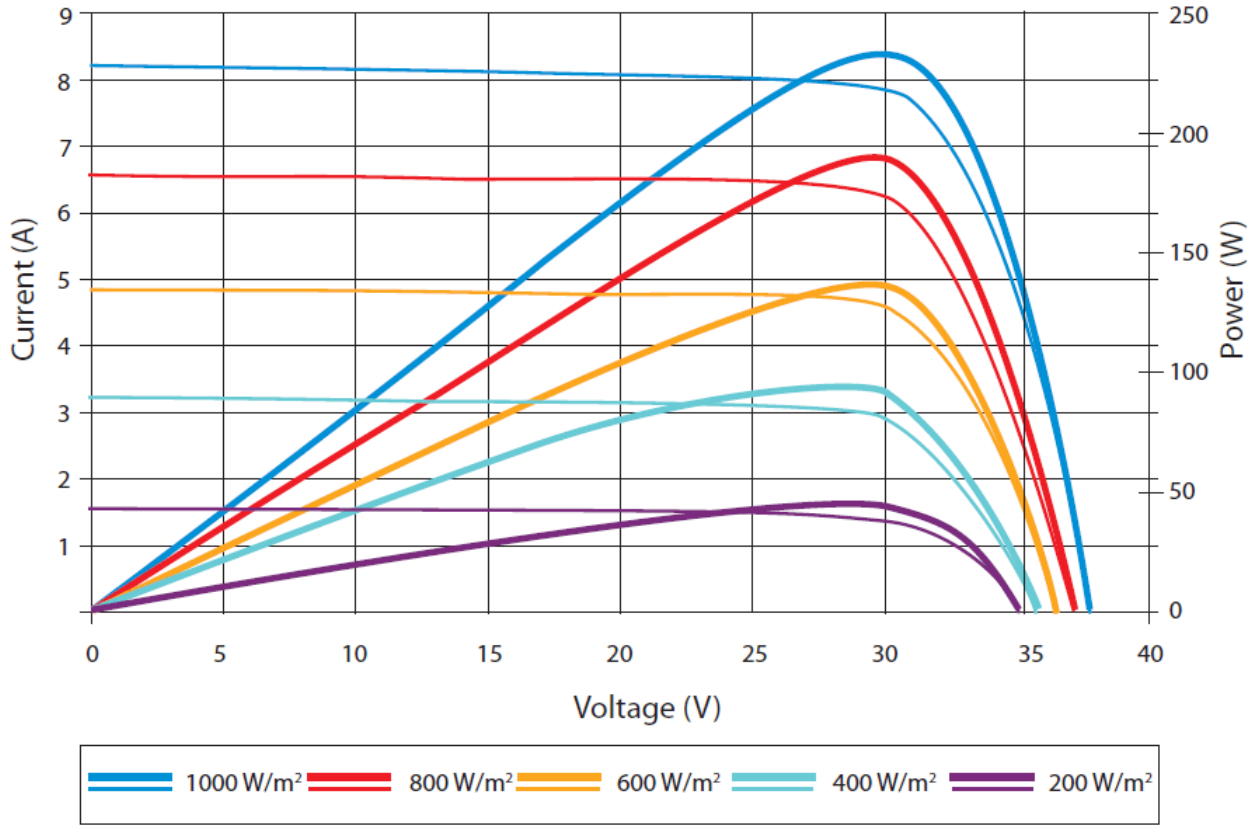


VI (Voltage-current) curve of a battery.

Maximum Power Point Tracking (MPPT) III

MPPT application to the photovoltaic (PV) cells

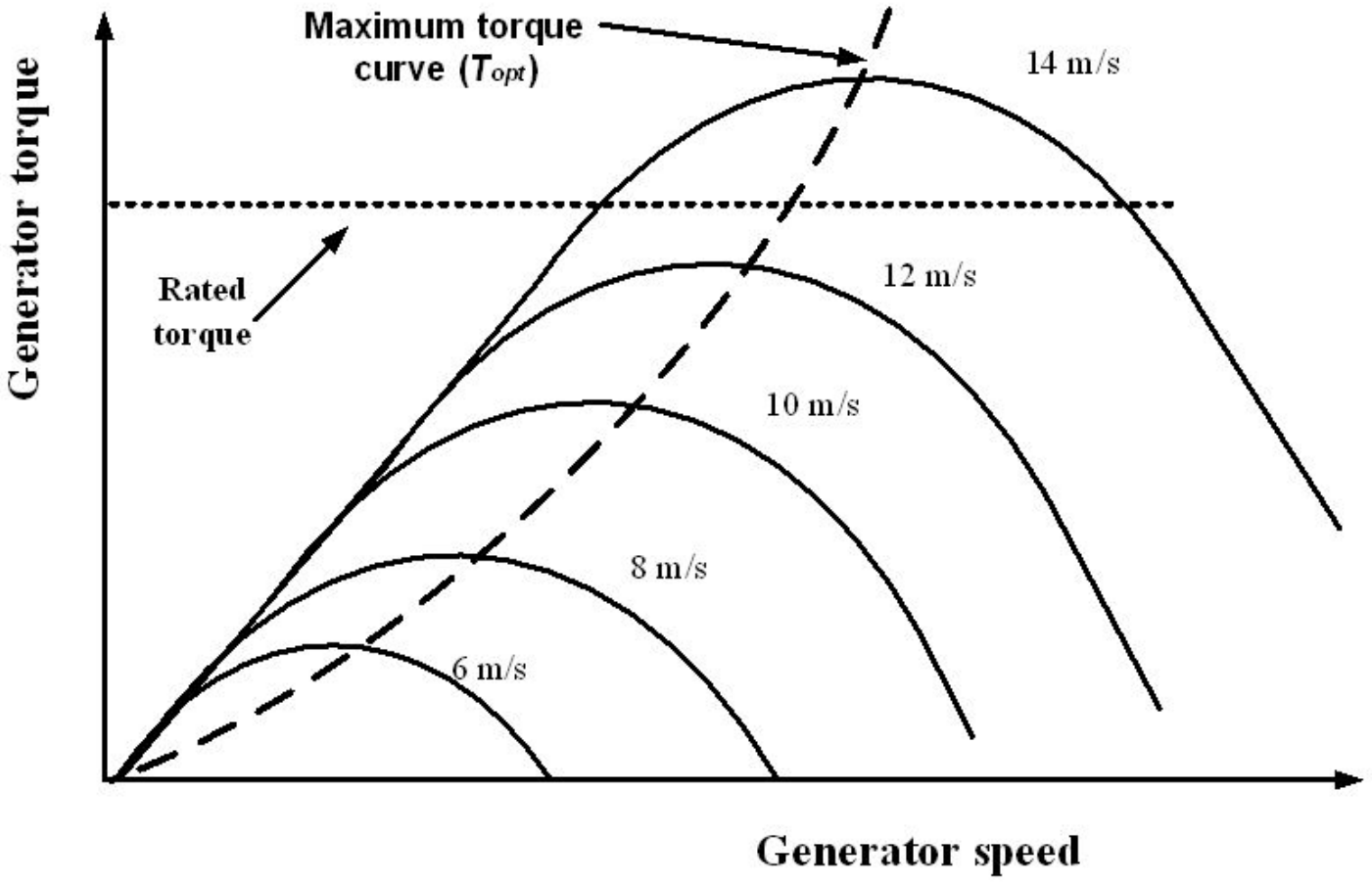
Current-Voltage & Power-Voltage Curve(230-20)



PV current vs voltage curve at the various solar intensity.

Maximum Power Point Tracking (MPPT) IV

MPPT application to wind mills



Generator speed vs torque curve at the various wind speeds.

Hybrid renewable energy systems (HRES) I

Problem statement

- Providing the solutions to grid independent renewable energy sources.
- Selection of capacity of each power source.
- Optimized switching between different power sources.

Recommended student profile for the admission

- Sciences: Basics of differential equations, basic classical physics
- Technology: Basic analog and digital electronics, control systems
- Computer knowledge: At least one programming language

Compulsory courses required for the master program

- Courses: Advanced engineering mathematics, linear systems, linear algebra, mathematical modeling,
- Seminars: MatLab, real-time systems

Optional courses required for the master program

- Courses: Nonlinear systems, stochastic systems, adaptive control
- Seminars: C/C++, Python

Target journals

Journal	**I.P.**	**Review time**
Renewable and Sustainable Energy Reviews	7	1-2 years
IEEE Transaction on Industry Application	1.9	>1
Applied Energy	5	≈ 1
Solar Energy	3.7	>1

Examples of research support

- Automation of a process
- Statistical and numerical analysis

Automation of a process

Examples

- Building a custom signal conditioner circuit.
- Process control, i.e. Controlling flow rate, temperature etc.
- Custom made experimental setup.

Statistical and numerical analysis

Examples

- Developing a computer program for organizing, collecting and processing data.
- Compliment the experimental results by help with the mathematical part of the article to speed up the writing process.

Recommended student profile for the admission

Depending on the student's selected work, some of the following are required.

- Sciences: Basics of differential equations, basic classical physics
- Technology: Basic analog and digital electronics
- Computer knowledge: At least one programming language

Compulsory courses required for the master program

Depending on the student's selected work, some of the following are required.

- Courses: linear algebra, mathematical modeling
- Seminars: MatLab, real-time systems

Optional courses required for the master program

Depending on the student's selected work, some of the following are required.

- Courses: Nonlinear systems, stochastic systems, adaptive control
- Seminars: C/C++, Python

Questions?

Thank you for your attention.