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Electrical engineering department
Senior student graduation project 2018
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Control the hybrid (wind-solar) electric power system using microcontroller

1. Introduction

According to statistics made in recent years, it is found that almost 33% of the world‘s populations do not have access to electricity. Most of the non-electrified regions are found in developing countries. These regions can be electrified either by extending the grids of the existing power systems or by constructing isolated new power systems, which are alternative energy sources. In general, it is preferred to go for the extension of the existing grids but they are not always affordable the fact that most of the non-electrified regions in developing countries are located in remote and difficult areas, like hilly regions, forests, deserts and islands, which demand huge investment for grid extension.

Hybrid PV/ Wind power generation systems are becoming prevalent options for the power supply of small electrical loads at remote locations or for isolated grids. With the complementary characteristics between solar and wind energy resources for certain locations, hybrid PV/Wind power generation systems offer a highly reliable source of power.

Most previous studies for hybrid PV/Wind systems were focused mainly on local feasibility analysis. Yet, system stability, control and reliability analysis play an important role in practical application of hybrid systems. Therefore, this project develops a methodology for investigating the characteristics of hybrid PV/Wind power generation systems by applying simulation modeling and real time implementation.

2. Problem Statement

In the present scenario standalone solar photovoltaic or wind systems have been promoted around the globe on a comparatively larger scale. The independent systems of wind only or solar only cannot provide continuous source of energy, as they are seasonal.

The solar and wind energies are complement in nature. By integrating and optimizing the solar photovoltaic and wind systems, the reliability of the systems can be improved.

3. Motivation

A hybrid power system has the ability to provide 24-hour grid quality electricity to the load. This system offers a better efficiency, flexibility of planning and environmental benefits compared to the diesel generator isolated system. The maintenance costs of diesel generators can be decreased as a consequence of improving the efficiency of operation and reducing the operational time which also means less fuel usage. The system also gives the opportunity for expanding its capacity in order to cope with the increasing demand in the future.

4. Objectives

The main objective of this work is:

1. To construct a PV/Wind hybrid system for an isolated network and study the impact of rejecting or inserting anyone of the power sources.
2. To design a smart switching circuit for the overall system control.

5. Methodology

Various software programs are used in this project:

1. ETAP Software.
2. Code Vision Compiler.
3. Proteus Simulator.

6. Student recruitment strategy:

One group of excellent or very good level

Good luck