

## Graduation Design Project Proposal Form

### Project # P1

<b>Project Title:</b> Faults Assessment in Solar PV array by simulation and experiment.
<b>Professor(s) Name(s):</b> 1.Dr. Wonsuk Ko    2. Dr.Essam Al-Ammar
<b>Number of Students:</b> Two
<b>Students Qualifications</b> Students should have good background in PV modeling and MATLB.
<b>Statement of Problem</b>  Due to the advantages of this source of energy, and the increase of the electricity demand, Photovoltaic (PV) system capacity has been increased. But there are faults in the PV field such as short circuiting of a module, a disconnection with open circuiting of a module, short circuiting of a bypass diode, an increased contact serial resistance. For these reasons, fault detection and localization methods in PV systems are needed to increase reliability, efficiency and safety in PV systems. Numerous diagnosis techniques are proposed in the literature. In this project, we are going to simulate a simple detecting and localizing of fault occurring in photovoltaic arrays. The designed technique is based on the analysis of the anomalies in the I-V characteristic.
<b>Brief Description of the Project</b>  This project investigates a fault diagnosis technique for a photovoltaic string, based on the I-V characteristic analysis. Simulated data (I-V characteristics) will be used to validate the fault diagnosis technique. In this project, various fault cases will be considered and classified. The objective of proposed project is to study modelling PV array and understand fault signal analysis. After understanding PV fault case, experiment is required using real solar panel.
<b>Objectives</b>  <ol style="list-style-type: none"><li>(1) Understanding PV Principle</li><li>(2) Modelling of PV array</li><li>(3) Understanding fault detection and diagnosis</li><li>(4) Simulating suggested PV model and fault case.</li><li>(5) Demonstrating result.</li><li>(6) Experiment using real solar panel</li></ol>
<b>Technical Approach and Expected Deliverables</b>  <ul style="list-style-type: none"><li>● Literature search of the fault analysis in Solar PV array under project</li><li>● Modeling PV array using Software.</li><li>● Carry out Simulation using MATLAB or similar tool</li><li>● Report with simulated results and discussion</li><li>● Report with experiment results and discussion</li></ul>

## Project # P2

<b>Project Title:</b>	Design of Energy Management System for King Saud University Buildings and Facilities
<b>Professors Names:</b>	1. Abdullah M. Al-Shaalan 2. Osama Khaled
<b>Statement of Problem:</b>	<p>Energy Management means ways, methods and strategies for better energy utilisation, optimization and conservation. Energy Management constitute a serious concern for large consumers, big buildings and wide-infrastructures who depend heavily on a continuous and reliable flow of large quantities of energy supply.</p> <p>This project provides measures and recommendations for the design and sound management strategies for optimizing and efficient utilization of electric energy at King Saud University (KSU) campus.</p> <p>It introduces requirements and recommendations for the design of an electrical energy consumption within the framework of an energy efficiency management approach to achieve the best permanent functionality of electric service based on the lowest electrical energy tariff, acceptable energy availability and economic saving.</p> <p>These requirements and recommendations apply, to all facilities in the KSU comprising colleges, laboratories, mosques, libraries, housing, hospital and recreational areas, etc.</p>
<b>Brief Description of the Project</b>	<p>In this project, methods to design an energy management system will be dealt with by various sides as follows:</p> <ol style="list-style-type: none"><li>1) "Energy Manager" position will be created to monitor electric energy consumption at the university and to propose programs and means to achieve energy conservation at all university facilities. In this regard, a coordination can be established with university services department.</li><li>2) Reviewing the monthly consumption bill for the KSU to analyze it and examine the reasons that may lead to its increase, if any, and suggest procedures, methods and techniques that would reduce the size of the monthly bill.</li><li>3) Conducting an "energy audit" process for the KSU buildings and facilities to identify the sources of waste in electricity consumption, if any, and to implement programs that would reduce that waste to the lowest possible extent, and thus, reduce the monthly consumption bill, such as conducting studies to modify control systems in air conditioning and lighting devices so that only the part to be operated is controlled, and low-efficiency electrical appliances are replaced with high-efficiency ones.</li><li>4) Take advantage of modern technologies such as solar energy that can have a major role in reducing electrical energy consumption.</li></ol>
<b>Objectives</b>	<p>There are several objectives that can be achieved from this project and can be summarized as follows:</p> <ol style="list-style-type: none"><li>1) Reduction of energy consumption at the KSU based on optimal and efficient and economic management strategies.</li><li>2) Keeping good quality, efficient and reliable performance for the electric energy in all the KSU campus buildings and facilities.</li><li>3) Mitigating the losses and costs imposed by energy waste and non-efficient appliances and equipment operated in the KSU.</li></ol>
<b>Technical Approach and Expected Deliverables</b>	<p>The technical approach of this project will be executed through the following aspects:</p> <ol style="list-style-type: none"><li>1) Design an Energy Management system in the KSU campus to observe and audit energy consumption in order to optimize its consumption and reduce its abuse and waste.</li><li>2) Installing photovoltaic renewable energy sources to mitigate depending on the conventional electricity sources.</li><li>3) Recommendations based on the results and conclusions attained at the project completion.</li></ol>