

## Graduation Design Project Proposal Form

### Project # 1

<b>Project Title:</b> Design and Installation of a stand-alone Photovoltaic Power Supply for a parking lot at SASO premises in conjunction with the Saudi Vision 2030
<b>Professor(s) Name(s):</b> Professor Abdulrahman M. Alamoud
<b>Number of Students:</b> Two
<b>Students Qualifications:</b> EE404
<b>Statement of Problem:</b> The Saudi vision 2030 has opened the door widely to the spread of photovoltaic applications in Saudi Arabia. The vision plan is to install 9.5 GW of renewables in Saudi Arabia by the year 2023. This is coupled with Saudi Arabia's large area and high concentration of solar energy makes it ideal for a vast number of applications such as generating electricity for home use, parking lots, mobile phone towers, road signs, roads emergency phones, mobile military forces (army, national guard, and border guard), medical ambulances, and oil pipe lines cathodic protection to name but a few. As such there is a need for a stand-alone photovoltaic (PV) electric generator for use in remote locations where the grid system is not available. The PV system could be stationary, installed on a fixed site or mobile, installed on a vehicle.
<b>Brief Description of the Project:</b> The project is intended to teach students how to design a photovoltaic (PV) system and give them hands-on experience of constructing a stand-alone PV system for multiple uses. The work will involve the disciplines of electronics, solar radiation, solar cells, photovoltaic electric system design, and review of relevant PV standards. A team of two students will work on the design and installation of 1-5 kW PV system.
<b>Objectives:</b> The design objectives are as follows: <ol style="list-style-type: none"><li>1. To put to use theory and tools the students acquired in previous electronic courses such as EE404.</li><li>2. To acquire experience in the design of a photovoltaic electric system.</li><li>3. To implement their design in practical stand-alone PV electric generator to be used in parking lot.</li><li>4. To familiarize the students with relevant PV standards and the important role of SASO.</li></ol>
<b>Technical Approach and Expected Deliverables:</b> The work will involve two phases covering one semester each. In the first semester the students will learn PV system design techniques. They will then design a suitable stand-alone PV system to be installed on the roof of a parking lot at SASO. The students will take into account, in their PV design, the realistic constraints such as economic factors, safety, reliability, aesthetics, ethics and social impact. In the second semester, the students will work on the implementation of a small-scale PV system of their design. They will start with procurement of the project hardware: PV modules, inverter, batteries, circuit breakers, switches, and cables and wires. The system will be designed so that it completely covers the roof of the parking lot. Testing of the constructed PV system will commence to ensure a practical performance of their design. If the PV system performance is not found to be working properly, design fine tuning will be made. The expected deliverable is a small PV electric generator matching the available space and budget. SASO may provide financial support to the project.