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Electrical Power Analysis of Power Generation, Conversion and Utilization with Engineer Aspects and Tools

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Abstract:

Electrical power plays a key role for the human society development. In fact, the electrical energy possesses the distinct merits of high efficiency, high reliability, cost-effectiveness, clean and friendly properties for end users. Moreover, most of other types of energy sources, such as fossil

fuels, wind power, etc., can be transferred to the electrical energy for usage. In this way, the energy efficiency and flexibility will be much more appreciated. So, the whole process of electrical power generation, conversion, transmission and utilization, can reveal the essentials

and properties of electrical energy. Although in SEE, there are the common physics and electrical power related courses, such as SEE2001 and SEE3102 (both taught by the PI), the students have few chance to learn more about the each process of the electrical power in-depth and extensively.

Hence, this proposal aims to provide the in-depth and extensively learning probability for the students to strengthen their knowledge with the related undergraduate (UG) curriculum. Inspecific, the proposal will create an onsite lab teaching and learning modules for UG students,

which mainly focuses on the electric power analysis of the whole electrical energy generation, conversion, transmission and utilization. The key is to offer three modules for students learning and practicing, including the dual electric motor drive testbed module for demonstrating the power generation, conversion and utilization, the wireless power transfer (WPT) platform module for demonstrating the power transmission and utilization, and the power analysis module for the electrical devices and equipments study. In particular, the target UG students will be those UG students attending courses of taught by the PI (SEE2001 electromagnetic principles of energy engineers and SEE3102 power plant engineering), and other UG students who are interested in electrical and electronic engineering for their projects and competitions. In this way, through the course-lab-teaching based discovery-enriched curriculum (DEC) modules, these students can build a clear and extensive knowledge for electrical energy application and power analysis. Thus, some of them can form different teams with the electrical energy related projects for attending some competitions.