



## Senior Design Project Proposal

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### 1. Project Title: **FPGAControl 1: FPGA assisted control of the direct torque of induction motor drives**

#### 2. Project Description:

Typical DC-DC converters are controlled by analog circuitry. However, they can also be controlled by FPGA-based circuits. Such an approach has the advantage of flexibility offered by FPGAs. FPGA-based solutions can be easily reconfigured with improved or different controlling techniques.

The goal of this project is to develop a design methodology for FPGA-based control circuits with application to systems from power electronics. This methodology will utilize an existing FPGA development board. The target application is the direct torque control for induction motor drives.

#### 3. Project Design Objectives:

The following are the main steps.

1. Reading and summarizing articles related to this topic. Identification of the main steps of the proposed methodology. This is closely related to the identification of the tools (Matlab/Simulink, Xilinx or Altera CAD tools) utilized in each step.
2. Application of all steps of the design methodology to implement the direct torque control for induction motor drives. Testing and verification.
3. Once the methodology is refined we will develop solutions and apply the proposed methodology to other applications as well.
4. Maintain a project website.

#### 4. Project Prerequisites:

At least a student of this group must have taken one or more of the following courses: ECE-375, ECE-331, and ECE-437. Experience with programming in Matlab/Simulink and VHDL/Verilog. Basics of power systems and power electronics. Familiarity with digital design and FPGAs.

Most importantly, students should be self-motivated to learn new interdisciplinary approaches that bridge knowledge and skills from power systems, power electronics, control, digital design, and FPGA development boards.