AIMS^2 Research Project in the Electrical and Computer Engineering Department

Research Duration:	Summer 2019 (June – August 2019)
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Title of Project:	Electric Speed Drives and Environment: Goals and Objectives of the Project, Expectations and Outcomes

Goals and Objectives of the Project, Expectations and Outcomes

Project: Electric Speed Drives (ESD) or Variable Speed Drives (VSD) are at the forefront of electric transportation. Companies such as Tesla, Nikola, GM, among others are developing and improving their electric vehicles and targeting heavy transportation such as semi-trucks, commercial buses. Aviation, marine, rail, pipeline and military which account for 20% of primary energy use [1]. There is a considerable impact of such technologies on the environment. The cost of these technologies is in the billions of dollars and they create thousands of jobs. For example, Anheuser-Bush will buy form Nikola 800 semi-truck, hydrogen fuel powered with a 320 KWH battery system. Nikola will build 28 hydrogen fuel stations. We also know that the City of LA bought 100 BMW electric vehicles. This project will focus on understanding VSD and their impact on the environment. In this project, we will learn and research the fundamentals of ESD, DC, BLDC and IM motors applied to ESD. In addition, students will research the different methods of motor speed control, mainly BLDC and IM. Finally, students will research the impact of electric transportation in the environment. Goals and Objectives: The goals of this project is to introduce students into basic research related to electric speed drives and its effect in the environment:1. Developing skills for finding and reviewing technical papers. 2. Understanding fundamentals of VSD and their environmental impact. 3. Understanding fundamental analysis and modeling of

electric machines (DC, Induction, BLDC, Synchronous motors and their speed control) 4.

Developing skills for conducting analysis using Simulink/Matlab 5. Conducting comparative analysis of different energy supplies (Fuel Cell, Batteries, Hydrogen, etc.)

Expectations and Outcomes:
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- Learn the fundamentals of database research (IEEE, ELSEVIER, etc.)
- Preparing a poster
- Presentation of their findings
- Polishing communication skills (i.e.ppt, word report, presentation, learn research skills.)
- Critical thinking.
- Time management.
- Ethics in engineering
- Team work

We expect from students to work at least 10 hours a week as a team in a laboratory (a lab space will be provided), a weekly meeting with the advisor (mandatory). We expect responsibility, TEAM WORK, maturity, effort (lots of it) and achieve the deliverables shown above (i.e. poster, ppt, etc).

[1] "Electrification Futures Study." NREL, Paige Jadun, Colin McMillan, Daniel Steinberg, Mateo Muratori, Laura Vimmerstedt, Trieu Mai. Golden Colorado, 2017