2016 - Senior Design Project Proposal

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Preferred students: 2 MECH + 4 ECE

1. Title: SolarMarq: Designing and prototyping the foundation of a new one-person solar car

2. Description:

The goal of this project is to design the foundation of a new solar car, SolarMarq, which will be used to participate in solar car competitions. This will represent the initial platform on top of which a complete competition-ready one-person solar car will be developed by future design project teams. As such, this initial foundation must be designed with modularity and extendability in mind. In this initial phase, we will focus on three main components: the basic mechanical frame, the solar array with batteries and power converter, and the electric motors with related controls. We will look into re-using components such as batteries from the eLimo project.

3. Design Objectives:

The following are the main steps.

1. Design the mechanical frame, steering, and break system. Optimize for weight, aerodynamics, simplicity, and cost. Students: two mechanical engineering students.
2. Design the solar array subsystem comprised of PV arrays, power converters, and energy storage (batteries). Students: two electrical/computer engineering students.
3. Design the electric motors subsystem and related controls. Students: two electrical/computer engineering students.
4. System integration and preliminary testing for proof of concept.
5. Maintain a project website.

4. Project Prerequisites:

Experience with designing/working with mechanical parts of a car. Familiarity with PV arrays and power electronics, embedded systems, and CAD tools, such as Spice simulators and Matlab/Simulink. Basics of DC motors and electronic speed controllers.
Most importantly, students should be self-motivated to learn new interdisciplinary approaches that bridge knowledge and skills from mechanical engineering, power electronics, embedded systems, DC motors, simulations, and system integration.

5. Customer and Adviser:

Customer: prof. Cris Ababei
Adviser: prof. Cris Ababei