Name:______________________________________________

Area of Specialization:_______________________________

EMAIL Address:_____________________________________

PREFERENCES:
Using the attached numbered list of projects list your project preferences, using the project numbers, in order from A (first choice) to D (last choice).

A  B  C  D

QUALIFICATIONS:
On a single page, give up to four bullets for each project you specified, listing your primary experiences and background that you believe qualify you to work on these projects you selected.

PROCEDURE:
Turn in this cover sheet along with your list of qualifications for each project shown above to Barbara in ES202 not later than noon of Wednesday, August 21. Your Preferences and Qualifications will be considered by the Organizing Committee when making team and project assignments prior to the second day of class.
Capstone Design Project Summaries: Fall 2013

These are very brief descriptions of project concepts and ideas which do not necessarily have substantial detail specified. You should expect clarification as well as expansion of these ideas once projects are assigned.

1. **Mercury Remote Robot Challenge – Prototype Project**

The robot should be capable of competing in the Mercury Remote Robot Challenge 2014. The rules of the competition can be found at: [mercury.okstate.edu](http://mercury.okstate.edu)

A summary of the project is:

Design and build a robot that can:
1) Be controlled from a distance in excess of 50 miles;
2) Traverse a path from Start to Finish;
3) Capture a load, transport it over a bridge and deliver it to the destination;
4) Maintain two way communications with the operator;
5) Capable of recognizing a "loss of signal" condition and act accordingly.

The robot may have optional on board sensors. The project will therefore have to deal with long range communications, mechanical and electrical design as well as software. Note that the "capture", "transport" and "deposit" actions are new for the 2014 event. The students would have access to the "mercury Robotics" student organization to help them in all the aspects of the project.

2. **Wireless Energy Harvesting Design – Prototype Project**

Students are required to design, construct, measure, and demonstrate a wireless energy harvester capable of driving a small electronic device (output power > 10Watts). This project will introduce students to the concept and implementation of efficient wireless energy harvesting. A schematic of the harvester is required. Harvesting efficiency (as attached: SDC-WEHD Wireless Energy Harvesting Design) and novelty of the design will be the leading criteria in selecting the winning design.

3. **LED Dimmer Circuit – Prototype Project**

Aero-Tec Industries, Inc. is a manufacturer of backlit display panels that are used primarily in the cockpits of various aircraft. Aero-Tec’s clients are requesting that the incandescent lamps used in these panels be replaced with LEDs. The goal of this project would be to design and build a circuit to control surface-mount LEDs and cause their dimming curve to emulate that of incandescent lamps.

The following guidelines apply:

- The panels are connected to a dimmer control that reduces applied voltage to accomplish dimming.
- A secondary source of power that is not varying in voltage is not available.
- The input voltage will be 0 to 5 or 0 to 28 volts AC or DC. It may be acceptable to design a separate circuit for each of the four possible inputs (i.e. 5Vac, 5Vdc, 28Vac, and 28Vdc).
- On the 28 volt systems the light output goes to zero at 12 volts. On the 5 volt systems the light output goes to zero at around 2 volts. (So the board must operate at voltages as low as 2 volts.)
- In some scenarios a panel illuminated with LEDs could be placed in the midst of panels illuminated with incandescent bulbs, so the dimming profiles must match.
- Each circuit will power multiple LEDs.
- All components must be surface mount components and cannot raise more than 0.156 inches above the surface of the circuit board.

4. NATCAR – Prototype Project

Natcar is a design contest created by UC Davis and National Semiconductor and run in conjunction with UC Berkeley. It is currently sponsored by Texas Instruments. Teams design, build and race autonomous cars on a track marked by 1”-wide white tape. In addition, there is a wire under the tape that has a 100 mA_{RMS} 75 kHz sinusoidal current flowing in it.

The rules of the competition can be found at: [http://www.ece.ucdavis.edu/natcar/](http://www.ece.ucdavis.edu/natcar/)

5. A Grid Eye sensor – Prototype Project

**Problem Description:** Home automation provides safety and comfort for elderly in their homes. Localization of elderly inside the smart home environment plays an important role in home automation. Hence the main objective of this project is to localize the elderly using a Grid Eye sensor, which is an array IR sensor. The location information will be then transmitted to a computer as well as to a mobile device such as a smart phone or tablet computer.

**Description of Sensor:** Grid Eye sensor is a thermal array sensor from Panasonic that contain a 64 thermopile elements in 8x8 grid format. This sensor is capable of simultaneously detecting the direction of moving objects and the presence of motionless object. Complete details of the sensor can be found in the reference links below.

**Tasks:** Using the sensor we can determine the exact location of the elderly inside home. The sensor can be placed on the ceiling as shown in the figure to the right for detecting the elderly.

Human motion can be tracked and recorded on a microcontroller, then transmitted to a computer through wireless communication. Users can also use their mobile devices to find the location of an elderly in his/her home.
The major tasks of the project involve: 1) Using the Grid Eye sensor to build a circuit board and connect it to a microcontroller. 2) Using the microcontroller to read the data from the sensor and transmit the data wirelessly to a computer. 3) Developing the user interface software to display the human location on a computer and a mobile device.

References: