Senior Design Project Topics

Briefs

EECE401 Senior Design I

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Design Project Topics (Brief)

- Intel
  - –Design Challenge Problem in WiMAX
- Honeywell
  - –Low Cost LunaSat Attitude Design and Control
- San Diego Gas & Electric
  - –Smartgrid/Microgrid performance simulation
- Tacoma Power
  - –Demand Response with Smart Meter
- National Institute for Nano Engineering (NINE) Project
  - –Self-Powered Ferroelectric Nano-sensor
- IEEE mini-Grants
  - –Senior Design Project with Industry Standards Components

Note that more detailed version of this subject comes soon.

Intel's Design Challenge Project

- WiMAX (Worldwide Interoperability for Microwave Access)
- 3 Mbit/s broadband speed without the need for cables
- Based on the IEEE 802.16 standard (also called "Broadband Wireless Access").
- Part of Design Challenge Competition between HU and NCA&T
- "Predictive WiMAX Characterization and Variance Mitigation Based on Real World Deterministic Field Testing, Simulation, and Modeling"
- WiMAX Performance Problem:
  - Quantification of performance and behavior of radio devices
  - Quantifiable methods for understanding the performance under shifting conditions that impact RF performance in the field
- Deliverables
  - Data collection and analysis of system performance
  - Recommendations and Solutions for Cellular Deployment
- Program Requirements:
  - Real world radio performance
  - Modeling and Simulation
- Current Status at HU
  - HU faculty mentors
    - Dr. John Trimble (Manager) and Dr. Charles Kim (Co-Manag
    - Several students in SYCS and ECE are joining the HU team
  - Senior Design Class
    - 3 students would be selected
    - The 3-student, with help of other students, lead the design and be responsible for completion (no matter what others say)
- External Project Manager
  - Dr. John Trimble
  - An Intel Appointee

SDG&E's Smart Grid/Micro Grid Project

- **Background**
  - Smart Grid
  - Pilot Micro Grid Project
  - Information based technologies and distributed energy resources
  - Smart Meters and AMI
  - Grid-scale battery storage and homes equipped with networked energy-saving devices
- **Problem**
  - Cost/Benefit Analysis
  - Proof of Concept & Performance Simulation of Micro Grid
    - Normal Operational Condition
    - Fault Condition
- **Deliverables**
  - Complete understanding of the Micro Grid project of SDG&E
  - Modeling and Simulation results of Micro Grid under normal and faulted conditions
- **External Project Manager**
  - TBA

Honeywell's Lunar Orbiter Project

Honeywell

- Problem
  - Satellite Mission Design
  - Low Altitude Lunar Reconnaissance Orbiter (of taking science measurement)
- Requirement
  - SW Simulation & Analysis Problem using COTS tools
  - Design a system to determine the attitude (or orientation) of the Lunar Orbiter
- Deliverables
  - Design of the system
  - Prototype if possible
  - Testing on the ground if possible
- External Advisor
  - Thomas Hickey

Tacoma Power's Demand Response Projec

- Problem
  - Peak charge to be applied
  - Demand Response program in need
  - "manage customer consumption of electricity in response to supply conditions"
- Requirements
  - The best demand response program for Tacoma Power
  - Enabling technologies
- Deliverables
  - Recommendation and evaluation of the Demand Response program
- External Advisor
  - Amy Grice (Senior Engineer)

NINE's Nano-Sensor Project

- Enabling Self Powered Ferroelectric Nano sensor
  - Nano-generation from vibration energy
  - Nano scale mechanical energy into electric energy using piezoelectric charge detection
  - Harvesting energy from the environment
  - Nano-rod sensor

- Specific Problem ?
- Requirement ?
- Deliverables ?

- Internal advisor: Dr. Harris
- External Advisor: NINE manager

IEEE Mini-Grants

- Introduction
  - $500 prize money
  - For students and faculty mentor
  - Design project with industry standard component
  - Published in an IEEE journal as “student application paper”
- Requirement
  - Application with Abstracted Summary Submission, describing
    - Project goal
    - What standards are being considered to achieve the goal?
    - Intention to submit the Final Application Paper upon the completion of the project
    - A statement of endorsement from a faculty mentor
- Important Dates
  - 15 Oct 2009: deadline for Application
  - 14 Apr 2010: deadline for Final Application Paper.
- Note: **Every project is qualified for the IEEE grants, should submit the Application.**
- More information can be found at:
  - http://standardseducation.org/applications
  - Email inquiry: stdseducation@ieee.org

Other Candidate ?

- Only 1 more topic is needed
- Industry initiated topic is highly sought
  - From State Farm?
- Bring the topic with following items:
  - Title of the project
  - Problem Statement of the project
  - Background Information
    - Needs, sponsors, importance, impact, etc
  - Functional and Design Requirements, if possible
  - Deliverables
  - Possible Internal/External advisor
- Contact your lecturer for the steps to present your idea in the class.