

Senior Design I - Fall 2013

- **EECE 401**
 - CRN 83550
 - 3 credit hours
 - W 1310 – 1600
 - LKD 3121
- **Instructor**
 - Dr. Charles Kim
 - (202)806-4821
 - ckim@howard.edu
 - Office Hours (LKD3014): Open Door Policy
 - T 1400 – 1600
 - W 1600 – 1700
- **Highly recommended course to take along**
 - EECE416 Microcomputer
- **Web ---Syllabus, Notes, etc**
 - www.mwftr.com

“Senior Design” – brief definition

- Is
 - Culmination of EE/CpE Education, Training, etc
 - **Design *experience*** that requires adequate consideration of
 - **Knowledge**
 - **standards,**
 - **Constraints, and**
 - Should be related to the **electrical/computer engineering discipline.**
 - ***Process*** to final product (through Senior Design II)
- Is NOT
 - Further expansion of a class project
 - Final product only

Course Objectives and Outcomes

- **Objectives**
 - Learn and use design process to meet needs
 - Becoming to be aware of Technology Impact to Society
 - Becoming an effective team member
 - Becoming an effective communicator
 - Enjoy Design Experiences
- **Topics of the course**
 - Engineering Design Processes
 - Teamwork
 - Communication
 - Professional (or “soft”) Skills
 - Industry Experts and Guest Speakers
- **Course Outcomes (ABET)**
 - (c) Design a system component, process, or system –
 - Throughout the class, we learn the design process and apply it and integrate to a working system which solves customers' problem
 - (g) Effective communicator –
 - Presentations and report writing will enhance verbal, written, and slide communication
 - (i) a recognition of the need for, and an ability to engage in life-long learning –
 - Awareness of the continued, non-stop learning of new technology
 - (j) a knowledge of contemporary issues –
 - Understand the issues related with the project and their impact to society and the project itself.

“Design” – Definition ?

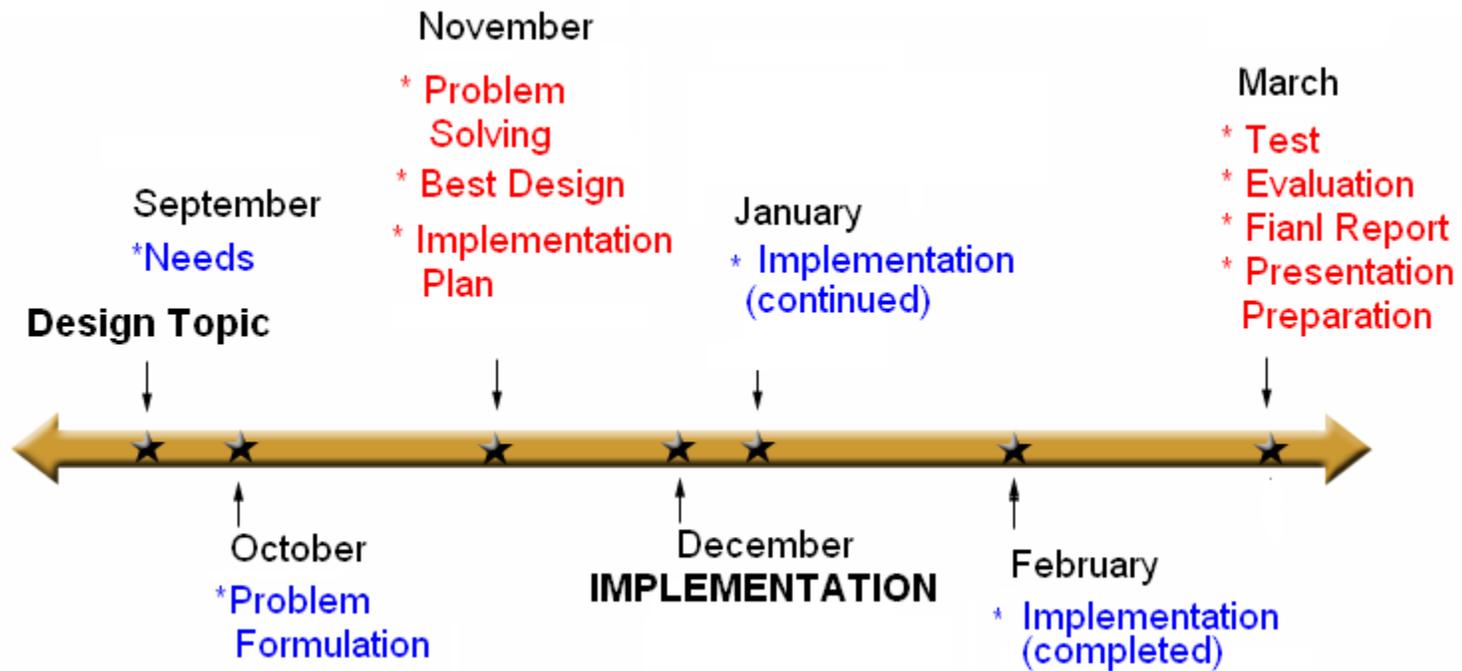
- ABET
 - “The **process** of devising a system, component, or process to meet desired needs,” which involves
 - “A **decision-making** process (often iterative), to convert resources optimally to meet the stated needs” by applying basic sciences, mathematics and engineering, adequately considering
 - knowledge, standards, and constraints related to the electrical/computer engineering discipline.”
- Industry
 - (1) “Determine that a need exists with a customer for specific goods or services and how much that customer is able and willing to pay for it.
 - (2) Then determine if the product or service is compatible with the competencies of the company and if it can be manufactured at a cost that is less than the customer will pay.
 - (3) If so, proceed by designing to match the company’s ability to manufacture, rather than basing the design on state-of-the-art technologies.
 - (4) Finally, prior to full implementation, prepare a pilot demonstration”

“Senior Design” Schedule

- Fall 2013
 - Understand the Design Processes and Components – Aug-Sep 2013
 - Selection of Design Projects – Oct 2013
 - Proposal for the Projects – Oct 2013
 - Proposal Presentation (Public event) – Nov 2013
 - Solution Generation – Nov-Dec 2013
- Spring 2014
 - Top Design Selection – Jan 2014
 - Design Implementation – Feb-Mar 2014
 - Design Evaluation – Apr 2014
 - Final Presentation (ECE Day – Apr 2014)

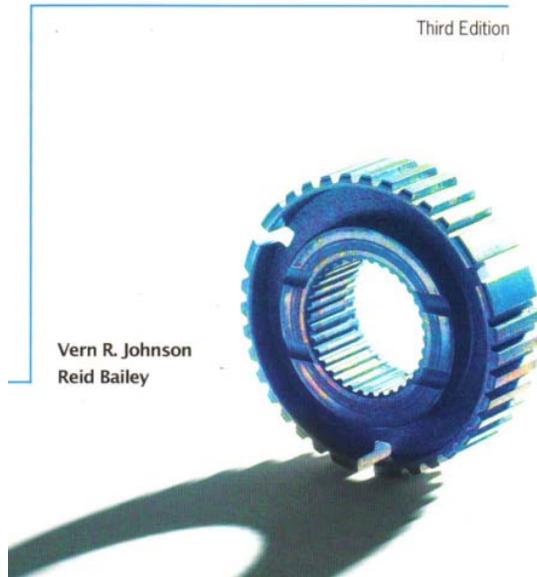
Milestone

- Understanding Design Processes: **September**
- Project Topic Selection: **September**
- Team Formation: **September**
- Problem Formulation: **October**
- Problem Solving and Top Design Selection: **November**
- Design Implementation (initial stage): **November - December**



Main Text and Resources

Becoming a Technical Professional



- Becoming a Technical Professional
 - by Vern Johnson and Reid Bailey
 - published by Kendal/Hunt Publishing Co.
 - 3rd Edition
 - ISBN 13:978-0-7575-2765-4
 - Written for first-year engineering students
 - Process/Idea is same for seniors with actual application & implementation of the process & idea.
- Resources
 - Niku, Creative Design of Products and Systems, Wiley

Course Grading and Expectation

- Expectation
 - Attendance
 - Active Participation
 - Weekly Activities
 - Assignments
 - Actively seeking solutions
 - Active interaction with instructor and advisor
 - Everything counts
 - Professional manner
- Grading
 - **Individual Score (X):40%**
 - Attendance (10%): only on-time arrival counts
 - Homework +Others (20%)
 - Final Exam (10%)
 - **Group Score (Y): 60%**
 - Class activities + Assignments (30%)
 - Proposal + Presentation (30%)
 - **Peer Evaluation Score (P): 0 – 1.0**
 - **FINAL SCORE (F)**
 - $F = X + Y*[0.6+ 0.4*P]$
- Grades
 - **A: 90 – 100**
 - **B: 80 – 89**
 - **C: 70 – 79**
 - **D: 60 – 69**
 - **F: 0 - 59**

Engineering Design – Topics and Objectives

- Topics

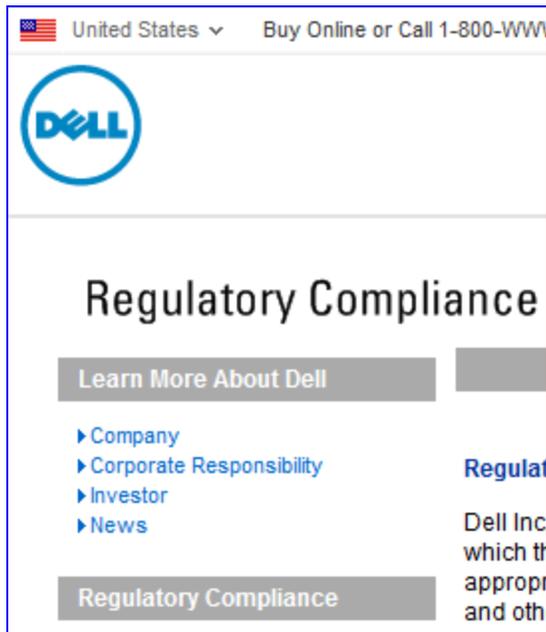
- Engineering Design Overview
- **Problem Formulation**
- **Problem Solving**
- **Solution Implementation**
- The Art and Science of Creativity
- Project Management
- Technical Presentation
- Technical Writing

- Objectives

- Understanding an engineering design **process**
- Understanding **the 3 phases** of design and how design is an adaptive, systematic process
- Applying a design process to meet a set of **needs**
- Design under constraints
 - **Budget**
 - **Time**
 - **Regulation/Standards**

Regulatory Compliance – What is this?

- Example



Electromagnetic Compatibility

Dell products are designed, tested, and classified for their intended electromagnetic environment (domestic/residential environment or business/industrial environment). Electromagnetic Compatibility (EMC) is the ability of items of electronic equipment to function properly together in the electronic environment. While all Dell computer systems have been designed and determined to be compliant with regulatory agency limits for EMC, there is no guarantee that interference will not occur in a particular installation.

Required statements for the international EMC specifications, marks and approvals, as obtained and documented on the product specific [Product Safety, EMC and Environmental Datasheet](#), are provided in applicable agency/country language(s). Examples of EMC specifications include, but are not limited to, CISPR 22 and FCC Part 15.

Electrostatic Discharge

Dell products that have the CE marking are designed and tested for immunity to Electrostatic Discharge (ESD) to IEC standard 61000-4-2, CISPR 22, and CISPR 24. While these products have been designed and determined to be compliant with standard levels for ESD, there may be situations, such as low humidity levels, that can exacerbate ESD event occurrence. Users are encouraged to read and follow the ESD protection guidance provided within the [Protecting Against Electrostatic Discharge](#) section of this website.

- What are these?
 - CISPR22, FCC Part 15, IEC 61000-4-2, and CISPR 24.
- Warm-up HW #1: What are these?
 - A docx/txt file which summarizes above 4 standards or specifications.
 - Use complete sentences; no bullet itemization; no page limit.
 - File naming norm: “**your_last_name_1.docx [or txt]**” - no cover page (your name and ID in the first line)
 - Due: T September 4 – by 2359 hour (Email submission to ckim@howard.edu)

Standard/Regulation

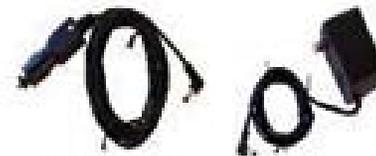
- Cellphone Booster



Complete Cell Phone Booster Kit



Wilson 811210 Signalboost Cellular Amplifier & portable, vented carrying case



AC/DC & DC power supplies

Antenna and Antenna Window mount



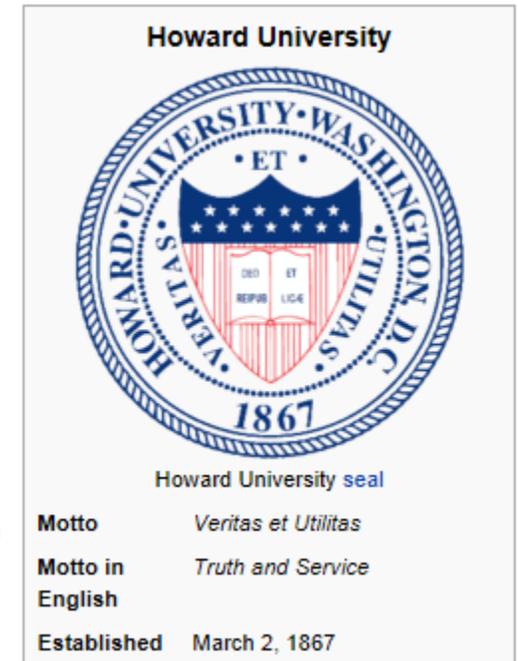
- FCC says “Turn it off” – why?

[Got a Cell Phone Booster? FCC Says You Have To Turn It Off](#)

- Warm-up HW #2: Why?
 - A Word/text file of 1 page **extended summary** in your own words – what and why the FCC decision on cellphone booster
 - File name: “**your_last_name_2.docx [or txt]**” - no cover page (your name and ID in the first line)
 - Due: T September 4 – by 2359 hour (Email submission to ckim@howard.edu)

How to write and summarize?

- People are more likely to read subjects/writings/emails that create curiosity or provide utility
- When they are busy
 - Curiosity fades in importance
 - They read only the ones with practical importance [“utility”]
- So, write as if you are a staff write for a newspaper, and you have an editor whose job is to cut your article to fit into a limited 1 or ½ page.
 - Important things first
 - Summary of the event/thing first so that it delivers message even though only that summary survives the “cutting”
 - Then expand your story after the Summary
 - Use your own words



Read this for example

The Philadelphia Eagles don't start their season until [Sept. 9](#) against the [Cleveland Browns](#). Yet Eagles fans like myself know full well that the season really begins on Sept. 5. And unlike most of the other 29 teams still waiting around to kick off, there is extra reason for Philadelphia to pay attention to the year's very first game.

To reach their big goals, the Eagles will probably need to win the NFC East - and to do that, they must dethrone the defending division and Super Bowl champion New York Giants. But Philadelphia also has to hope that the [Dallas Cowboys](#) can't overtake New York first. As such, it will be required viewing in Philadelphia to see Dallas and New York meet [on opening night](#) on Sept. 5.

The best hope for the Eagles is that neither of them look good, which could be plausible. Expectations have gone down for the Cowboys recently, with Jason Witten doubtful to play and Miles Austin and Dez Bryant also banged up. Given the two gut wrenching losses the Cowboys suffered to the Giants late last year - which changed the entire direction of the season - Dallas has to hope that New York doesn't have its number.

Yet expectations are also middling for the Giants, despite their championship. Given that they merely caught fire late last season - just like in 2007 - that the Green Bay Packers, San Francisco 49ers and Eagles are still in the NFC, and that New York is not an

News Staff Writer Style? Compare this

www.cbsnews.com/8301-202_162-57600384/syria-strike-seems-inevitable-as-u.n-warns-against-unilateral-military-action-hunt-1

Updated at 6:48 a.m. Eastern

DAMASCUS, SYRIA | U.N. chemical weapons experts investigating an alleged poison gas attack near Damascus left their hotel again Wednesday hoping to carry out their second field trip, which was delayed Tuesday for security reasons.

The team of about 20 inspectors left their hotel in the Syrian capital in a convoy of cars to visit the eastern Ghouta suburbs, where the Obama administration says President Bashar Assad's forces unleashed a chemical weapons attack on Aug. 21 that killed hundreds of people.

Local opposition activists told CBS News that the convoy had reached the town of Mleiha, in the sprawling Ghouta area, and videos posted online by the activists showed the U.N. inspectors interviewing patients at clinics in Mleiha and the nearby town of Zamalka.



Play VIDEO

Intercepted communications, tissue samples prove Syrian regime responsible for gas attack



On Tuesday, Vice President Joe Biden made it clear that regardless of what the U.N. inspectors find, the **White House is now convinced** the attack was carried out by Assad's forces.

The **American government's assessment** is based on the circumstantial evidence from videos posted on the internet, and, as CBS News correspondent David Martin reported Tuesday, intelligence -- much of it still classified -- ranging from intercepted Syrian communications to tests of tissue samples taken from victims.

Another key piece of circumstantial evidence which has been cited by both officials and analysts for days is the simple fact that the regime is the only entity in Syria known to have chemical weapons and the means to disperse them.

With this

By Oliver Holmes and Erika Solomon
BEIRUT | Wed Aug 28, 2013 7:59am EDT

(Reuters) - The United Nations Security Council was set for a showdown over Syria on Wednesday after Britain sought authorization for Western military action that seems certain to be vetoed by Russia and probably [China](#).

U.N. chemical weapons experts investigating an apparent gas attack that killed hundreds of civilians in rebel-held suburbs of Damascus made a second trip across the front line to take samples. Secretary-General Ban Ki-moon pleaded for them to be given the time they need to complete their mission.

But the United States and European and Middle East allies have already pinned the blame on Assad and, even without full U.N. authorization, U.S.-led air or missile strikes on [Syria](#) look all but certain, though the timing is far from clear.

That has set Western leaders on a collision course with Moscow, Assad's main arms supplier, as well as with China, which also has a veto in the Security Council and disapproves of what it sees as a push for Iraq-style "regime change" - despite U.S. denials that President Barack Obama aims to overthrow Assad.

Uncertainty over how the escalation of the conflict at the heart of the oil-exporting Middle East will affect trade, and the world economy sent oil prices, and gold, to their highest levels in months while stocks fell. Fears over the economy of Syria's hostile neighbor [Turkey](#) pushed its lira to a record low.

Analysis & Opinion

[Western powers could strike Syria within days](#)

[West mustn't rush into Syrian conflict](#)

Related Topics

[World »](#)

[Russia »](#)

[United Nations »](#)

[Syria »](#)

Related Video

[U.N. resumes Syria chemical attack probe](#)

4:20am EDT

[Rebels gain ground in Northern Syria](#)

[Israel will respond with force to any attack from Syria](#)

[Biden: No doubt Syrian regime used chemical weapons](#)

Another Reuters' article Example



By Tarmo Virki and Sinead Carew
HELSINKI/NEW YORK | Wed Sep 5, 2012 3:15am EDT

(Reuters) - Nokia and Microsoft Corp will take the wraps off the struggling European company's most powerful smartphone on Wednesday, in what may be their last major shot at winning back a market lost to Apple, Samsung and Google.

The world's largest software maker and the Finnish company that once dominated the cellphone market will showcase the device in New York on Wednesday morning and demo it for industry insiders about the same time

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Fri, Aug

From genius define gadge
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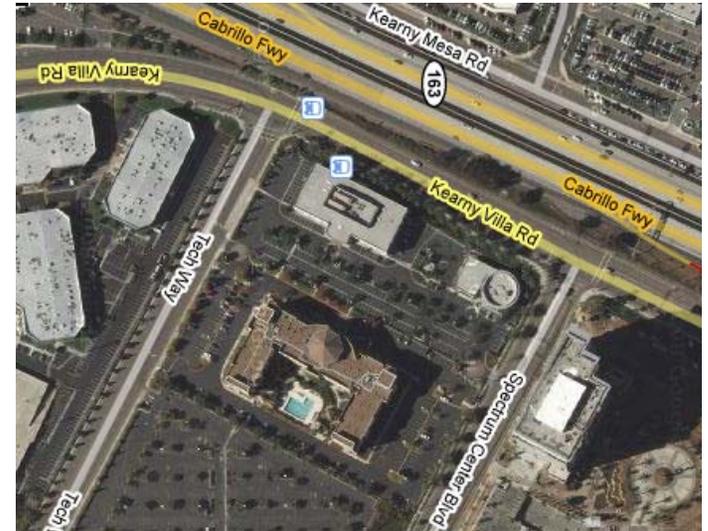
- Before we close:
- HW#1 and #2
- Due both on T Sep 3, 2013 at 2359 hour via email
- Follow the file naming convention

How did we do the warm-up assignments?

- Good:
 - 1 Summary Paragraph
 - Followed by details which answer the question
- Not Good:
 - No Summary Paragraph
 - Jumped to the details

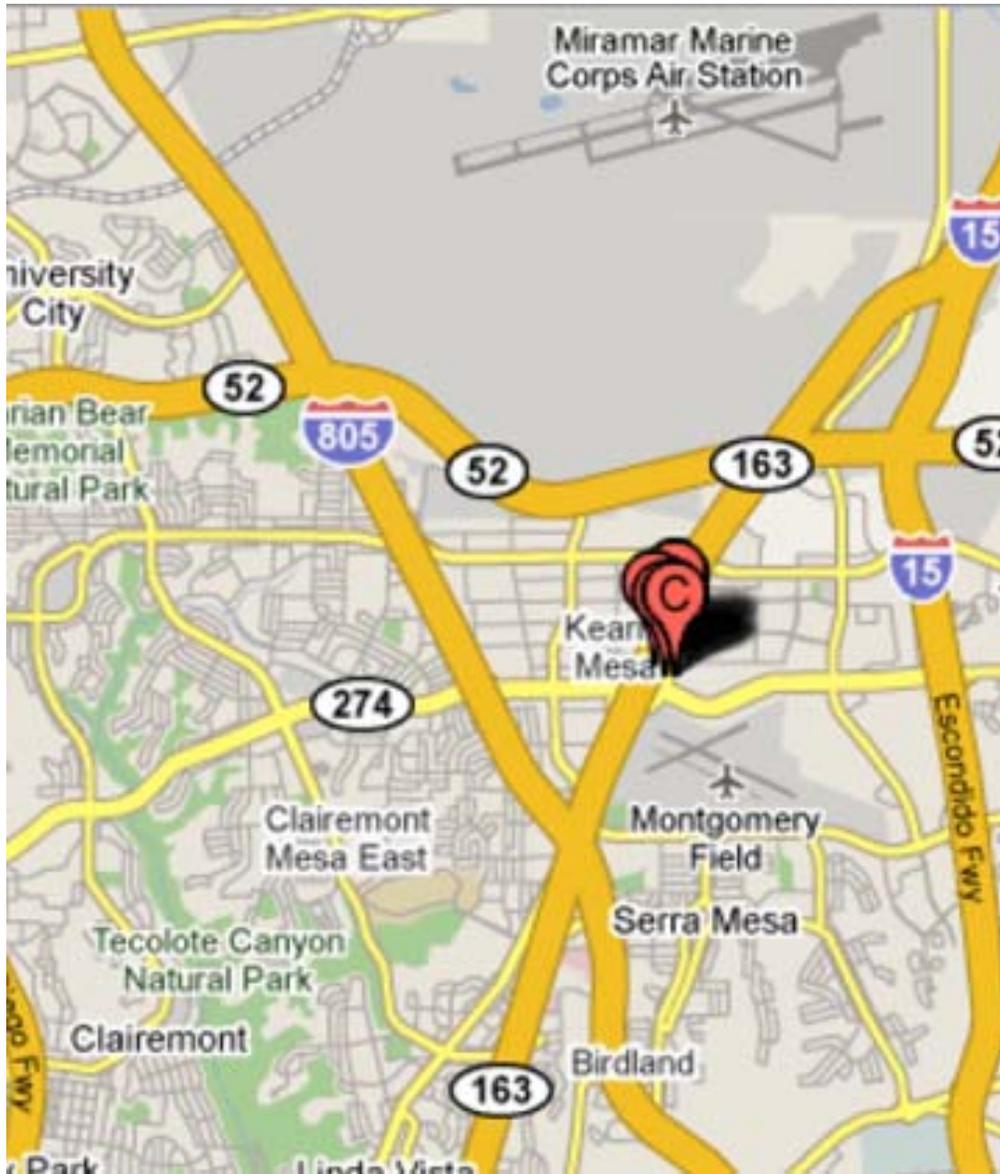
Assignment #3

- A building on 8620 Spectrum Center Blvd, San Diego, CA (“Sunroad Spectrum 12 Office Tower”) – Now (2012) Ashford University
- Difference between two photos of the same building is about \$20M.
- Left (summer 2008). Right (Summer 2009)

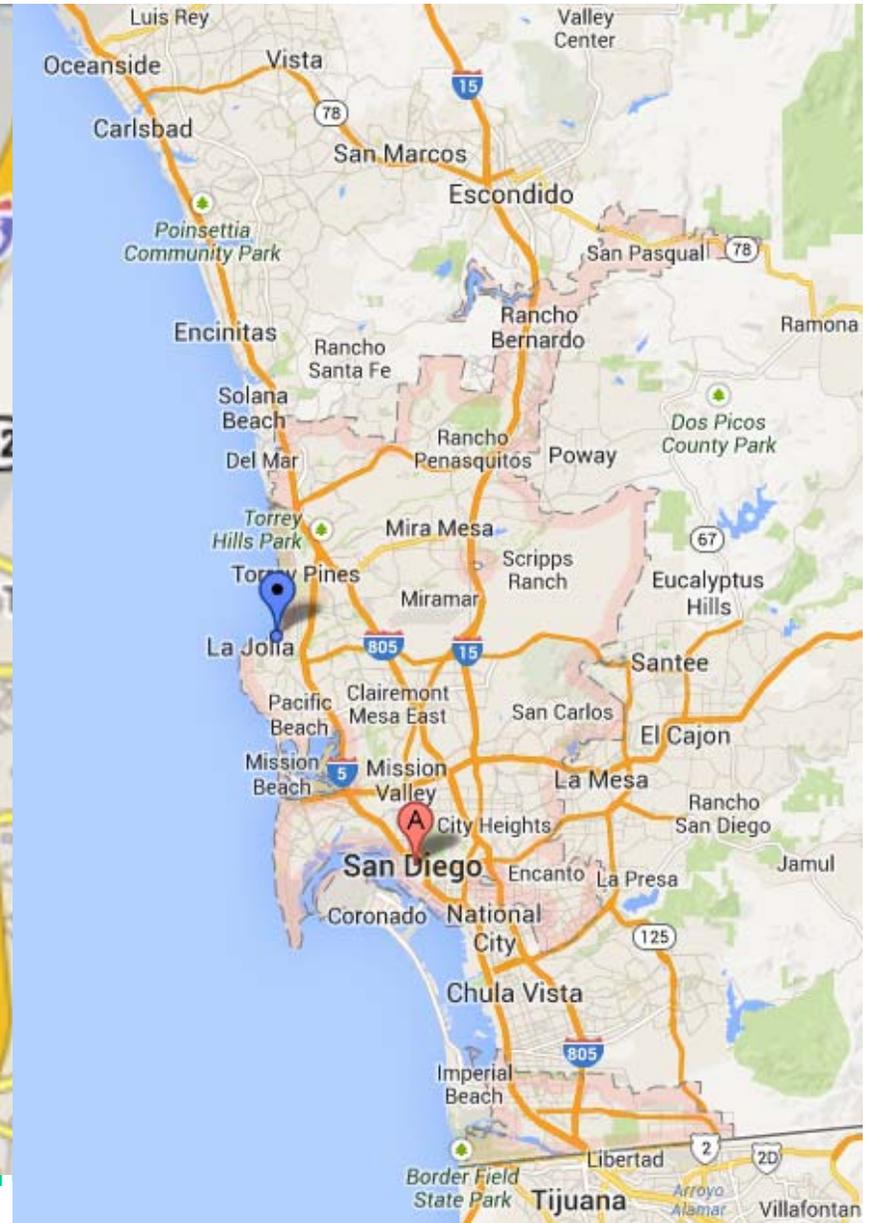


Howa

General Location of the Building



Charles Kiri - Howard



Assignment #3 Instruction

- Investigation of the happening around the building
- Should answer all the questions of:
 - What happened?
 - How it happened?
 - Why it happened?
 - How could it be avoided
 - What is the general lesson from the happening?
- Individual Work
- Written report (hardcopy only)
 - Concise, technical, professional,
 - News staff writer-like report --- the importance of the first paragraph for summary of the entire report. (Write the main part first, then write the summary paragraph)
 - With your own words.
 - No cover sheet; no photos; no drawings; TEXT ONLY.
 - Letter size, 1" margin all sides, 12 pt. Times New Roman font. Single column. Single space. Min 2, Max 3 pages.
 - Pick your own title – less than 10 words
 - **Due: Bring it to W Sept 11 class**

Engineering Design-Overview

- **Problem Formulation**
 - Recognition of a set of **needs**
 - **Information** gathering about the needs
 - Determine the **requirements** of the project
- **Problem Solving**
 - Investigates the available **alternatives** to meet the requirements – **Current State of the Art**
 - **Generates and Analyzes and Specifies** alternatives with the requirements
 - **Makes Decision** on which alternatives will be implemented
 - **Selects** the Top Design
- **Solution Implementation**
 - Creates an implementation and test plan
 - Follows the plan to **build** the design
 - **Evaluates** against the requirements from problem formulation

Characteristics of Design

- Design is:
 - Process **cycles** through the 3 phases of Problem Formulation, Problem Solving, and Solution Implementation
 - **systematic**, not trial-and-error
 - **adaptive**, not a recipe (nor a cookbook)
 - **process**, not an event or product
 - **Iterative** back to earlier phases
 - Simultaneous in refinements of the needs/requirements
 - Done based on Engineering and Scientific Knowledge
 - To be Rigorous in testing and evaluation
 - To execute planned activities
 - To **comply** regulation, codes, rules, standards, etc
 - “Very demanding, overwhelming but awakening experiences that I utilized in my job interview and apply in my work now” – former student
 - “ “ (at the end of the class)

Design Project Topics

- Industry
 - Northrop Grumman (?)
 - NASA
 - Southern Company (?)
 - PEPCO
 - SDG&E
 - Your Own ?
- National Level Competition & Challenge
 - Cornell Cup 2014 Competition
 - Others:
- In-House
 - Continuation of the last semester projects?

4 Elements for Design
Project Suggestion:
1. Background
2. Objectives
3. Design Requirements
4. Deliverables

Cornell Cup 2014

- 3rd USA national contest for embedded systems
 - Howard teams success
- College-level embedded design competition created to empower student teams to become the inventors of the newest innovative applications of embedded technology.
- **Teams of 3-5 students** will create detailed **design plans**, a **working prototype**, and a **final presentation** that effectively demonstrates the **capabilities and robustness of their ideas**.
- **Applications** and **final report** entries will be “blind” reviewed by a team of experts and all judging criteria is made openly available to all contestants
- Intel Atom board based Design and Implementation

Howard's Success in Cornell/Intel Cup 2012 and 2013

- 2012:
 - 2 team proposals were submitted
 - 1 (“Green lighting”) was selected as the finalist
 - Chidi Ekeocha, Shamir Saddler, Ameer Baker, Isaac Collins, Ravi Jaglal
 - 1 (“Blind Assistant”) was selected as a wild card
 - Gerard Spivey, Joshua Durodola, Antonio McMichael, Keir Morris, Christopher Urquhart
 - The “Blind Assistant” won the Wild Card Winner in the Final Competition in May 2012
- 2013:
 - 2 proposals were submitted
 - Both teams were selected each as a finalist
 - Water: Eric Turner, Henok Mazegia, and Ade Akinsiku
 - Smart Backpack: Paul Alade, Ellwood Lane, Jennifer Okafor, Samuel Omosuyi, and Kalonji Bankole
 - Team Sigma (“Smart Backpack”) earned the Honorable Mention award



Charles Kim – H

Who are the finalists in the 2013 Cup?

- 2013:
 - University of Massachusetts, Lowell – Autonomous Robotic Mechanism
 - University of Pennsylvania – Autonomous Airborne Vehicle
 - Columbia University – Assistive Robotic Manipulator
 - Arizona State University – Human-Computer Interaction
 - [Howard University – Bison Technology \(Portable Water Purification System\)](#)
 - Worcester Polytechnic Institute – Cyber Physical Systems
 - Worcester Polytechnic Institute – FIVOLTS
 - University of Colorado, Denver – Intracell
 - University of Massachusetts, Lowell – LEAF
 - University of California, Berkeley – Mengbaolity, intelligent shopping cart
 - Oregon State University – MetroSwift
 - Oregon State University – MoJo2
 - Seattle Pacific University – Nia Wheel
 - Columbia University – Ouroboros
 - University of Pittsburgh – PandaCare
 - Florida Institute of Technology – Panther 1
 - University of Massachusetts, Amherst – Personal Black Box
 - University of Pennsylvania – ProtoDrive
 - Southern Illinois University – Salty Dawg

Who were the finalists in the 2013 Cup? (-continued)

- 2013 (-continued):
 - University of Rochester – Swarm UV
 - Purdue University – Table It
 - University of Massachusetts & B. V. Raju Institute of Technology – Team BioBot
 - University of Houston – Team Ignitus
 - Columbia University – Team Lions
 - **Howard University – Team Sigma (Smart Backpack) --- “Honorable Mention”**
 - Arizona State University -- Techpriests
 - **University of Pennsylvania – Titan [Winner]**
 - University of California, San Diego – UAV Tracker
 - University of Rochester – Uread Braille
 - University of Pennsylvania – Vision Interactive Operating System



Cornell 2013 Cup at the Disney's Contemporary Resort



Cornell Cup 2014

- Visit the Cornell Cup website
 - Cornell University, Systems Engineering
- Read Team summaries of 2012 and 2013
- Brew up an idea or two, new and interesting ones
- Share with friends (Howard and Brazil students)
- Form a team
- Write a 1-pager of summary
- Come see me before the end of September
- Why can't we send another 2 teams for 2014 competition?
- Don't wait !
- Take the initiative !

2014 Cornell Cup USA presented by Intel Competition Save the Date & Q&A Sessions

Cornell Cup USA <cornellcupusa@cornell.edu>

 You forwarded this message on 9/3/2013 1:06 PM.

Sent: Tue 9/3/2013 1:02 PM

To:

Save the Date



Cornell Cup USA presented by Intel

Competition
May 2-3, 2014

[Register your team](#) today for a chance to win a

\$10,000 Grand Prize

Or

To Find out More

Join us for an upcoming Question and Answer
Session