41ST ANNUAL

SANTA CLARA UNIVERSITY

SENIOR DESIGN

School of Engineering

CONFERENCE 2011

BioE. Civil. Computer. Electrical. Mechanical

May 5, 2011

2011 Senior Design Conference

Dear Students, Alumni, Community Partners, and Friends

Welcome to the 41st Annual Senior Design Conference. We are delighted to have you with us for this display of our students' work.

Today's presentations showcase the mix of hands-on experience and theoretical learning that honors our mission to educate thoughtful and responsible leaders and innovators of the future. Working on their capstone projects, our students have been designing affordable and sustainable building materials and techniques for earthquake-ravaged Haiti, developing a computer application to support fair trade around the world, furthering the process of LED optical wireless communication, and creating an autonomous network of robotic kayaks to be used in environmental research, to name just a few.

In educating our engineering students, we strive to impart the knowledge, skills, vision, and heart necessary to take on the challenges of the 21st century. We are grateful for your contributions in helping us realize this goal. We invite you to enjoy this day witnessing the creativity and expertise of our exceptional engineering students.

Sincerely,

Godfrey Mungal, Dean
School of Engineering

Kathryn Kale '86, Executive Director
Alumni Association

Thursday, May 5, 2011
Program Schedule

12 p.m. — **Judges' Registration**
California Mission Room, Benson Center

12:30 p.m. — **Lunch and State-of-the-School Address**
Godfrey Mungal, Dean
School of Engineering
California Mission Room, Benson Center

1:30 p.m. — **Judges' Welcome and Orientation**
Godfrey Mungal, Dean
School of Engineering
Kathryn Kale, Executive Director
Alumni Association
Ruth Davis, Associate Dean of Undergraduate Studies
School of Engineering
California Mission Room, Benson Center

2 – 5 p.m. — **Senior Design Presentations**
Benson Center, Engineering Center
The Harrington Learning Commons and Orradre Library
Kennedy Commons

4:30 p.m. — **Demonstrations**
Engineering Quad

5:30 p.m. — **Dinner**
Bannan Engineering Laboratories
and Engineering Quad

2011 Senior Design Presentations

BIOENGINEERING SESSION 1

Learning Commons 129, Viewing and Taping A

Surgical Fire Safety and Prevention System

2:05 – 2:30 p.m.

West Askew, Michelle Bohner
Advisor: Paul Davison

Surgical fires are a rare but very real risk of electrosurgery procedures, which can result in serious trauma or even death. The SAFirE device is an intelligent system designed to improve safety and reduce the risk of such occurrences.

Detect-A-Baby: Creation of a portable, at-home ultrasound device capable of detecting embryo movement

2:40 – 3:10 p.m.

Khaaliq DeJan, Alex Drake, Cameron Monroe
Advisor: Talal Al-Attar

Currently, fetal detection through medical sonography has been restricted to use only in a clinical setting. The goal of our project is to develop, create, and begin initial testing on a portable ultrasound device capable of detecting fetal movement for use at home by the family.

Operation Coating

3:20 – 3:50 p.m.

Jonathan Ang, Katherine Eckerline, Kalpith Ramamoorthi, Daniel Walinsky
Advisors: Paul Davison, Yuling Yan

Developing and testing a non-stick coating for PEAK Surgical's PlasmaBlade®, an electrosurgical cutting device. The new coating will lower the chance of blood vessels and tissue adhering to the surface of the blade.

BIOENGINEERING SESSION 2

Learning Commons 133, Viewing and Taping B

Detection of Pathogens Using Electrochemical DNA Sensors for Resource-Limited Settings

2:05 – 2:30 p.m.

Sarah Ghanbari, Nick Giustini
Advisor: Unyoung Kim

Development of a microfluidic diagnostic device capable of determining local water safety by incorporating a high-throughput concentrator and an electrochemical DNA sensor to rapidly concentrate, lyse, and detect the presence of pathogens in a given water sample without the need for expensive and bulky lab equipment.

SEED: Sustainability Energy Engineering through Digestion

2:40 – 3:15 p.m.

Todd Bruschwein, Jenna Fong, Katie Kurtz; Business students: Jonathan Mari Codilla, Chloe Michelle Halstead
Advisor: Craig Stephens

Using the process of anaerobic digestion in a small scale biodigester, the goal is to create usable biogas. By feeding the digester with on-campus food waste from the Benson dining commons, we aim to create a cost-effective source of renewable and sustainable energy.

Probing the Mechanical Properties of Muscle Stem Cells

3:20 – 3:50 p.m.

Lauren Jauregui, Sandeep Kaur, Arille Jeriza Virrey
Advisors: James Grainger, Unyoung Kim

Stem cells replace missing proteins that are either absent or defective in muscle dystrophic diseases. Mechanical properties of cell culture substrates, in combination with surface chemistry, provide important biological cues affecting cell proliferation and differentiation. We will investigate the mechanical properties of the substrates with coherence to the regenerative cells.

CIVIL ENGINEERING SESSION 1

Bannan Engineering 326

Sustainable Design in Ghana

2:05 – 2:30 p.m.

Daniel Lawrie, William Sommer
Advisors: Mark Aschheim, Sukhmander Singh

Research and implement a new building material into a sustainable and economical residence for the people in Northern Ghana. Our new material eliminates the need for a brick press, simplifying production. A catenary arch creates simple and easy-to-build structures that can serve as a residence and other functions.

New Design for Haiti

2:40 – 3:10 p.m.

Danielle Locklar, Kelli Oura, Lauren Reinnoldt
Advisor: Reynaud Serrette

This project includes the design of structurally insulated panels implemented for quick and easy construction and fabrication of an affordable single family home in an effort to rebuild Haiti. This design would promote economic growth, improve living quality, and address the right to shelter that is vital to all individuals.

EBNet Haiti Natural Masonry Program

3:20 – 3:50 p.m.

Maura Cyrus, Nicholas deCesare, Alvaro Lacayo
Advisors: Mark Aschheim, Sukhmander Singh

Working with the Ecological Building Network on the Haiti Native Reconstruction Project, we will focus on designing low-cost, sustainably minded housing options to rebuild Haiti. Our project will require the research, fabrication, and testing of ecologically designed concrete blocks, incorporating recycled concrete rubble and other local building materials.

EBNet Haiti Bamboo Connections

3:55 – 4:20 p.m.

Jake Echeverria, Chris Sampson
Advisors: Mark Aschheim, Tonya Nilsson

Our project addresses the bamboo framing portions of a housing system developed in collaboration with the Ecological Building Network for post-earthquake reconstruction in Haiti. Experimental research focuses on validating a new bamboo lateral-load-resisting system for withstanding earthquakes and hurricanes, as well as a bamboo roof truss system.

CIVIL ENGINEERING SESSION 2

Bannan Engineering 325

Fifth Floor Redesign, Lawson Lane

2:05 – 2:30 p.m.

Vincent Postillion, Jessica Powell
Advisor: Sikandar Khatri

Structural steel redesign of the fifth floor of an office building at Lawson Lane which has been developed by the Sobrato Organization and has been put on hold due to the weak real estate market.

Sustainable Design of an Outdoor Classroom
2:40 – 3:05 p.m.
Anne Drinkward, Jeanine Ruffoni
Advisor: Mark Aschheim
The purpose of this project was to design a sustainable and cost-effective outdoor classroom for the Santa Clara Community Garden. Multiple design options were analyzed, which utilized different materials such as tension fabric and bamboo. A final design was chosen based on cost and environmental impact.

Structural Design of SCU Learning Commons Including Glass Dome Addition
3:20 – 3:45 p.m.
Peter Fritz, Robin Landis
Advisor: Reynaud Serrette
This project consists of the complete structural design of the Santa Clara University Learning Commons featuring the addition of a 100-foot glass dome entryway. The structural steel design incorporates seismic analysis, composite beams, eccentric braced frames, and connection design.

Steel Bridge
3:55 – 4:20 p.m.
Christopher Bartunek, Johnette Besseling
Advisor: Reynaud Serrette
A design for a steel bridge was developed to conform to the specific situation established in the official 2011 Student Steel Bridge Competition rules. Fabrication of the bridge reached completion by mid-April to take part in the competition hosted by Sacramento State University.

CIVIL ENGINEERING SESSION 3
Bannan Engineering 105

Outdoor Classroom Design for the Santa Clara Bronco Garden
2:05 – 2:30 p.m.
Enli Li, Rojil Peralta
Advisors: Edwin Maurer, Tonya Nilsson
A lightweight structure for an outdoor, open-air classroom in the Santa Clara Bronco Gardens will incorporate sustainable materials and a green roof linked to a water catchment system. The water collected will irrigate the garden during the summer and will heat up the classroom through the use of solar heating in the winter.

Gravity-Fed Water Distribution System in Malawi
2:40 – 3:05 p.m.
Marian Price
Advisor: Steven Chiesa
This project involves creating a water distribution system for the people in the Mlowe Watershed of Malawi, Africa. This system utilizes gravity to bring water from two rivers down to villages at lower elevations. The main goal is to improve the distribution and quality of water for the local people.

Low-Tech Coconut Shell Activated Carbon Filter
3:20 – 3:45 p.m.
Ami Cobb, Mikell Warms
Advisors: Steven Chiesa, Edwin Maurer
This activated carbon filter is made from coconut shells readily available in Bluefields, Nicaragua. This rural town suffers from bacteria- and pesticide-infested waters, leading to a high mortality rate in children and the elderly. We hope to make an impact by using a low-tech method to filter their drinking water.

Sea Level Rise: Analysis and Redesign on Calabazas Creek
3:55 – 4:20 p.m.
Katie Muller, Alexandra Thorpe
Advisor: Edwin Maurer
An analysis of flooding in the Calabazas Creek after a potential 1.4-meter sea-level rise due to climate change. Floodwall redesign and other prevention measures are proposed to mitigate the resulting increase in water surface elevation.

Natural Watershed Runoff Monitoring
4:25 – 4:50 p.m.
Paul Ramsell, Laura Webb
Advisor: Edwin Maurer
This project designs a stream gage measuring depth of water and flow in a Blue Oak Ranch Reserve creek on Mount Hamilton to understand the hydrologic response of a natural watershed. This includes designing and constructing a stage meter, measuring flow using current velocity meters, and developing a stage-discharge curve.

CIVIL ENGINEERING SESSION 4
Bannan Engineering 107

Redesign of NASA's Sustainability Base
2:05 – 2:35 p.m.
Maria Campbell, Luis Orea, Juan Vargas
Advisors: Tonya Nilsson, Reynaud Serrette
Redesign of the structural components in NASA's Sustainability Base to utilize less steel, by weight, while implementing core concepts of green building and sustainability. Comparison of four designs in an attempt to present a structure that, by comparison, best exemplifies sustainable building practices.

Residential Hill-Top Design: Phase Two
2:40 – 3:05 p.m.
Jonathan Perez
Advisors: Reynaud Serrette, Sukhmander Singh
Provide an efficient and inexpensive structural and geotechnical design using a mixture of sustainable and economical materials for a basement of a two-story residential hilltop home. This hilltop design will serve as an alternative for urbanization and encourages the preservation of San Joaquin agricultural lands.

Sustainable Subdivision Design
3:20 – 3:50 p.m.
Colin Kodama, Jonathan Okada, Chelsea Unemori
Advisor: Steven Chiesa
The project entails a sustainable subdivision design for the Kumuhau and Kakaina parcels in Waimanalo, Hawaii. The 19.52 acres of undeveloped agricultural land, owned by the Department of Hawaiian Home Lands, has been designed to accommodate residents with the intent of establishing a healthy, community-based environment.

Sustainable Residential Development
3:55 – 4:20 p.m.
Ernesto Araica, Matt Paolercio
Advisor: Steven Chiesa
The project incorporates sustainability into a 30-acre plot of land located in San Jose, California. The goal is to minimize the residential development's impact on earth by following environmentally responsible and sustainable development practices.

CIVIL ENGINEERING SESSION 5
Bannan Engineering 106

Signal Timing Design and Stadium Traffic Control
2:05 – 2:30 p.m.
Sonia Duenas, Andrea LeGare
Advisor: Rachel He
Focus on retiming the signals on San Tomas Expressway to decrease traffic congestion, wasted time, and unnecessary burning of fossil fuels. Also studying and designing traffic systems and traffic control for the new football stadium.

Multimodal Traffic Management System Design for Recurrent and Emergency Situations
2:40 – 3:05 p.m.
David Kojima, Jake Roths
Advisor: Rachel He
Development of a traffic management model for the City of Santa Clara using Paramics Modeller to study the current traffic flow and determine the best course of action to take in emergency evacuation situations.

Traffic Control and Pedestrian Bridge Design
3:20 – 3:45 p.m.
Leanna Elserougi, Gabriela Mercado
Advisors: Rachel He, Reynaud Serrette
The consistently high rate of vehicular volume on Stevens Creek Boulevard presents hazards for both pedestrians and bicyclists, making crossing the street by foot a dangerous task. Our proposed solution is the placement of a pedestrian bridge in order to improve traffic volume by faster signal timing.

LEED Design for the BART Extension to the South Bay
3:55 – 4:20 p.m.
Joseph Bernardi, Jared Lum
Advisor: Rachel He
BART has begun its plans to extend their current system to the South Bay. We will examine the first two stations and determine the necessary steps to make them as close to LEED certified as possible.

I-880/I-280 Interchange Design
4:25 – 4:50 p.m.
Christopher Bedell, Jake Taylor
Advisor: Rachel He
Investigating possible traffic designs to alleviate traffic congestion while taking into account city and state ordinances. We will be constructing designs using AutoCad and implementing financial analysis for each respective design.

COMPUTER SCIENCE AND ENGINEERING SESSION 1
Sullivan Engineering 618

CSS Arena
2:05 – 2:30 p.m.
Jason Barry
Advisor: Silvia Figueira
A competitive CSS Gallery that increases traffic and exposure to your website by battling other players for virtual territory in a Risk-esque game of Web design dominance.

What Should I Listen To?
2:40 – 3:05 p.m.
Katherine Lanier
Advisor: Silvia Figueira
A dynamic website that attempts to recommend to users, based on preferences they define, what they should listen to next. The site is constantly updated as users input new information.

LabelCheck.net
3:20 – 3:45 p.m.
Rudy Rimland
Advisor: Rani Mikkilineni
LabelCheck.net integrates recipe and menu management with shopping. Targeted to consumers with dietary restrictions, site members identify, verify, and track ingredients and nutritional content in their diet. On the website, members create, select, and share recipes and menus. When shopping, members access automatically generated shopping lists with the smartphone application.

The Future Is Green
3:55 – 4:20 p.m.
Melissa Conlin, Michael Truong
Advisor: Rani Mikkilineni
The Future Is Green project, for the Girl Scouts of Northern California, teaches young girls about green technologies. We laid the foundation for the website which works as a learning tool, incorporating information about sustainable technologies, and teaching the advantages of these technologies through interactive simulations.

COMPUTER SCIENCE AND ENGINEERING SESSION 2
Sullivan Engineering 604

Best Unified Reservation Portal (BURP!)
2:05 – 2:30 p.m.
Pardeep Kang
Advisor: Rani Mikkilineni
A Web-based resource to assist restaurant goers with cost-free reservations, reviews, offers, information, and more. A fun and easy-to-use Web portal, which would be beneficial for restaurateurs and their guests.

Quantification of Information in a Computational Neural Model
2:40 – 3:05 p.m.
Guy Hotson
Advisors: John Birmingham, Silvia Figueira
The goal of this project is to create a software tool which simulates neural dynamics then calculates the amount of information in the resulting neural spike trains.

GPRS + Paramics: Low-Cost Traffic Signal Synchronization
3:20 – 3:45 p.m.
Nick Bergseng, Riccardo Franchi
Advisors: JoAnne Holliday, Rachel He
Across the United States, incorrect timings on traffic signals waste millions of gallons of gasoline and hours of travel time. GPRS + Paramics connects powerful traffic modeling software with low-cost microcontrollers via cellular modems, cheaply and effectively providing system-wide traffic signal monitoring and control to cities of any size.

Web-based Satellite Mission Operations Dashboard
3:55 – 4:20 p.m.
Laura Bica
Advisor: Christopher Kitts
This project will create a new way of displaying important spacecraft data for both public and private purposes. The data will be shown on a Web-based dashboard, and will be semi-automated to allow for the most current and relevant data to always be shown.

COMPUTER SCIENCE AND ENGINEERING SESSION 3
Sullivan Engineering 605

A Perception to Interaction Mobile Interface
2:05 – 2:30 p.m.
David Witherspoon
Advisor: Ahmed Amer
A project to better incorporate mobile communication and interaction into the real world by offering a means to set up a communication channel prompted by physical location, a physical item, or injected markers in an existing digital medium.

Note Sharing
2:40 – 3:05 p.m.
Bryan Clark, Christopher Gargani
Advisor: Ahmed Amer
An application for sharing notes in a group with minimal set-up on the users' part.

International Phone Card Application
3:20 – 3:45 p.m.
Arturo Posadas
Advisor: Silvia Figueira
Create a telephony platform using open source software and VoIP technology to establish a database ranking international phone cards from best to worst. The ranking will be done according to user inputs and collective intelligence.

FACE: Fair Trade Aid Calculator for Everyone
3:55 – 4:20 p.m.
Ryan Davidson, Eva Jensen, Rosalie Tolentino
Advisors: Silvia Figueira, Rani Mikkilineni
FACE is a senior project designed to help The World of Good Organization, winner of the Katherine Swanson Equality Tech Award, promote fair trade around the world. FACE incorporates a Fair Wage Survey application on five mobile platforms and Web-based visualizations, which creatively illustrate the organization's fair-wage data.

COMPUTER SCIENCE AND ENGINEERING SESSION 4
Sullivan Engineering 602

Core Dump: A Game for Demystifying Programming
2:05 – 2:30 p.m.
Gavin Hagiwara, Dustin Han
Advisor: Darren Atkinson
A Flash-based platform game that teaches basic programming concepts to the player. The player will utilize a programming language interface to manipulate the environment, combat enemies, and solve puzzles.

Fixing Return Oriented Programming Vulnerabilities
2:40 – 3:05 p.m.
Kevin Rowe, James Taguchi
Advisor: Joanne Holliday
Hackers can use the "return oriented programming" exploit technique to bypass defenses and take control of computer systems. We examine the method of attack and propose a defensive software implementation to mitigate return oriented programming vulnerabilities.

WiFind
3:20 – 3:45 p.m.
Chris Dunder
Advisors: Silvia Figueira, Dan Lewis
WiFind is a low cost, software-based smartphone positioning system for indoor areas such as offices, schools, hospitals, and malls where GPS is unavailable or poor quality but WiFi coverage is prevalent.

Spelling and Sorcery
3:55 – 4:20 p.m.
Garrett Andersen
Advisor: Maria Pantoja
Spelling and Sorcery is a smartphone application, combining the appeal of mobile games with educational goals. Players will spell their way to victory in a fun and engrossing vocabulary game. This app will bring a new spin on the classic word game formula.

ELECTRICAL ENGINEERING SESSION 1
Learning Commons, Training and Instruction 203

Java Application That Performs Circuit Calculations
2:05 – 2:30 p.m.
Elieser Oseguera
Advisors: Rani Mikkilineni, Tokunbo Ogunfunmi
A Java-based application that implements various techniques for calculating nodal voltages for a given circuit. A graphical user interface that is straightforward allows for this application to be utilized by professionals, professors, and students alike.

LED Optical Wireless Communication
2:40 – 3:05 p.m.
Will Cook, Dylan Rust
Advisor: Sarah Kate Wilson
This proposal has as its focus the construction and testing of a system of light-emitting diodes and photodetectors that will transmit and receive information in the visible and infrared frequencies of the electromagnetic spectrum. This will allow wireless communications without the potentially negative consequences associated with currently used radio frequencies.

Characterization of Temperature-Dependent Resistivity of Carbon Nanofiber
3:20 – 3:45 p.m.
Jason Tan
Advisors: Hohyun Lee, Toshishige Yamada, Cary Yang
This project aims to characterize the temperature-dependent electrical resistivity of carbon nanofibers using four-point probe measurements at various currents. Each applied current produces a different temperature profile along the nanofiber, thus yielding a spatially and temperature-dependent resistivity. The temperature profile is determined using heat transfer modeling.

Portable Laser Guitar
3:55 – 4:20 p.m.
Joseph Oloju, Kurt Robinson
Advisor: Sarah Kate Wilson
This electronic guitar uses lasers in place of metal strings and computer speakers in lieu of a guitar amp to play music. This proof-of-concept design allows for a retractable guitar neck, making the instrument portable and perfect for today's on-the-go musician.

ELECTRICAL ENGINEERING SESSION 2
Learning Commons, Training and Instruction 205

Non-Linear Transmission Line (NLTL) Implementation in Standard CMOS Technology
2:05 – 2:30 p.m.
Nick Breska, David Ho, Gopal Singh
Advisor: Talal Al-Attar
Using CMOS IMPATT (IMPact ionization Avalanche Transit-Time) diodes to investigate the possibility of designing NLTLs and estimating the enhancement of the rise and fall time for a pulse.

Organic Polymer Solar Cells
2:40 – 3:05 p.m.
Mark Loiseau
Advisor: Mahmud Rahman
This design project seeks to improve the efficiency of solar cells made with organic semiconductors by leveraging recent discoveries in the field of organic photonics.

Tunable Microstrip Patch Antenna Using IMPATT Diode in Standard CMOS Technology
3:20 – 3:50 p.m.
Dylan Lockman, Daniel Lundberg, Yevgeniy Spektor
Advisor: Talal Al-Attar
We are developing an antenna that functions across multiple frequencies in the RF range. This is achieved by using an array of IMPATT diodes implanted across the antenna. These diodes are controlled by an active circuit. In turn, this changes the antenna's electrical properties.

MECHANICAL ENGINEERING SESSION 1
Benson Parlor B

Fuel Efficient Cook Stove
2:05 – 2:35 p.m.
Abimael Bastida, Miguel Gomez, Saul Hernandez, Alejandro Lobato
Advisor: Hohyun Lee
Design, build, and implement a fuel-efficient cook stove for use in impoverished communities of Nicaragua by incorporating the use of thermoelectric power generation to produce a forced air flow.

Make It Rain
2:40 – 3:10 p.m.
Dean Hoang, Kenneth Murata, Geoffrey Zen
Advisors: Timothy Hight, Shoba Krishnan
Our team partnered with Walden West Science Center for this project to design a sustainable drip irrigation system for their garden. Excess power from the solar panels will be stored for general use. This project will be explained to the students at the camp in order to educate them on sustainability.

Mud Brick Press
3:20 – 3:45 p.m.
Miriam Rodriguez, Lawson Tong
Advisor: Mark Aschheim
Create and implement a mud brick press using an injection molding method. The brick itself will have two hollow sections to conserve material and reduce weight. This design will be used in developing nations to build houses.

MECHANICAL ENGINEERING SESSION 2

Benson Parlor C

Compressed Air Bike

2 – 2:35 p.m.

Kevin Azpeitia, Ben Dowdell, Daniel Garcia-Prats, Adam Schwarz; Business student: John Hart
Advisor: Timothy Hight

A single-person vehicle powered by highly compressed air stored in two carbon composite air cylinders, which propel a radial piston rear drive motor. Aiming to improve previous attempts and bring compressed air storage technology to the forefront of sustainable energy, this design focuses on safety of the pressurized air cylinders.

SCU|MotorSports Baja SAE

2:40 – 3:15 p.m.

Caitlyn Alexander, M. Jared Guerrero, Jason LeBlanc, E.J. McKay, Ben Richter, Zach Sanchez, Harman Sekhon
Advisors: Drazen Fabris, T. Kim Parnell

The SCU|MotorSports Team designed and built a rugged, single-seat, off-road vehicle meeting the 2011 Baja SAE rules and specifications.

Attitude Determination and Control for Nanosatellite

3:20 – 3:50 p.m.

Alexander Fischer, Anthony Lozano, Andrew Zembala
Advisor: Christopher Kitts

This project consists of a modular attitude determination and control package to orient a spacecraft in orbit using sensing, processing, and passive and active control.

MECHANICAL ENGINEERING SESSION 3

Kennedy Commons

Hydrodynamic Test Fixture for Prosthetic Aortic Heart Valves

2:05 – 2:35 p.m.

Nick Devich, Edward Hayes, William Hendricks
Advisors: Drazen Fabris, T. Kim Parnell

The goal of this project was to design, construct, program, and validate an inline manufacturing test fixture for Sadra Medical's prosthetic aortic valve. The test fixture shall detect known modes of failure that have been determined by Sadra Medical Inc. to impact the clinical function of the manufactured valves.

Passive Water Management System for PEM Fuel Cell

2:40 – 3:10 p.m.

Charles Klein, Kelly Nightengale, Hanna Nilsson, Shawn Tokairin
Advisors: Hohyun Lee, Daniel Strickland

In this project, we improved the efficiency of a polymer electrolyte membrane fuel cell by managing excess water production. We designed, built and tested a humidifier which couples with integrated wicks to remove water from the membrane and use that water to humidify inlet gases.

Solar-Powered Water Purification System

3:20 – 3:50 p.m.

Ryan Hinds, Megan Ingemanson, Jason Santiago
Advisors: Drazen Fabris, Hohyun Lee

Brackish water and salt water are purified using a vapor distillation process. The energy required for the system is primarily provided by solar power. The system generates a maximum of 25L of pure water/day.

Solar-Powered Regenerative Fuel Cell

3:55 – 4:30 p.m.

Joseph Baini, Jacob Becker, Michael Calcagno, Jensen Machathil, Michael Ryan, Sapaan Shah; Business student: Tyler Richard Johnston
Advisors: Timothy Healy, Daniel Strickland

This project focuses on developing a hydrogen PEM fuel cell for storing energy from PV panels.

INTERDISCIPLINARY PROJECTS

Learning Commons 316, St. Clare Room

Blades of Power

2:05 – 2:35 p.m.

Ayesha Ahmad, Christina daSilva, Zaireen Razzak
Advisor: Shoba Krishnan

Our project involves educating young children about wind energy. Our focus is to analyze and test two different types of wind turbines and then integrate them together. We have also created an interface to compare and display the amount of energy being produced from each turbine.

ANGLER – Autonomous Network for Gradient Location in Environmental Research

2:40 – 3:15 p.m.

Alvaro Gandara Astray, Gregory Emmanuel, Jake Pfitsch, Mike Vlahos, Dean Willmert, Xander Wroblewski
Advisor: Christopher Kitts

Create an autonomous network of robotic kayaks which sense and navigate by physical gradients in water.

ECHO: Ergonomic Chair for Health Optimization

3:20 – 3:50 p.m.

Natasha Ahuja, Chris Lord, Kristen Stieger, Christian Zempel
Advisor: Timothy Hight

The purpose of the ECHO project is to design and build an affordable, revolutionary ergonomic chair that will be available to anyone who currently suffers or may eventually suffer from back pain caused by extensive periods of sitting.

Omoverhi

3:55 – 4:35 p.m.

Collin Burdick, Katherine Fazackerley, Ben Frederiksen, Nick Greos, Katherine Mardula, Simi Olabisi, Matt Renner; Business students: Maria Veronica Lleva Bass, Kristen Lee
Advisors: Shoba Krishnan, Hohyun Lee

Team Omoverhi developed a low-cost, low-maintenance, solar-powered incubator for premature infants in Nigeria. A solar thermal system heats the incubator through pipes containing hot water while a control system monitors the heat depending on the needs of the infant.

WE WISH TO THANK THE FOLLOWING ALUMNI, FRIENDS, AND INDUSTRY PARTNERS WHOSE PARTICIPATION AS JUDGES CONTRIBUTES GREATLY TO THE SUCCESS OF THE

Senior Design Conference…

2011 Senior Design Judges

Thank You

Bioengineering

Erik Burd '05
Restoration Robotics

Ron Hansen '72
NDS Surgical Imaging

Michael Helms '05
Stanford University School of Medicine

Gerardo Noriega
GVMED

Mamatha Sen '09

Dale Shockley '02
Math Solutions

Civil Engineering

Jeff Abercrombie '84
California High Speed Rail Authority

Cathy Avila '86
Avila and Associates Consulting Engineers

Ernesto Avila '83
Avila and Associates Consulting Engineers

Mario Baratta '64, '83
Baratta & Associates

Daniel Bettencourt '07
NOVO Construction

Thomas Bolich '70

Chris Brady '98
Stanislaus County Public Works

Paul Conrado '73, '82
The Conrado Co. Inc.

Laura Draxler '88
ZERE Energy and Biofuels

Jim Foley '68, '70

Chris Freitas '84
Santa Clara County

Todd Goolkasian '85
Cornerstone Structural Engineering Group

Richard Grabinski '91
Flatiron Corporation

Joseph Harkins '76
Lawrence Berkeley Lab

John Hopkins '74

Tony Inocencio '89
Flatiron Corporation

Kristen Jackson '08
Rudolph and Sletten

Don Johnson '69
Lockheed Martin

Sheila Johnson '82
Lockheed Martin

Bill Knopf '64
Carollo Inc.

Greg Mason '83
L.S. Mason and Associates

Anthony Mei '70
U.S. Army Corps of Engineers

Craig Mobeck '95
City of San Jose

Joseph Quilici '79
Quilici Engineers Inc.

Glenn Roberts '71
City of Palo Alto

Greg Rodrigues '79
Hohbach-Lewin Inc.

Mike Sheehy '75
Ruth and Going Inc.

Hooman Sotoodeh '82
EnviroScience Inc.

Jim Tomich '86
Bay Area Air Quality Management District

David Topete '95
SOHA Engineers

Richard Weber '92
Whitson Engineers

Computer Science and Engineering

Nikhil Balram
Ricoh Innovations Inc.

Gordon Brebner
Xilinx Inc.

Ross Dakin '07
LiveOps Inc.

Tony D'Antonio '91
Telespree Communications

Chuck DeVita '62
Growth Process Group

Karl Hennig '04
iControl Networks

Megha Jindal '10
Yahoo

Jeff Krenek '87
Hewlett-Packard

Ryan Leary '08
OnLive

Frank Lee '88
GIC Inc.

Philippe Levy '88
Visa Inc.

Avery Lu '95
ALU Net

Karim Mahrous
Sandia National Laboratories

Joseph Mastroieni '73, '77
Diocese of San Jose

John McKenna '99
NVIDIA

Richa Mehta '12

Shriram Natarajan '02
Venturi Wireless

Warren Savage '93
iPextreme

Sean Schiff '09
Sportvision

Richard Sherman '61, '64

Scott Starks '04
Hewlett-Packard

Martin Vonnegut '58, '61

Michael Wang '93
Macronix

Curtis Wilson '79
Logiquest

William Zurn '00
Alpha IP

Electrical Engineering

Samit Ashdhir '00
Microsoft Corp.

Ralph Babcock '90

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AMD

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