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Howard R. Hughes College of Engineering

Senior Design Competition

December 7, 2011

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Smart Carb Team: Francisco Aviles, Chris Walling, and Arnaldo Leyva

Student Contact Information

Francisco Aviles- avilesf2@unlv.nevada.edu

Chris Walling- walling4@unlv.nevada.edu

Arnaldo Leyva- eyvaa6@unlv.nevada.edu

Senior Design Project Abstract
Thomas Beam Engineering Building, Great Hall
December 7, 2011

Time: 10:45am-11:15am

Title: Smart Carb – Carburetor Control System

Department of Mechanical Engineering

Project Participants: Francisco Aviles, Chris Walling, and Arnaldo Leyva

Instructor: Dr. John Wang

Faculty Advisor: Dr. Woosoon Yim

Abstract
Our senior design project stems from the tedious work involved in tuning a carburetor. One of our teammates, Chris Walling, will actually be applying our device to his classic car. At first, we just wanted to tune a carburetor, but soon we realized that it would be much more beneficial -- yet challenging -- to optimize the amount of fuel that is being fed through the carburetor. We chose to do this by controlling the amount of fuel that flows into the power valve. This type of control is possible because an O_2 sensor was used to read the amount of unburned fuel exiting. Once we have this data, a needle valve is used to finely adjust the amount of fuel that is entering the power valve.

We were able to manufacture all of our custom components using the Mendenhall Center and the SEB machine shop. Our goal is to improve performance by improving the Break Specific Fuel Consumption. We aim to increase that form of efficiency by 2.5%. This may not sound like a great deal, but in many engines, that can make all the difference.

Notes:

The Harriet and Fred Cox Engineering Design

Beginning in 2003, Howard R. Hughes College of Engineering supporters Harriet and Fred Cox have generously provided for the Harriet and Fred Cox Engineering Design Award to be given to the most outstanding projects in the Senior Design Competition. Ongoing support for the awards has been established by their endowment gift to the College. The founder of four corporations: Emulex Corporation, Manufacturers Corporation, California Data Processors, and Microdata Corporation. Fred Cox knows the value of entrepreneurship very well, and he and his wife, Harriet, are delighted to support the Howard R. Hughes College of Engineering and our students in this significant venture.

SENIOR DESIGN EXPERIENCE

Part of every UNLV engineering student's academic experience, the senior design project stimulates engineering innovation and entrepreneurship. Each student in their senior year chooses, plans, designs, and prototypes a product in this required element of the curriculum. A capstone to the student's educational career, the senior design project encourages the student to use everything learned in the engineering program to create a practical, real world solution to an engineering challenge.

The senior design competition helps focus the senior students in increasing the quality and potential for commercial application for their design projects. Judges from local industry evaluate the projects on innovation, commercial potential and presentation quality. One overall winner, two winners from each discipline, and one multi-disciplinary winner (when applicable) are chosen and receive cash awards with commemorative plaques and medallions.

The competition has generated significant interest from the local community, and has provided additional motivation for students to be innovative and to produce quality projects.

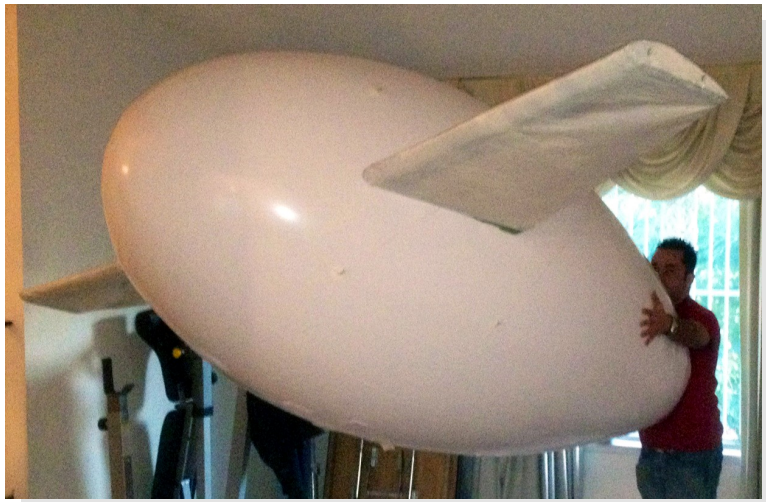
HISTORY

In 1999, the Entrepreneurship Club (E-Club) of the College of Engineering began sponsoring the Senior Design presentation event. The E-Club has been actively pursuing the goal of integrating entrepreneurship with engineering curriculum through seminars and facilitating senior design projects. In 2001, the E-Club conducted its first senior design competition. This opened the senior design event to Civil and Environmental, Electrical and Computer, and Mechanical Engineering students. The E-Club itself, the senior design projects and the competition all encourage students to become entrepreneurs upon graduation and contribute to the College's role in the economic diversification of the Southern Nevada area.

AWARDS

Beginning in 2002, College of Engineering supporters Harriet and Fred Cox have generously provided for the Harriet and Fred Cox Engineering Design Award to be given to the top outstanding projects in the senior design competition. Ongoing support for the awards has been established by their endowment gift to the College. The founder of four corporations — Emulex Corporation, Manufacturers Capital, California Data Processors, and Microdata Corporation — Fred Cox knows the value of entrepreneurship very well, and he and his wife Harriet are delighted to support the College of Engineering and our students in this significant venture. A special dinner in the spring celebrates the students' achievements and provides their families, faculty, and the greater Las Vegas community an opportunity to share in the excitement of the students' work.

HAWT Team Members: (left to right) Casey Griffith & Danny Byrd



Student Contact Information

Casey Griffith- cgriffith89@gmail.com

Danny Byrd- projectvapor@gmail.com

Senior Design Project Abstract

Thomas Beam Engineering Building, Great Hall

December 7, 2011

Time: 10:00am- 10:30am

Title: H.A.W.T. (High Altitude Wind Turbine)

Department of Mechanical Engineering

Project Participants: Danny Byrd and Casey Griffith

Instructor: Dr. Zhiyong Wang

Abstract

The High Altitude Wind Turbine (H.A.W.T.) provides a rapid-response, easily deployable source of renewable energy, to be marketed for military applications and disaster relief efforts in "off-grid" areas. The H.A.W.T. is comprised of a helium-filled envelope, a bottom-mounted 600-Watt wind turbine, stabilization fins, side-mounted airfoils, a tethering/conductive cable, and a ground-based hub for distributing all of the generated power. The H.A.W.T. utilizes the lifting gas, helium, and the airfoils in order to climb to an altitude of around 1500 ft. In doing so, it is able to tap into the constant airflow stream characteristic of the upper boundary layer. At this higher elevation, the air moves at an exponentially higher velocity than on the ground, due primarily to a lack of buildings, trees, and terrain that would otherwise slow it down. Accordingly, given these higher velocity constant airflows, the H.A.W.T. has the capability to generate much more power than its land-based counterparts, for example, a stationary, tower-mounted wind turbine.

The philosophy behind the H.A.W.T's design centers on transportability, ease of deployment, efficient energy generation, safety, and reliability. As such, every aspect of the design -- from its total weight to the storage method of the unit itself -- is in conformance with those values. Given the scale and cost of manufacturing and testing a full-scale version of the H.A.W.T., a 1/8th-scaled model was constructed for use in the senior design competition to act as a proof of concept.

Notes:

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SENIOR DESIGN COMPETITION PRESENTATION SCHEDULE

WEDNESDAY, DECEMBER 7, 2011

LOCATION: THOMAS BEAM ENGINEERING BUILDING– GREAT HALL

PRESENTATION SLOT	PRESENTATION TIME	SENIOR DESIGN PROJECT TITLE	GROUP MEMBER NAMES	DEPARTMENT
PRESENTATION 1	8:30 - 9:00 A.M.	ATMOSPHERIC WATER GENERATOR	OMER AYUBI, CHANATAN CHARNKIJTAWARUSH, & ALLAND MAGYAWI	MECHANICAL ENGINEERING
PRESENTATION 2	8:45 - 9:15 A.M.	MAXIMUM POWER POINT TRACKER	HARIS PALIC, MICHEL TABET, & PEDRO MARTINEZ	ELECTRICAL & COMPUTER ENGINEERING
PRESENTATION 3	9:00 - 9:30 A.M.	SEPARATION OF COMBINED SEWER SYSTEMS	JESUS CAMPUZANO, JORGE CARRASCO, & CAHL GOUKER	CIVIL ENGINEERING
PRESENTATION 4	9:15 - 9:45 A.M.	WINDOW REBEL	PAUL FJARE, DHARYL MONSALUD, ZACHARY MARSHEL, & MARCO MONTALVO	MECHANICAL ENGINEERING
PRESENTATION 5	9:30 - 10:00 A.M.	INTERACTIVE ADVERTISING & 360° DISPLAY	MARCIE ARAI, JORDAN DORAN, & FINAN BARIAGABR	ELECTRICAL & COMPUTER ENGINEERING
PRESENTATION 6	9:45 - 10:15 A.M.	FREEMONT STREET EXPERIENCE PEDESTRIAN CROSSING	STEPHANIE LOPEZ & TORIE LIBONATI	CIVIL ENGINEERING
PRESENTATION 7	10:00 - 10:30 A.M.	HIGH ALTITUDE WIND TURBINE	DANNY BYRD & CASEY GRIFFITH	MECHANICAL ENGINEERING
PRESENTATION 8	10:15 - 10:45 A.M.	SMART MOBILE PLATFORM	DINO TINITIGAN, PRUT UDOMWATTAWEE, & ANGEL PENALOZA	ELECTRICAL & COMPUTER ENGINEERING
PRESENTATION 9	10:30 - 11:00 A.M.	LAS VEGAS STRIP ODOR REMEDIATION PROJECT	GUADALUPE GUTIERREZ, DANIEL HOSKINS, & FRANCELL RODRIGUEZ	CIVIL ENGINEERING
PRESENTATION 10	10:45 - 11:15 A.M.	SMART CARB	ARNALDO LEYVA, CHRIS WALLING, & FRANCISCO AVILES	MECHANICAL ENGINEERING
PRESENTATION 11	11:00 - 11:30 A.M.	PORTABLE VACUUM LEAK DETECTION	JOSE ELIZONDO, LEONEL MARTINEZ, & MINGHAO WU	ELECTRICAL & COMPUTER ENGINEERING
PRESENTATION 12	11:15 - 11:45 A.M.	NICARAGUA NEEDS AGUA-	KHLOE CAMPOS, DIEREMI GUERRERO, AARON MARIANO, & LEAH PRESTON	CIVIL ENGINEERING
LUNCH	12:00 - 1:00 P.M.	LUNCH BREAK		
PRESENTATION 13	1:00- 1:30 P.M.	SYNCHRONIZED AUDIO RECORDERS	JONATHAN BARRETT & STEVEN MOREHEAD	ELECTRICAL & COMPUTER ENGINEERING
PRESENTATION 14	1:15- 1:45 P.M.	THE RC GLOVE	ERROL RICE, JUSTIN TRUEBLOOD, & BRIAN LEONARD	ELECTRICAL & COMPUTER ENGINEERING
PRESENTATION 15	1:30- 2:00 P.M.	AUTOMATED SOLAR PANEL DUST REMOVER	EDGAR GUTIERREZ, DANIEL ANDERSON, & NICKOLAS EUBANKS	ELECTRICAL & COMPUTER ENGINEERING

EDITORIAL: Working together

Dec. 07, 2010

UNLV collaboration should be a model

Let's face it, a whole lot of college students major in liberal arts because they're not fond of math. Likewise, plenty of science students aren't excited about the humanities or business.

There's nothing wrong with pursuing your passions and playing to your strengths. But in trying to establish a career and make a living, sometimes the difference between success and failure is knowing when you don't have all the answers -- and being able to find them.

Over the years, UNLV's graduating engineering students have displayed a great deal of innovation in their senior design competitions. But as the Review-Journal's Richard Lake reported Monday, their work conceiving and building products that solve problems has not led to a single commercial splash.

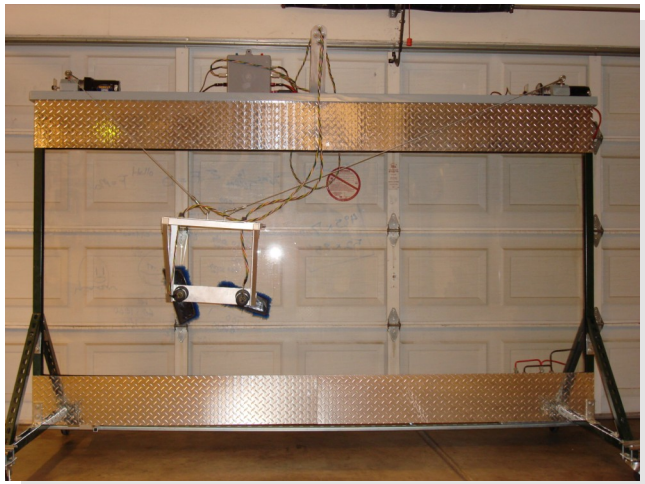
So the deans of the College of Engineering and the College of Business decided some introductions were in order.

Teams of engineering seniors were partnered with business students to take the products to the next step: the marketplace.

Students Baldomero Corona, Siul Ruiz and Francisco Sermeno had created a moving dolly that can lift 300 pounds up to 3 feet off the ground. And they weren't sure about taking on more partners.

"They said we could make $23 million after five years," Mr. Corona said of the UNLV business students. "We thought we'd be able to sell 20 of these and make our money back."

Window Rebel Team : (Left to R) Dharyl Monsalud, Paul Fjare, Zachary Marshel, and Marco Montalvo



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Senior Design Project Abstract

Thomas Beam Engineering Building, Great Hall

December 7, 2011

Time: 9:15am to 9:45am

Title: Window Rebel

Department of Mechanical Engineering

Project Participants: Dharyl Monsalud, Paul Fjare, Marco Montalvo, and Zachary Marshel

Instructor: Dr. Zhiyong Wang

Faculty Advisor: Dr. Woosoon Yim

Abstract

Clean windows are key to the presentation and appearance of any business, whether occupying a skyscraper or an office building. Window washers, employed by either the company or an outside contractor, are used to maintain a building's appearance, but can be costly in the case of an outside company, or time consuming in the case of using existing employees. Several companies have developed automated window cleaners which can clean skyscrapers with little human assistance. However, very few of these companies are creating products which can be used by small businesses in office buildings.

The Window Rebel fills this gap in the market. The Window Rebel is an automated winch-driven window cleaner. The prototype uses two winches located at the upper corners of a window section, which move a cleaning unit in a pattern along the section. The cleaning unit uses a cleaning solution and spinning brushes to clean the window. The winches would be permanent installations of a building while the cleaning unit could be detached and moved to another building. This design could also be modified to work on larger buildings, or for obscure window designs.

Notes:

Other projects that have UNLV engineering and business students working together involve wastewater management, rifle magazines and solar-powered water purification.

Higher education is supposed to prepare undergraduates for the real world by developing the skills that drive the economy. Students who remain largely within a single discipline, inside their comfort zone and away from their perceived academic weaknesses, don't get the diverse education that can unlock their greatest potential.

Bravo to Rama Venkat, interim dean of UNLV's College of Engineering, and Paul Jarley, dean of UNLV's College of Business. Their collaboration is a model for the kind of academic partnerships that can take big ideas and make them big successes.

Dean Rama Venkat

Howard R. Hughes College of Engineering

University of Nevada Las Vegas

702-895-3699 Office

rama.venkat@unlv.edu

engineering.unlv.edu

Judges

Wekianos Hailu

Las Vegas Valley Water District

Wekianos (Weki) Hailu graduated from Addis Ababa University, Ethiopia with a major in Mechanical Engineering in 1979. He joined the Faculty of Engineering at Addis Ababa University as a Graduate Assistant and over a period of 14 years worked his way up to the rank of Assistant Professor. During this time he also completed 15 months of Masters Degree study in Birmingham, England and a 6 months research leave at the Polytechnics of Turin, Italy.

Weki completed his PhD in Materials Science at the University of Birmingham, England in 1997. After graduation, he joined the Northern Ireland Bio Engineering Center (NIBEC), within the school of Electrical Engineering at Ulster University, as a Research Officer and worked on the development of Plasma Enhanced Chemical Vapor Deposition Coating from 1997 to 2000.

In 2001 Weki moved to the United States and has been working at the Las Vegas Valley Water District since 2003. Weki is a registered Professional Engineer (Nevada, U.S.), Secretary of the Nevada Section of the ASME. Formerly he was a professional member (MIM) of the Institute of Materials (UK).

Notes:

Team Members: Omer Ayubi, Alland Magyawi, Chanatan Charnkijtawarush

Student Contact Information

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Alland Magyawi- magyawi2@hotmail.com

Chanatan Charnkijtawarush- charnkij@hotmail.com

Senior Design Project Abstract

Thomas Beam Engineering Building, Great Hall

December 7, 2011

Time: 8:30am- 9:00am

Title: The Water Box – Atmospheric Water Generator

Department of Mechanical Engineering

Project Participants: Omer Ayubi, Chanatan Charnkijtawarush, and Alland Magyawi

Instructor: Dr. Zhiyong Wang

Faculty Advisor: Dr. Robert Boehm

Abstract

With the United Nations announcing a worldwide water shortage, the need for alternative sources of drinking water has been the topic of much debate in recent years. There is a lack of clean drinking water around the world, with many people and children dying or becoming very sick from drinking dirty water.

The goal of our project is to address that need by collecting water from an unconventional source, the air. This method efficiently extracts water from the air in arid climates, and at a low cost, in order to bring clean drinking water to individuals where water is not prevalent. Our product combines the absorption power of desiccants and the thermodynamic principle of condensation to provide enough water for an average family. Our design is centered on the desiccant wheel technology. This allows for air to be collected from the driest of climates, turned into moist air, and condensed into drinking water, all at the push of a button. A desiccant wheel method is used for efficiently absorbing water from a low-humidity environment; this water then can be condensed into drinking water. This was done theoretically through analytical analysis and experimentally by constructing a prototype and developing a test procedure. The theoretical results indicate a water production of 2 gallons of water in 24 hours in an environment of 20% relative humidity and 90ºF ambient temperature. The notion to extract water from the air is a simple and ancient one; however, to quantify a significant amount, a new technique was developed with promising results.

Olivia Furlan, P.E.

Brown & Caldwell

Olivia M. Furlan, P.E. is a Senior Engineer at Brown and Caldwell. Her main field of practice is assessment, design and rehabilitation of wastewater infrastructure. Ms. Furlan received her B.S. in Civil Engineering from the University of Nevada, Las Vegas in 2005. She has been a member of ASCE for 10 years, served on the NSPE board, and has served in multiple capacities for the Southern Nevada Future City competition, including Regional Co-coordinator since 2009.

Eric Cox

Telulex, Inc.

Eric Cox is the founder and president of Telulex Inc., a manufacturer of precision test equipment. He was also the founder of TelOptics Corp., a solid-state optical switching company. He has a BS in Electrical Engineering from UC Berkeley and a MS in Electrical Engineering from Cornell.

Senior Design Instructors

Civil & Environmental Engineering
Dr. David Ashley
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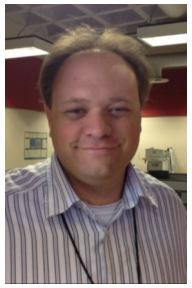

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Mechanical Engineering
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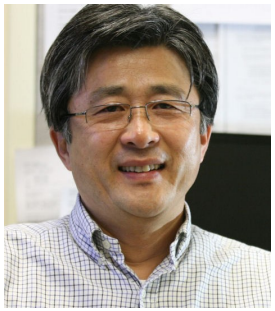

Dr. Woosoon Yim, Chair and Professor of Mechanical Engineering
woosoon.yim@unlv.edu

Mechanical engineers are problem solvers. They apply the laws of science in order to provide practical solutions to problems. Mechanical engineers deal with the relations among forces, work or energy, and power in designing systems, which will render the achievements of science to the betterment of the human environment. They may work to extract oil from deep within the earth or to send a spacecraft to the moon. The products of their efforts may be automobiles or jet aircraft, power plants or air conditioning systems, large industrial machinery or household can openers. They are involved in programs to better utilize natural resources of energy and materials as well as to lessen the impact of technology on the environment.

A Broad Discipline
All facets of modern life are directly affected by the work of mechanical engineers. Mechanical engineering involves the planning, design, manufacturing, and operation of devices, machines, and systems. It's a broad discipline at the forefront of technological advancements in energy conversion, manufacturing, machine design, fluid mechanics, and aerospace systems.

Meeting Society's Demands
Mechanical engineers continue to work toward meeting the demands of an increasingly complex technological society. They work on a variety of new ideas and innovations including: renewable energy, computational and theoretical mechanics automatic control, microfluidics, thermal system design, HVAC, robotics in applications related to:

- Space technology and aircraft design
- Orthopedic biomechanics
- Pollution control
- Automobile design and combustion engines
- Autonomous system design
- Problems of heating and air conditioning

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Mechanical Engineering

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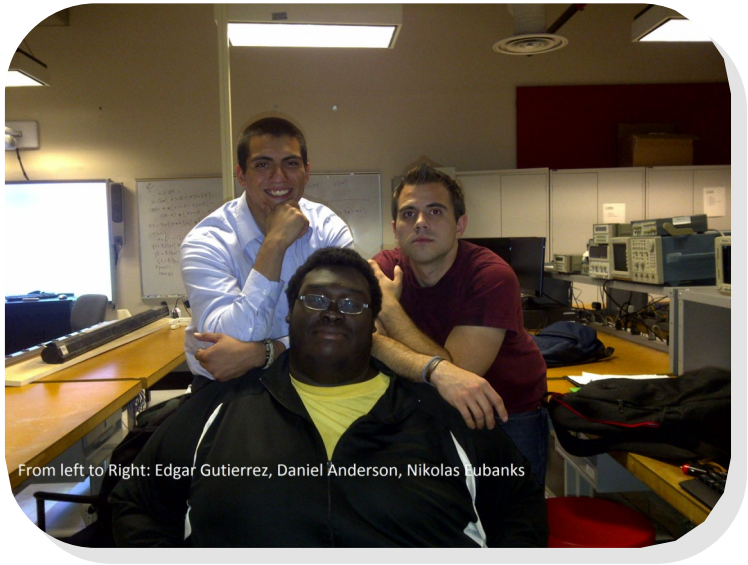

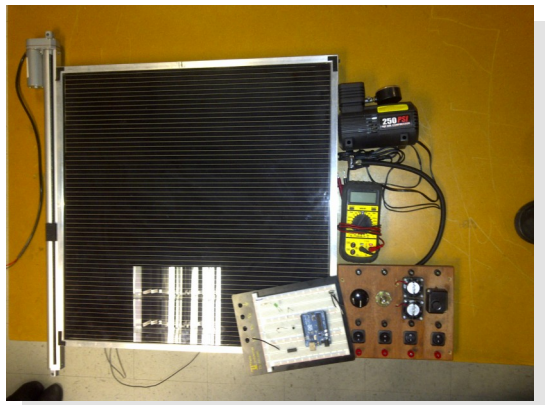

Student Contact Information

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Daniel Anderson- ander719@unlv.nevada.edu
Nikolas Eubanks- eubanksn@gmail.com

Senior Design Project Abstract

Thomas Beam Engineering Building, Great Hall

December 7, 2011

Time: 1:30pm – 2:00pm

Title: Automated Solar Panel Dust Remover

Department of Electrical and Computer Engineering

Project Participants: Edgar Gutierrez, Daniel Anderson, and Nickolas Eubanks

Instructor: Brandon Blackstone

Client Advisor: N/A

Faculty Advisor: Dr. Yahia Baghzouz

Abstract

The desire to have renewable energy has grown significantly around the world. In hot, desert regions, harnessing the sun's energy is an invaluable resource. In turn, this demand for renewable energy has led to the construction of large-scale solar power plants. The obvious disadvantage of such technologies in arid climates is the need for water to produce energy. The cost of supplying water to such regions is very expensive, which is why many solar power plants thrive in areas with regular rainfall, where the supply of water is relatively easy to secure.

To combat the high dependence for water, photovoltaic (PV) solar power systems are utilized because they require only very little or no water. The problem with these panels is that they accumulate dust particles over time, which compromises the power efficiency of the solar power system. The dust essentially causes water to become more essential, due to the constant cleaning needed to maintain high power efficiency.

The focus of our project was to design an automated system that could effectively clean photovoltaic cells without the use of water and also without compromising power efficiency. Our automated Solar Panel Dust Remover is designed to periodically remove the inevitable buildup of dust on PV panels. The Dust Remover blows a high burst of compressed air across the panel in fixed intervals designated by the user in order to remove all debris from the surface. The system is integrated with the solar panel, drawing as little power as possible to power the system. Since power is crucial, the entire system, except for the timer, shuts off to conserve energy in between cleaning cycles.

Dr. Donald Hayes, Chair and Professor of Civil & Environmental Engineering

donald.hayes@unlv.edu

About CEE

Civil and environmental engineering involves the planning, analysis and design, construction, operation, and maintenance of the world's structures and infrastructure. Civil and environmental engineers design and construct buildings, bridges, highways, dams, water and wastewater treatment facilities, and other public and private works essential to civilized life in a modern society. Civil engineers also apply modern and sophisticated tools to plan and design large-scale systems for the public good, as well as the components and materials that are employed. Civil engineers work primarily in teams, in a broad range of business models and as public servants. The Civil and Environmental Engineering curriculum is designed to provide graduates with the skills needed to become successful, innovative and socially responsible civil engineers.

Our curriculum, modeled on the recommendations of the American Society of Civil Engineers (ASCE), is fully accredited by the Engineering Accreditation Commission of ABET (111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone: 410-347-7700).The Department of Civil and Environmental Engineering provides a well-rounded education, combining theoretical principles with practical laboratory experience. Our program prepares you to excel in industry or compete against other students at the best graduate schools in the country. Las Vegas is in a perfect example of engineering in action. The city has emerged as a major urban center with major investments in infrastructure for transportation, water and wastewater systems, and major structures like bridges and buildings.

For more information, please visit our website:

ce.egr.unlv.edu

Senior Design Project Abstract

Thomas Beam Engineering Building, Great Hall

December 7, 2011

Time: 9:00am- 9:30am

Title: Separation of Combined Sewer Systems Utilizing CIPP

Department of Civil & Environmental Engineering

Team Name: ESI, Environmental Solutions and Innovation

Project Participants: Cahl Gouker, Jesus Campuzano, and Jorge Carrasco

Instructor: Dr. David Ashley

Client Advisor: Brian Osborne

Faculty Advisor: Dr. Jaci Batista

Abstract

The release of untreated wastewater has numerous negative effects on both humans and the environment. Wastewater is released by combined sewer overflows and separate sewer overflows when treatment or conveyance capacity of current sewer systems is reached. Combined sewer system overflows are estimated to be 850 billion gallons annually. Combined sewer overflows primarily occur during wet weather events such as precipitation or snowmelt. The increase in runoff results in an increased volume of water in the sewer lines. The EPA can impose fines on any community that allows wastewater to be discharged untreated. Separating the wastewater and runoff in the system will allow system controllers to discharge excess runoff without discharging untreated wastewater

ESI took on this project to determine if and where cure in place pipe (CIPP) can be utilized to separate current combined sewer systems. ESI will also look into the feasibility of CIPP compared to the cost of installation of a separate sewer system. The use of CIPP can provide an alternative solution for the separation of wastewater from runoff while also providing cost savings to the affected communities.

Notes:

Notes:

RC Glove Team: (L to R) Justin Trueblood, Brian Leonard, and Errol Rice

Student Contact Information

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Brian Leonard- Bleonard82@gmail.com

Errol Rice- Errice@gmail.com

Senior Design Project Abstract

Thomas Beam Engineering Building, Great Hall

December 7, 2011

Time: 1:15pm- 1:45pm

Title: Radio-controlled (RC) Glove

Department of Electrical & Computer Engineering

Project Participants: Brian Leonard, Errol Rice, and Justin Trueblood

Instructor: Brandon Blackstone

Client/Faculty Advisor: Brandon Blackstone

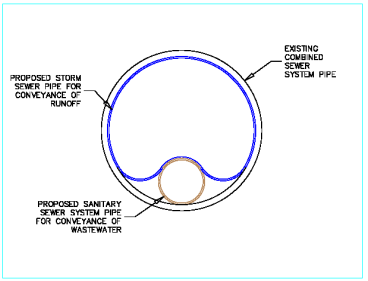
Abstract

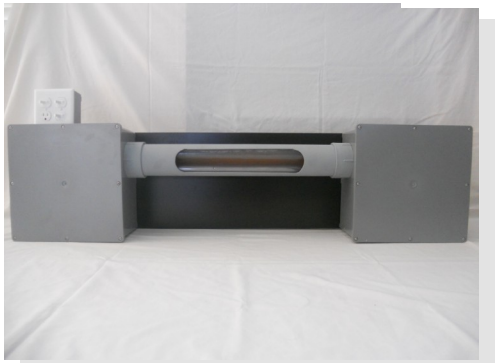
Radio-controlled (RC) cars are a multi-billion dollar industry, enjoyed by children and hobbyists alike. It is not uncommon for a hobbyist to spend hundreds of dollars on pre-built radio-controlled cars. Hobbyists who build their own RC cars even spend more to get parts in order to customize a car to their liking. However, there has been very little advancement in the way the cars are controlled. Radio cars are controlled by a transmitting joystick and uses radio frequency (RF) as the dominant medium to transmit the signal between control and car.

Three Old Guys (TOG) realized that there is a great opportunity to enter an already successful market and take advantage of the ways things are done by putting our ingenuity to revolutionize this hobby. Looking closely, the RC car is what people always customize with faster motors, stronger shocks, and cool body styles. What we did was build a controller that an end user can control with a glove by using hand. This RC glove brings a whole new dynamic to the Radio Control market. Besides being fun, it also provides the ability to control the car with one hand instead of using two, which is the traditional way one controls an RC car.

Another improvement is in the transmission between the car and the controller. The signal is transmitted by using Bluetooth technology. Unlike traditional RF, which uses only one frequency for transmission, Bluetooth technology sends data from one device to another using up to 79 frequencies. By using Bluetooth, we can take advantage of future adaptations, such as creating an app to work with an Iphone or Android device to connect to your car and control it. This is a very exciting application will not be too difficult to integrate into the existing receiver's in the car. TOG is all about being on the edge of technology, and making it fun for the end user.

ESI Team Members (L to R): Jorge Carrasco, Jesus Campuzano, and Cahl Gouker





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Senior Design Project Abstract

Thomas Beam Engineering Building, Great Hall

December 7, 2011

Time: 9:45am- 10:15am

Title: Fremont Street Experience Pedestrian Crossing

Department of Civil & Environmental Engineering

Project Participants: Torie Libonati and Stephanie Lopez

Instructor: David B. Ashley

Client Advisor: Mendenhall Smith

Faculty Advisor: Dr. Samaan Ladkany

Abstract

To gain access to the Freemont Street Experience from the east side of North 4th Street, pedestrians must cross a dangerous section of that street. This section of roadway currently has a designated crosswalk, with traffic signals in place specifically for pedestrian traffic. However, at night and during rush hour, this system is inadequate to handle the large volume of both pedestrians and vehicles. Motorists who are distracted by the Freemont Street Experience constantly fail to notice pedestrians crossing or the traffic signals. This is a dangerous combination that poses a great safety issue.

The specific problem faced by our team was how to create a safe entrance for pedestrians into the Freemont Street Experience from east of North 4th Street, without interfering with traffic. Five solutions were analyzed, including a "Do Nothing" alternative. One of these alternatives was to construct a pedestrian bridge over North 4th Street. Another alternative was to redesign North 4th Street so that it becomes an underpass beneath this area. A similar alternative was to construct a pedestrian underpass beneath North 4th Street. The final alternative was to close North 4th Street and redirect traffic so that no vehicles would be allowed through this area. The alternative chosen was the pedestrian bridge; this choice was based on such variables as cost, time, pedestrian safety, vehicle safety, pedestrian convenience, vehicle convenience, effect on businesses, and aesthetics.

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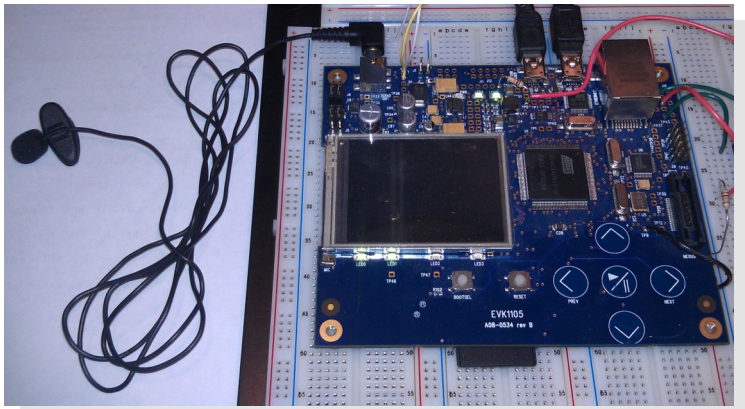

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Senior Design Project Abstract
Thomas Beam Engineering Building, Great Hall
December 7, 2011

Time: **1:00pm- 1:30pm**
Title: Synchronized Audio Recorders
Department of Electrical & Computer Engineering
Project Participants: Jonathan Barrett and Steven Morehead
Instructor: Brandon Blackstone
Client Advisor: N/A

Abstract:

For many years the film industry has been dependent on old analog technology for recording audio. The transition to digital formats has been a slow one. Currently, a combination is commonly used, where the audio is passed through analog equipment -- such as amplifiers and filters -- before it finally is recorded to a digital device. The most preferred digital recording medium is the Digital Audio Tape (DAT), which is bulky and difficult to operate. Once the audio is recorded, it must be edited by an audio expert. Usually, this is a lengthy and expensive process, especially if multiple tracks are to be combined for the final product. All of this equipment is proprietary, extremely expensive, and usually requires experienced experts to operate. To take the next step toward a fully digital audio experience, our Synchronized Audio Recorders, are portable, require low power, are synchronized, and are affordable.

Synchronized Audio Recorders are designed to be small, standalone devices for recording a single channel of audio to a secure digital (SD) card, while at the same time being synchronized with each other. This allows multiple units to function as a system without direct interaction with each other. The end result is multiple digital audio tracks that can easily be combined once downloaded to a computer. The solution is affordable and easy to use, making these recorders a useful tool, especially with the prevalence of internet video today.

Team Members: (L to R) Torie Libonati and Stephanie Lopez

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Senior Design Project Abstract

Thomas Beam Engineering Building, Great Hall

December 7, 2011

Time: 10:30am- 11:00am

Title: Las Vegas Strip Odor Remediation Project

Department of Civil & Environmental Engineering

Project Participants: Guadalupe Gutierrez, Francell Rodriguez, and Daniel Hoskins

Instructor: Dr. David Ashley

Client Advisor: Brian Osborne, P.E, M.P.A. Clark County Water Reclamation District

Faculty Advisor: Dr. Jacimaria Batista

Abstract

Las Vegas Boulevard is a world renowned travel destination, located in the heart of our city. One-of-a-kind tourist attractions dot the landscape along the Las Vegas Strip and include carnival rides high atop the Stratosphere, the beautiful Bellagio fountains, the breathtaking Cirque du Soleil shows, and the Fremont Street Experience. Las Vegas is a place where people come expecting to be "wowed," and is pleased to provide that experience. For the most part, the city delivers, and people leave with a good overall impression. However, an area that could be improved upon are unpleasant odors that escape from the sewer system in parts of the city, one of the most notable locations being at the intersection of Las Vegas Boulevard and Flamingo Road, right at the heart of the strip. This odor is a byproduct of biological processes that occur in the wastewater as it flows through the system en route to the wastewater treatment plant.

In this project, our group -- Gutierrez, Rodriguez and Hoskins eSCENTial Air Technologies (GRHeAT) -- evaluated four different alternatives for dealing with this issue: granulated activated carbon filtration, biofiltration, nitrate addition and the do-nothing alternative.

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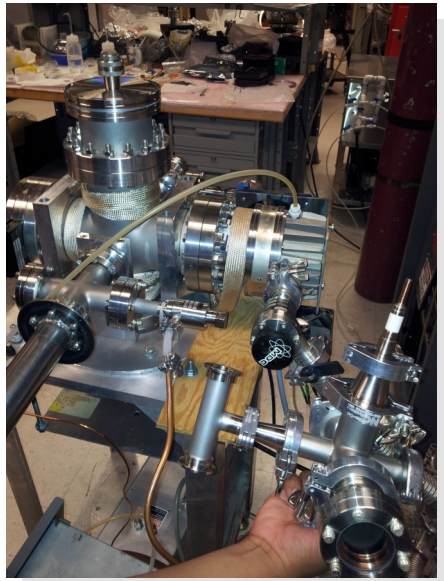
Team Members: (L to R) Minghao Wu, Leonel Martinez, and Jose Elizondo



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Senior Design Project Abstract
Thomas Beam Engineering Building, Great Hall
December 7, 2011

Time: 11:00am- 11:30am

Title: Portable Vacuum Leak Detection

Department of Computer and Electrical Engineering

Project Participants: Jose Elizondo, Leonel Martinez, and Minghao Wu

Instructor: Brandon Blackstone

Advisor: Stanley Goldfarb

Abstract

The detection of leaks within vacuum systems is an important issue for the solid state industry. Currently, several techniques are employed to detect leaks. These range from simple acoustic methods that listen for the leak to expensive and precise methods, such as mass spectrometers and residual gas analyzers. However, these systems are expensive and require both trained operators and invasive procedures for effective use. A sizable subset of vacuum systems utilize a foreline. It is for these systems that we have developed a simple and inexpensive method of leak detection.

Our design consists of three main stages: ionization, filtering, and photo-detection. The ionization stage occurs in the foreline within our device. Using parallel plates to generate a strong electric field, a glow discharge is created from the gases flowing through the foreline. The glow discharge releases photons with wavelengths corresponding to the gases present in the foreline. To detect leaks, a tracer gas -- in this case, helium -- is sprayed outside around the system where the leak may be. If there is a leak, the helium will make its way into the foreline and undergo ionization, releasing a wavelength unique to helium. Because several gases may be present in the foreline, helium's specific wavelength must be isolated. Using fiber optics, photons from the glow discharge are directed through a bandpass filter tuned to helium's wavelength, thereby eliminating all unwanted wavelengths. Only helium's wavelength can pass through the filter and reach the photo-detector; at that point, the light energy is converted into electrical energy. Since this energy is small, an amplifier is used to boost the signal and increase the sensitivity of the detector. The output signal drives an indicator that signals whether helium is present in the system, therefore, a leak.

Team Members: (L to R) Francell Rodriguez, Guadalupe Gutierrez, and Daniel Hoskins

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Senior Design Project Abstract

Thomas Beam Engineering Building, Great Hall

December 7, 2011

Time: 11:15am – 11:45am

Title: Nicaragua Needs Agua: Potable Water Supply for the Community of El Robledal

Department of Civil & Environmental Engineering

Project Participants: Khloe Campos, Dieremi Guerrero, Aaron Mariano, and Leah Preston

Instructor: Dr. David Ashley

Client Advisor: Maylinn Rosales

Faculty Advisor: Dr. Sajjad Ahmad

Abstract

The drinking water supply in the community of El Robledal, Nicaragua, has become scarce due to deforestation, watershed degradation, and an increased population. As a result, a rainwater catchment lagoon eventually was built as the primary water source. Unfortunately, this basin contains poor quality water, and is insufficient during the dry season, leaving the El Robledal community in dire need of a cleaner and more reliable water
supply.

In partnership with Engineers Without Borders, DKAL Consultants aim to design a dependable, potable water supply system that best meets the community's demands. DKAL Consultants also aspire to design a water system that utilizes readily available technology and materials, is cost effective, requires minimal operation and training, and can adjust to other potential circumstances, such as further increase in population or unexpected weather conditions.

Based on site conditions, DKAL Consultants chose to focus on a design alternative involving a pipeline that extends from a natural spring approximately eight kilometers away to a storage tank within the community. In addition to the pipeline, DKAL Consultants also considered designs that had the potential to increase the amount of supplied water.

The ultimate purpose of the project was to provide the community of El Robledal with a practical design that could be implemented in the near future; however, the El Robledal water supply system is a great template for other communities that may suffer from a similar potable water deficiency.

Team Members: (L to R) Angel Penaloza, Dino Tinitigan, and Prut Udomwattawee

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Senior Design Project Abstract
Thomas Beam Engineering Building, Great Hall
December 7, 2011

Time: 10:15am- 10:45am
Title: Smart Modular Platform
Department of Electrical and Computer Engineering
Project Participants: Dino Tinitigan, Prut Udomwattawee, and Angel Penaloza
Faculty Advisor: Dr. Venkatesan Muthukumar

Abstract
SMP (Smart Modular Platform) is an open-source, fully customizable, modular platform for implementing embedded technologies into any device. SMP is designed to allow considerable design modularity and application-specific customization. The platform would consist of electric motors, an embedded system, a data fusion module, a control module, and other modules, such as sensor modules customized for the application. Each module would be designed to carry out a specific task, such as environment monitoring, system monitoring, collision avoidance, GPS, wireless control, and many other functions. It also will feature real-time web connectivity for monitoring and data logging.

SMP would be implemented on an electric wheelchair that has several customized modules designed to accommodate different disabilities. The wheelchair can be controlled by using traditional joystick controls, head movements and gestures, and remote control by a third person. This can be achieved by customizing the modules based on the user's needs. Additionally, the wheelchair will be equipped with a global positioning system (GPS) module, environment module, an access control module for radio frequency identification (RFID), and a Collision Avoidance System module. It will include an embedded system that will show a graphical user interface (GUI) to display important information to the user.

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Team Members: (L to R) Aaron Mariano, Leah Preston, Khloe Campos & Dieremi Guerrero

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Khloe Campos- camposk3@gmail.com
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Electrical & Computer Engineering

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Senior Design Project Abstract
Thomas Beam Engineering Building, Great Hall
December 7, 2011

Time: 9:30am– 10:00am

Title: Interactive Advertising and 360° Display

Department of Electrical and Computer Engineering

Project Participants: Marcie Arai, Finan Bariagabr, Jordan Doran

Instructor: Brandon Blackstone

Faculty Advisor: Brandon Blackstone

Abstract

The Interactive Advertising and 360° Display is a dual-component project that taps into the underutilized market of interactive digital advertising in the United States; it also aims to enhance the consumer experience.

The first aspect of our project involves a viewer-triggered advertisement system that is seldom seen outside of bars, clubs, and restroom settings. Where they are installed, a viewer approaching the advertisement often turns it off so that the system functions as a mirror. We have solved this problem with an easy-to-use system of our own. The 4i interactive advertising module features a countertop, two-way mirror/monitor system. This system detects the presence of a viewer and displays an advertisement, which becomes visible through the two-way mirror upon power up of the monitor. When no one is in front of the system, it appears as a regular mirror.

The second aspect of our project provides consumers with a more accessible and easier way of trying on clothes and accessories at a store by allowing people to adequately view themselves from all angles using a record and playback system. Currently, there is currently no market in the U.S. for such a product; the Kinect Dressing Room comes closest, but merely projects digital clothes and accessories onto the body with only a frontal view and an inaccurate fit. Our system allows customers to actually see themselves in the garments and in motion. The 360° display module consists of a larger, wall-mounted dressing room two-way mirror/monitor. If the user decides to create a recording, it can be played back through a monitor behind the two-way mirror, which will otherwise operate as a normal mirror. With this display system, we strive to increase sales and decrease unsatisfied customers.

Dr. Henry Selvaraj, Chair and Professor of Electrical & Computer Engineering
henry.selvaraj@unlv.edu

About ECE

Engineering has had a long history at UNLV beginning in 1962 with the hiring of Herb Wells, a local mining engineer, to offer courses that could lead to matriculation to the bachelor's programs located in Reno, Nevada. Local growth led to the establishment of the School of Engineering in 1976 housed within the College of Sciences. Things changed dramatically in 1984 when the University of Nevada Board of Regents approved of separate bachelor and masters degrees in civil engineering, mechanical engineering, electrical engineering, and computer science. That same year, plans were being finalized to construct the new Thomas Beam Engineering Complex to house all of the engineering and allied programs.

The electrical engineering program was accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410)-347-7700 in 1987. Master of Science in Electrical Engineering was in place by 1986. In 1990 Electrical and Computer Engineering took up residence in Thomas Beam Complex. By 1991, doctoral program in engineering with major in electrical engineering was approved. The faculty size in the department grew from 2 in 1983 to 15 in 2006. Currently, the Department has 15 faculty members, two professional staff for the laboratories and two administrative assistants. In 1999, the first Ph.D. student, Bing Chen, graduated. In 2005, B.S. in computer engineering was accredited by Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410)-347-7700. In 2006, E.M.I.T.I.O.N. and CICT Centers were approved by the Board of Regents.

For more information, please visit our website:

ece.unlv.edu

Senior Design Project Abstract
Thomas Beam Engineering Building, Great Hall
December 7, 2011

Time: 8:45am- 9:15am

Project: Maximum-Power Point Tracker for Photovoltaic Panels

Department of Electrical & Computer Engineering

Project Participants: Pedro Martinez, Michel Tabet, and Haris Palich

Instructor: Dr. Paolo Ginobbi

Faculty Advisor Dr. Yahia Baghzouz

Abstract

Solar Energy is one of the most promising renewable resources on the planet. With the need to reduce carbon emissions and the depletion of non-renewable energy resources, Solar Energy is a viable solution to our energy problems. The most common method of harvesting Solar Energy is by using Photovoltaic Panels. Due to the growing demand for renewable energy sources, the manufacture of photovoltaic arrays has advanced considerably. Unfortunately, the efficiency of such photovoltaic panels depends greatly on the weather and sunlight conditions. Our project involved building a Maximum-Power Point Tracking (MPPT) system that employs a controller to determine how much current and voltage should be drawn from a solar panel in order to maximize power output. The ideal amount of current and voltage values vary with environmental conditions. Therefore, the controller can continually calculate the values necessary to achieve maximum power output. Once the values of current and voltage are determined by the controller, a buck boost converter is used to draw those values. Photovoltaic technology is still very expensive; however, the use of controllers like the MPPT improves the cost benefits by enhancing the efficiency of these systems.

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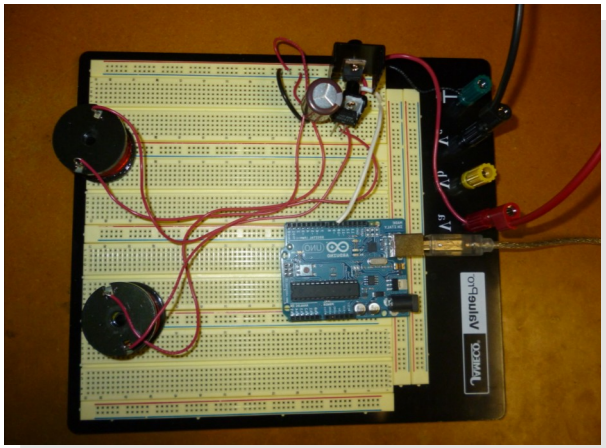

Team Members: (L to R) Haris Palich, Pedro Martinez, and Michel Tabet

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