CELEBRATE THE SPIRIT OF INNOVATION…

FALL 2010 SENIOR DESIGN COMPETITION

The Howard R. Hughes College of Engineering

WEDNESDAY, DECEMBER 1, 2010

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

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 to 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, two winners from each discipline, and one multi disciplinary winner (when applicable) are chosen and receive cash awards and 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.

The 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 provides their families, faculty, and the greater Las Vegas community an opportunity to share in the excitement of the students' work.

Senior Design Instructors

Dr. Paolo Ginobbi
Department of Electrical & Computer Engineering

Dr. Samaan Ladkany
Department of Civil & Environmental Engineering

Dr. John Wang
Department of Mechanical Engineering

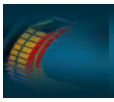
Judges

A special Thank You to our
Senior Design Industry Judges:

Michelle Miller
NSTec, LLC

Adam Godorov
NV Energy

Name
Company



Senior Design Competitio

Presentation Slot	Presentation Time	Senior Design Project Title
PRESENTATION 1	8:30 - 9:00 a.m.	City of North Las Vegas Effluent Discharge
PRESENTATION 2	8:45 - 9:15 a.m.	LIVE System
PRESENTATION 3	9:00 - 9:30 a.m.	File Transfer Station
PRESENTATION 4	9:15 - 9:45 a.m.	OPEN
PRESENTATION 5	9:30 - 10:00 a.m.	Vertical Lift Dolly
PRESENTATION 6	9:45 - 10:15 a.m.	Solar Powered Water Purification
PRESENTATION 7	10:00 - 10:30 a.m.	BET ON THIS
PRESENTATION 8	10:15 - 10:45 a.m.	Environmental Control Unit
PRESENTATION 9	10:30 - 11:00 a.m.	Motorcycle Accident Detection System
PRESENTATION 10	10:45 - 11:15 a.m.	Dual Surface Rotor Grinder
PRESENTATION 11	11:00 - 11:30 a.m.	Maryland Parkway Redevelopment
PRESENTATION 12	11:15 - 11:45 a.m.	Quick Loading Magazine
PRESENTATION 13	11:30 a.m. - Noon	OPEN
LUNCH	**Noon - 12:30 p.m.**	**LUNCH BREAK**
PRESENTATION 14	12:30 - 1:00 p.m.	OPEN
PRESENTATION15	12:45 - 1:15 p.m.	Fast Neutron Fission Detector
PRESENTATION 16	1:00 - 1:30 p.m.	Scanning Alpha Particle Spectrometer
PRESENTATION 17	1:15 - 1:45 p.m.	OPEN
PRESENTATION 18	1:30 - 2:00 p.m.	OPEN
PRESENTATION 19	1:45 - 2:15 p.m.	OPEN
PRESENTATION 20	2:00 - 2:30 p.m.	Design of the Tree Pedestrian Bridges Over Floo
PRESENTATION 21	2:15 - 2:45 p.m.	OPEN
PRESENTATION 22	2:30 - 3:00 p.m.	OPEN
PRESENTATION 23	2:45 - 3:15 p.m.	OPEN
PRESENTATION 24	3:00 - 3:30 p.m.	Bus Rapid Transit System Design on Flamingo R

tion Presentation Schedule

e	Department
	Civil & Environmental Engineering
	Electrical & Computer Engineering
	Electrical & Computer Engineering
	Mechanical Engineering
	Electrical & Computer Engineering
	Mechanical Engineering
	Electrical & Computer Engineering
	Electrical & Computer Engineering
	Mechanical Engineering
	Civil & Environmental Engineering
	Mechanical Engineering
	LUNCH
	Interdisciplinary Mechanical Engineering/ Electrical & Computer Engineering
	Interdisciplinary Mechanical Engineering/ Electrical & Computer Engineering
- Flood Plain Rivers in Sudan	Civil & Environmental Engineering
ngo Rd.	Civil & Environmental Engineering

Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 8:30am to 9:00am

City of North Las Vegas Water Reclamation Facility: Effluent Discharge

Department: Civil and Environmental Engineering

Project Participants: Tania Jarquin, ShaLonda Palmore II, and Laken Zografos

Instructor: Dr. Samaan Ladkany

Community Mentor: Dave N. Commons , Water Reclamation Facility Administrator, City of North Las Vegas

Abstract

The Las Vegas population continues to grow and the water demand parallels this trend. As a result, there is need for an additional water treatment plant. The North Las Vegas Wastewater Treatment Plant is located on Carey Avenue, south of Nellis Air Force base. Ideally, the treated effluent is sent down the Las Vegas Wash to Lake Mead in order to meet appropriate policies and retain water credits. At Lake Mead, it is further treated and reused. However, the plant's five-mile distance from the Las Vegas Wash calls for an alternative method to transport the treated effluent to Lake Mead. The Sloan Channel can be used because it connects to the Las Vegas Wash, but because a small section of the Range Wash is not fully tied in with the Sloan Channel, permits have restricted the use of this channel for water discharge. Also, the Sloan channel, an open channel involving health hazards, requires permits for use. Finally, this channel must be evaluated to determine if it can fully support the volume of the discharge for a given amount of wastewater per year. If use of the Sloan Channel is not feasible, the alternative is to construct an underground pipeline running along or directly under the channel to the wash. This involves cut-and-fill calculations, excavation, proper grade elevation of the pipeline for gravitational flow, and calculations of velocity and maximum flow of waste-water treatment. The most accurate measurements can be determined using GISMO (gisgate mapping) and GIS (Geographic Information Systems) software. Similar programs, such as Water Cad, can be used to insure proper size and material of piping. No pumping station is necessary because the pipe will be installed in a position that will allow the flow to travel downwards using only the pull of gravity. The cost of the project is very expensive; with the alternative design of underground piping, the cost increases even more. However, the engineering of the project is feasible.

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Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 8:45am to 9:15am

Low-power Integrated Vital-sign Examination System (LIVES)

Department: Electrical and Computer Engineering

Project Participants: Fakhar Anjum, Prentyce Albright, Kazeem Omidiji, Isaac Juarez

Instructor: Dr. Paolo Ginobbi

Faculty Adviser: Dr. McGaugh

Abstract

An estimated 160 million Americans will be monitored for chronic conditions by 2020. The combined market in the United States and the European Union for wireless health monitoring systems and home health monitoring systems will grow from $3 billion in 2009 to an estimated $7.7 billion by 2012. The Low-power Integrated Vital-Sign Examination System (LIVES) consists of a digital thermometer, a pulse oximeter, and an EKG machine. It will send three signals to one monitoring station wirelessly. A low-power digital signal processor is used in the design of the pulse oximeter and EKG device. The thermometer uses a microcontroller to display body temperatures ranging from 95-105 ˚F. Conversion of essential medical devices to wireless communications, as done with this system, can result in greater convenience and a more comfortable experience for consumers.

Notes:

No Photo or Graph Available

Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 9:00am to 9:30am

File Transfer Station

Department: Electrical and Computer Engineering

Project Participants: Alexander Campos & Aaron Morrisett

Instructor: Dr. Paolo Ginobbi

Faculty Adviser: Dr. Emma Regentova

Abstract

Portable digital information is exchanged continually by businesses, researchers, and students. Traditionally, floppy disks and, more currently, USB flash drives have been used to store and transfer digital information to a computer. However, a computer may not always be available when needed. To solve this problem, we developed a highly portable, hand-held File Transfer Station that can transfer folders and files from one USB flash drive to another without the need of a computer. The device has an LCD screen for a user-friendly interface and navigation buttons designed so that someone unfamiliar with the device can transfer files swiftly and without any difficulty. The menu options allow a user to specify which inserted drive to browse and transfer files from, to choose whether or not to overwrite files, and to verify that the files have been copied to the respective memory device. It has a real-time clock so that files have accurate time stamps of when the transfer occurred. The File Transfer Station can also be used to transfer files from a USB flash drive to a microSD card and vice versa.

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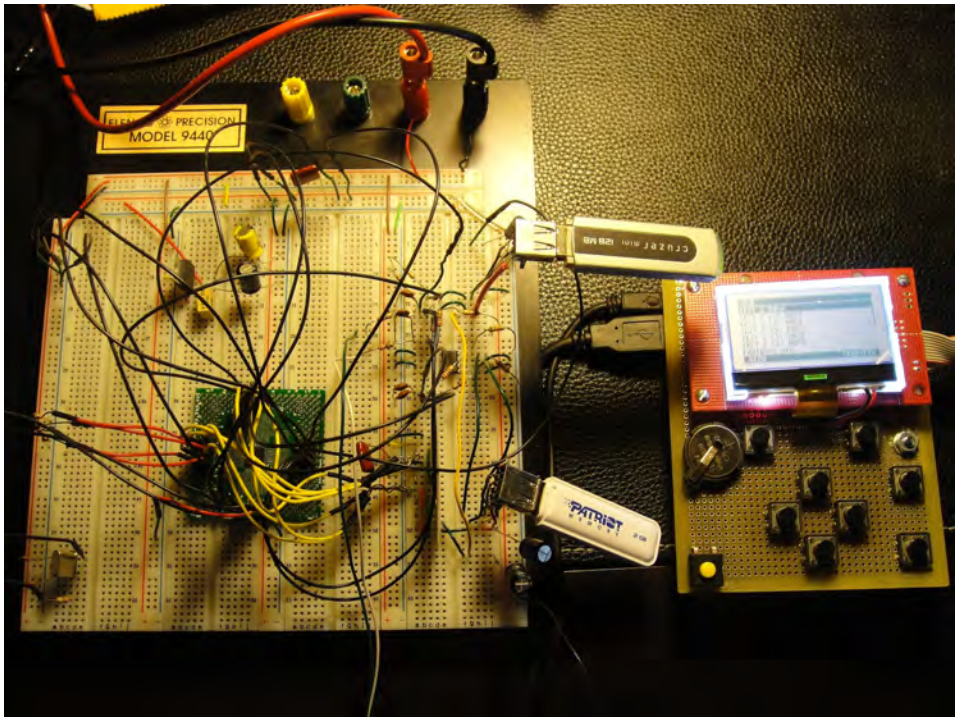
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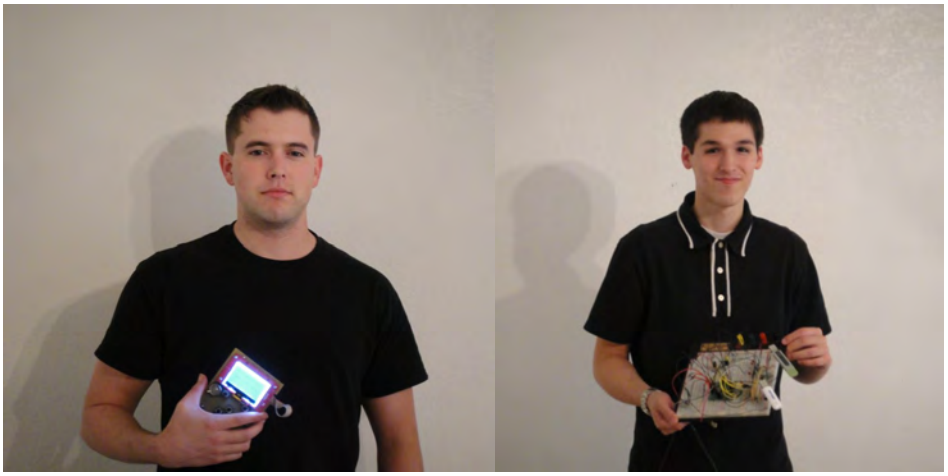
MODEL 9440
PATRIOT



Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 9:30am to 10:00am

Vertical Lift Dolly

Department: Mechanical Engineering

Project Participants: Baldomero Corona, Siul Ruiz, Francisco Sermeno

Instructor: Dr. John Wang

Faculty Adviser: Dr. Mohamed Trabia

Abstract

For households where there is a frequent need to vertically lift heavy loads vertically, such as compact furniture, we have designed the Vertical Lift Dolly. This device is a retrofit to a standard 600-lb dolly and includes a pulley system operated by an interchangeable hand winch. This allows a single user to easily move loads of up to 250 lbs to heights up to 34 inches. For example, this dolly can be used to lift a load of gravel, lumber, or a television set from the ground to the height of the bed of a pickup truck. Compared to similar devices available on the market, such as hand trucks and scissor lifts, the Vertical Lift Dolly is safe, durable, lightweight, and highly mobile. It is two to three times less costly than comparable products on the market and more compact. The straightforward lifting capability and the limited number of moving parts result in low maintenance. In most cases, repair can easily be done with a ratchet and screwdriver. The device can be modified to meet manufacturer or customer needs.

Notes:

Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 9:45am to 10:15am

Solar-Powered Water Purification

Department: Electrical and Computer Engineering

Project Participants: Wali Zaidi, David Altum, Jorge Rivera

Instructor: Dr. Paolo Ginobbi

Faculty Adviser: Dr. Yahia Baghzouz, Dr. Venkatesan Muthukumar

Abstract

The quality of drinking water is inadequate in many remote locations worldwide, often due to the lack of a purification system and/or an unreliable power source to supply an existing purification process.

A dependable and efficient solution is to harness the energy of the sun using photovoltaic panels. The design is a completely independent power source due to a back-up battery system for night use and overcast days. This design incorporates multiple performance sensors for maximum power efficiency and to ensure monitoring so that the water meets health, safety, and quality standards appropriate to that region. In addition to use in small, remote communities, this system has a wide range of target consumers such as humanitarian relief agencies and outdoor recreation enthusiasts.

Notes:

No Photo or Graph Available

Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 10:00am to 10:30am

Blade Element Theory Omnidirectional Neodymium Technical Home Improvement System (B.E.T. O.N. T.H.I.S.)

Department: Mechanical Engineering

Project Participants: Robert Saylors, Andrew Mazzolini, Tommy Roberts

Instructor: Dr. Zhiyong Wang

Faculty Adviser: Dr. Yi-Tung Chen

Abstract

Today's homeowners are interested in finding cost-effective ways to use Green Energy, having minimal impact to the environment. This project is a wind turbine for a single-family home and is capable of producing nearly 1 kW of energy in a 20 mph wind. The design involves a horizontal-axis wind turbine with three blades (designed using blade element theory); which are connected to a generator (constructed with hybrid neodymium magnets), and then connected to a fuselage-style body. The body has an extruding tail boom that is equipped with an over-speed protection system and a tail rudder. The base of the wind turbine has a ball-bearing system that allows the turbine to rotate freely, enabling it to track changes in the wind direction for optimal performance. This system is then attached to a mounting structure for stability. The anticipated customer base for this wind turbine system includes off-the-grid homes, cabins, and ranches; other customers could include sustainable communities.

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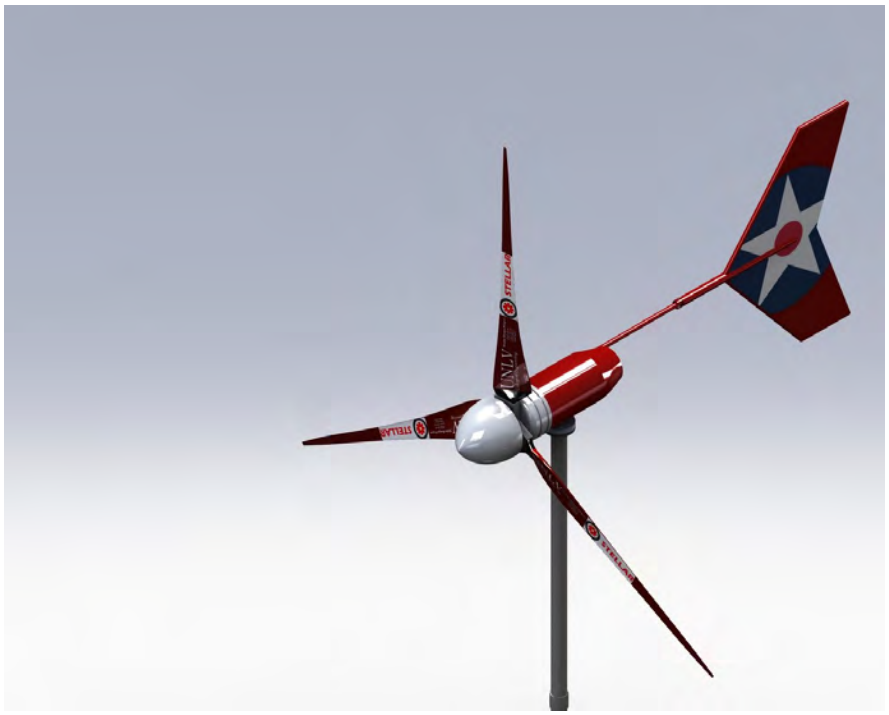

Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 10:15am to 10:45am

Project name: Environmental Control Module

Department: Electrical and Computer Engineering

Project Participants: Chris Belcher, Ho Nam Ho, Jonas Estefanos

Instructor: Dr. Paolo Ginobbi

Faculty Adviser: Dr. Biswajit Das

Abstract

The Environmental Control Module combines the functions of several devices in order to control room temperature, humidity levels, and barometric pressure. In addition, it measures oxygen levels and checks for the presence of various combustible gases. The user sets the range of conditions preferred in the room and an alarm signal, displayed on a monitor, indicates if any present conditions have been exceeded. One key feature of the system is that it can detect dangerous levels of light intensity. The module features electrochromic glass, which is able to tint to a near-black shade, thus prohibiting the entrance of any dangerous or uncomfortable levels of light. The module also has an LCD monitor and can be powered by a 12-volt rechargeable battery. This device can be used in homes, workplaces, schools, hospitals, laboratories and even outdoors. A possible application could be as part of a habitat system in space to ensure adequate environmental conditions to sustain life.

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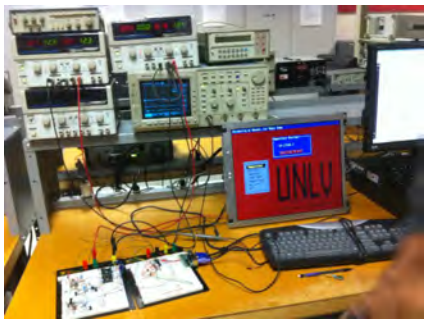
UNLV

Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 10:30am to 11:00am

Motorcycle Accident Detection and Notification System

Department: Computer and Electrical Engineering

Project Participants: Gerson Recinos, Yrene Ordaz

Instructor: Dr. Paolo Ginobbi

Faculty Adviser: Dr. Emma Regentova

Abstract

With over 200 million motorcycles in use worldwide, motorcyclists have a much higher probability of injury when involved in single-vehicle or multi-vehicle accidents. While most automobile companies have developed technologies to assist automobile drivers in case of accident or emergency, the motorcycle industry has lagged behind. Our device is a small, low-cost, and easy-to-use device that will increase the survivability of a motorcyclist when involved in an accident. It uses a GPS unit for position tracking, a GSM module for communication, and an accelerometer for accident detection. The system is able to send an SMS message including such information as position, which is sent to either a pre-programmed set of contacts or to the 911 emergency hotline. It has the capability of being used by motorcyclists worldwide due to the GSM protocol, the standard for cellular communication around the globe.

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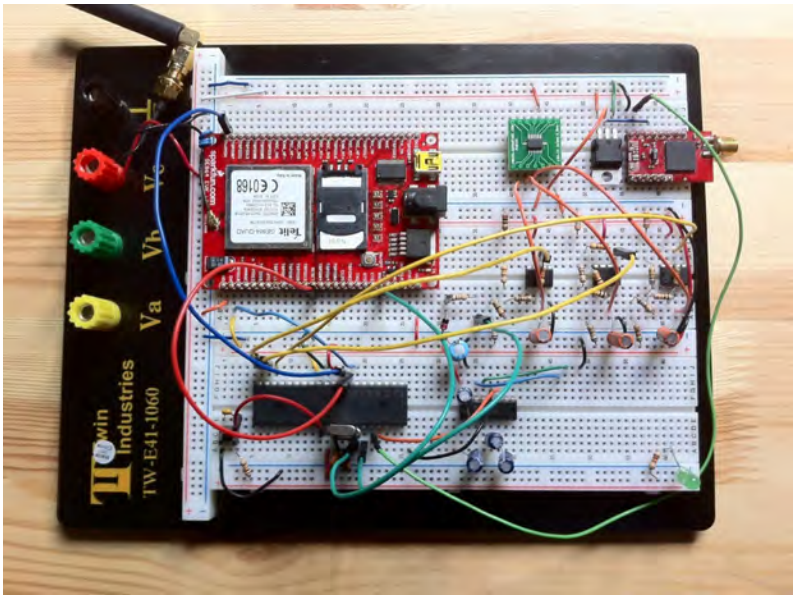
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Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 10:45am to 11:15am

Project name: Resurfacing Machine for Bicycle Brake Rotors

Department: Mechanical Engineering

Project Participants: Jesse Roberts, Matt Rumfield, Tim Smith

Instructor: Dr. Zhiyong Wang

Faculty Adviser: Dr. V. C. Venkatesh

Abstract

Normal wear of bicycle brake rotors causes the rotor braking surface to become highly polished and can even result in the formation of radial ridges. Expected imperfections primarily consist of a light glaze that occurs when the rotor contacts the brake pad contact at high speed, causing heat buildup and 'brake fade.' This resurfacing machine will remove the imperfections present on a bicycle brake rotor resulting from normal use. The machine has two AC motors, a rotor mounting bracket, an on/off toggle switch, and belts to drive the grinding wheels. It will restore the surface finish to that of OEM (original equipment manufacturer) standards and thereby restore braking performance. The machine will also serve as a truing stand so that warped and minor bends can be taken out of the rotor by using standard tools.

Notes:


BOMBER

Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 11:00am to 11:30am

Midtown Improvement and Redevelopment Plan at UNLV

Department: Civil and Environmental Engineering

Project Participants: Adam Schnepple, Isaac Guzman, Robert Dizon, Sam Ramos

Instructor: Dr. S. Ladkany

Faculty Advisor: Dr. S. Ladkany

Community Advisor: Mr. Mike Mamer (Clark County Dept. of Public Works)

Abstract

With the current amount of pedestrian and motor traffic along Maryland Parkway, safety and traffic concerns need to be addressed. For motor traffic, we propose an underpass on Maryland Parkway between University Road and Rochelle Avenue. This involves excavation to a depth of 14.5 to16 feet below existing grade and redesign of the existing intersections within the site to establish proper vertical alignment. The preliminary road deck material selected is asphaltic concrete, chosen for the material's durability and minimal maintenance cost. The retaining wall involves mechanically stabilized earth, which uses a strap-and-panel system relying on earth pressure to provide the required resistance. This system is preferred by Clark County for these applications. In addition, we propose a pedestrian bridge overpass over the intersection of Harmon Avenue and Maryland Parkway and two 11.5-foot suspension bridges at the existing crosswalk locations. All bridges consist of a reinforced concrete deck, steel suspension cables, pipe arches, and steel cross bracing to resist lateral wind and seismic loads. The overall project is designed to be aesthetically pleasing and durable, besides maximizing traffic flow and increasing pedestrian safety. Additionally, we believe that these improvements increase the potential for further the neighborhood improvements.

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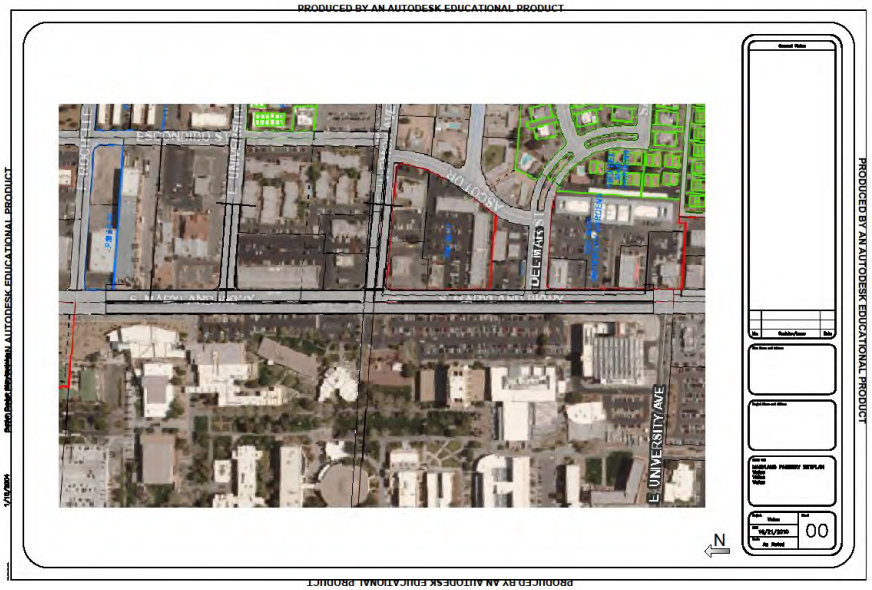
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REASURI
LAS VEGAS

Time: 11:15am to 11:45am

Quick-Loading Magazine for a Ruger 10-22 Rifle

Department: Mechanical Engineering

Project Participants: Michael Gund, David Froehle, Shara Maikranz

Instructor: Dr. Zhiyong Wang

Faculty Adviser: Dr. Mohamed Trabia

Abstract

The Ruger 10-22 is the most ubiquitous 22-caliber rifle in the U.S. Used mostly for recreation, this semi-automatic rifle has been adapted to replicate a wide variety of gun types. The most common magazine for this rifle is a top-loading, high-volume clip. The upwards force required to feed the desired rounds into the rifle is provided by a constant-force spring attached to a follower. While the force exerted by the spring is less than one pound at any given position, the magazine becomes increasingly difficult to load due to built-up internal friction as it reaches its capacity of 25 rounds. The overall results are high load times and physical discomfort to the loader: typically, the loader's thumb becomes fatigued after four consecutive loads. Our magazine system bypasses the entire spring system and allows the magazine to be loaded from the bottom. The spring / follower / lever assembly is designed to be disengaged from the magazine in order for the rounds to be bottom-fed. Once the magazine is fully loaded, the assembly is re-engaged by sliding the lever mechanism to the top of the channel, actively loading the spring. This increases load speed and eliminates loading discomfort. In order to ensure reliability and cost-effective manufacture, the system is self-contained with no removable parts.

Notes:

Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 12:45pm to 1:15pm

Project Fast Neutron Fission Detector

Department: Mechanical Engineering & Electrical Engineering

Project Participants: Steve Carter, Sulat Khoonsrivong, Jacob Mills, David Patonai, Lance Patonai

Instructor: Dr. Paolo Ginobbi & Dr. Zhiyong Wang

Faculty Adviser: Dr. Denis Beller

Abstract

A critical task for safeguarding nuclear fuel cycles involves precise measurements of plutonium in spent nuclear fuel. Our design is a Fast Neutron Fission Detector using foils having deposits of ultra-depleted ^{238}U. The specifications for the detector, such as dimensions, uranium thickness and total quantity is coordinated with Los Alamos National Laboratory, Idaho State University, and Rensselaer Polytechnic Institute. The device is used to characterize detector performance and also demonstrates the insensitivity of ultra-depleted ^{238}U to thermal neutrons. It will use the Monte Carlo N-Particle / Monte Carlo N-Particle extended transport code (MCNP/MCNPX) to characterize projected performance of the detector in various neutron environments.

Notes:


FIRE FIRE

Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 1:00pm to 1:30pm

Scanning Alpha Particle Spectrometer

Department: ME/CpE&EE

Project Participants: Alexander Lui, Tyler Stalbaum, Hassan Jaye

Instructor: Dr. Zhiyong Wang & Dr. Paolo Ginobbi

Faculty Adviser: Dr. Denis Beller

Abstract

Current assay methods for inferring plutonium mass in spent fuel assemblies are inadequate because they produce uncertainties of 10%—translating to more than 1000 kg/yr of unaccounted plutonium mass in high-volume storage or reprocessing facilities. A key challenge for safeguarding nuclear fuel cycles in Materials Protection, Accounting, and Control for Transmutation (MPACT) projects is the accurate and direct measurement of plutonium in spent fuel. Lead-slowing down spectroscopy (LSDS), capable of producing uncertainties of less than a few percent, is a technique presently being investigated to address the challenge. In order to build fission chamber detectors required for LSDS applications, UNLV has purchased high-purity depleted uranium that will be deposited on foils. However, a method needs to be devised to uniformly deposit pure actinides in very thin layers while maintaining purity. A scanning alpha-particle spectrometer (SAPS) is being developed to provide consistent and repeatable quality control measurements to ensure the quality and performance of the fast fission chamber detectors. The SAPS can verify the uniformity of the uranium deposits and detect if significant contamination is present in the deposit. Key components of the machine include the alpha Passivated Implanted Planar Silicon (PIPS) detector and the stage; both are mounted on individual linear actuators in a configuration similar to the ubiquitous ink jet printer. The SAPS will use motion in conjunction with data loggers to perform statistical analysis of alpha decay at discrete locations on the deposit.

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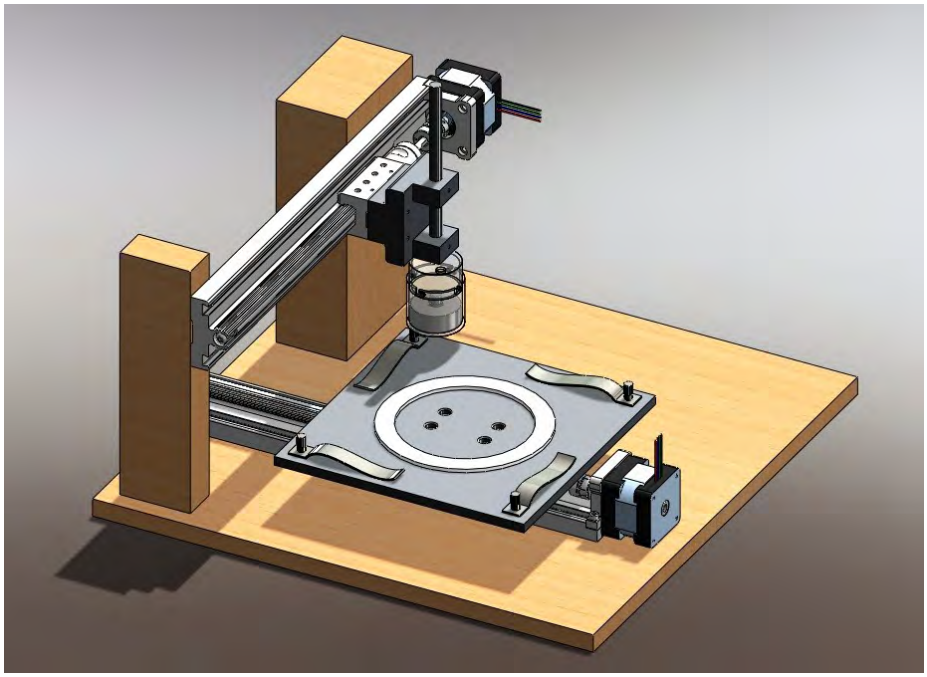

Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 2:00pm to 2:30pm

Design of the Tree Pedestrian Bridges Over Flood Plain Rivers in Sudan

Department: Civil and Environmental Engineering

Project Participants: Elizabeth Yengi

Instructor: Dr. Samaan Ladkany

Abstract

The longest river in the world, the River Nile, passes through Sudan from south to north. In the southern part of Sudan, it divides into two tributaries, the White Nile and the Blue Nile. During the rainy monsoon season, about three to six months in Sudan, the rivers flood. This makes it impossible for people to cross to the other side in order to continue their daily activities such as agriculture, animal husbandry, and hunting or to reach schools and health clinics. Sudan has been at war for almost 20 years and many areas do not have safety bridges. Locally made bridges often are not strong enough to withstand flooding. This design is a strong, safe pedestrian bridge. Tall trees are abundant in equatorial Africa, so the bridge design consists of two parallel tree trusses with each chord or diagonal made of one piece of tree. The trees can be used immediately after being cut because they are strong when green. The bridge abutment and foundations are also of tree trunks stacked four feet high over piles covered with sand; the stacks are various lengths to provide steps leading to the bridge entrances. Tall trees would be laid across the river and other trees anchored intermittently in the river as temporary shoring. When leveling the bridge, these trees become part of the bridge structure. In order to provide a smooth surface, the bridge dock can be made of layers of smaller trees connecting the two trusses with a top layer of split lapses. All wooden pieces are tied together with natural tree ropes, plants, or domestic animal skins. The client of this project is any local district in equatorial Africa. The cost is cheap because all materials will come from natural resources in the region.

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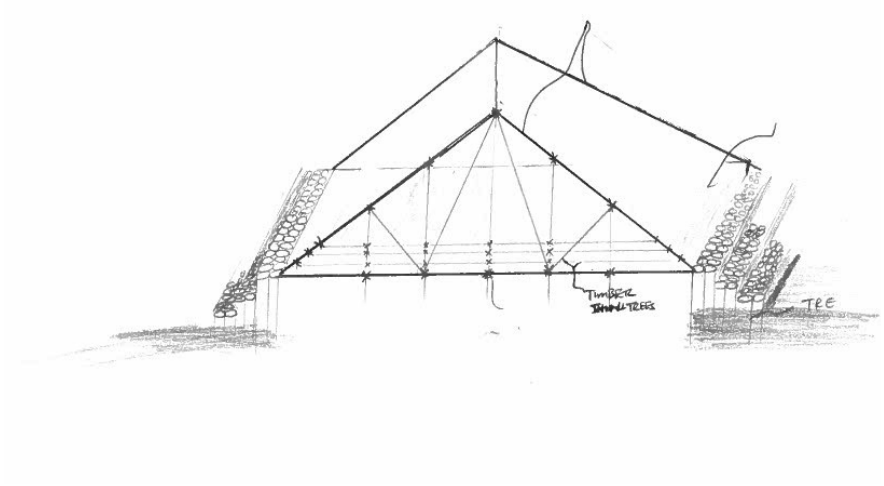
TIMBER
TREE

Senior Design Project Abstracts
TBE Great Hall
December 1, 2010

Time: 3:00pm to 3:30pm

Rapid Transit System with Bus-Only Central Lanes

Department: Civil Engineering

Project Participants: Kelvin Obcena, George Wallace, Jared Pasalo, Selemon Gebremeskel

Instructor: Dr. Samaan Ladkany, PE

Faculty Adviser: Dr. Alexander Paz, PE

Abstract

Flamingo Road is one of the most central passageways in the Las Vegas area, and most of its intersections are often congested with traffic delays for motorists and buses. Delays are expected to increase substantially as population continues to grow. This design proposes a rapid transit system that dedicates the center lanes to buses only along the 3.5 mile-stretch of Flamingo Road between Koval Lane and Pecos Road. The traffic distribution involves three outer lanes running each way for regular traffic and one center-most lane each way for buses only. To implement this design, medians are constructed on the middle of the road to separate the bus lanes from the regular traffic. In addition, the currently existing bus shelters in this area needs to be relocated to the medians as well as upgraded with innovative improvements such as integrated solar panels on the roofs to provide power to the shelters and interactive displays that will provide passengers with bus information. Since the bus shelters are located near the intersections, bus passengers can use the existing crosswalks to access these shelters. Overall, the construction of the medians and bus shelters covers the total cost of the project.

Notes:

No Photo or Graph Available

Award Winners

Will be announced
At the dinner on May 13, 2011

Congratulations on your achievement.

We look forward to seeing
you at the
10th Annual Senior Design Dinner

Cox Pavilion
5:30 p.m. - 9:00 p.m.

UNLV
UNIVERSITY OF NEVADA LAS VEGAS