

**Program & Abstracts  
for the 5<sup>th</sup> Annual**

**Pacific  
Undergraduate  
Research &  
Creativity  
Conference**

**PURCC-2005**

Compiled and Edited by  
Lydia Fox  
Department of Geosciences  
University of the Pacific  
Stockton, CA 9521

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# Program

## Oral Presentations

**Time: 11:00 AM – 12:00 PM**

**Room: GEO 102**

<b>Time</b>	<b>Author</b>	<b>Title</b>
11:00	Sarah Mansfield	The Spectacle as a Commodity: The New York Sensation Show
11:15	Lauren Gallow	Beyond The Black And White: Aubrey Beardsley s Ambiguities
11:30	Laura Lagua	Punishment for a Wicked – The San Francisco 1906 Earthquake
11:45	Jamie Cunningham	Portrait of the Artist as a Fading Youth

**Poster Presentations I**  
**Time: 1:00 – 3:00 PM**  
**Room: GEO 106**

Poster#	Author(s)	Title
1	Chantel Guinto	Restoration of the Calaveras River
2	Nancy Han, Donna Barnes, Meera Rakholia, Nimrit Gill, Lior Tamir, Joshua Ng, Krutav Patel, and Kinjal Patel	Characterization Of Genes Involved In Black Widow Spider Development
3	Matthew Hashimoto and Christopher Hatae	Kanamycin as a selectable marker for <i>Pichia pastoris</i>
4	Wilson Leung, Vincis Casuga, Amy Yon	Enhanced Secretion in <i>P. pastoris</i> with Maltose Binding Proteins
5	See Xiong	The Stability of the Zeocin Resistance Marker in <i>P. pastoris</i>
6	Irving Chao, Mike Ignacio, and Warren Cheung	NMR Spectroscopy of <i>Latrodectus hesperus</i> 's Tubuliform Silk
7	Stephanie Davis, Olivia Martinez, Grace Mercado, Grace Pintor, and Jenie Rocetes	Expression of ECP-2 through quantitative real-time PCR
8	Joseph Schooler, Caroline Lai, Robert Passamano, and Stephanie Phan	Egg Case Proteins of <i>Latrodectus Hesperus</i>
9	Amber Miller	Designing A Genetic Screen To Search For Genes Involved In Repair of DNA Double Strand Breaks in Fruit Flies
10	Khanh Ngo	Identification Of The Rad51 Gene In The Vaginal Parasite <i>Trichomonas vaginalis</i>

11	Andrew Kim	Complexes of $\text{Re}_2(\text{O}_2\text{C}_2\text{H}_3)\text{Cl}_2 \cdot 2\text{H}_2\text{O}$ with 1 9-Diethyladenine
12	Monty Lo	DNA Damage Investigated by Restriction Enzyme Cleavage
13	John Soong	Quantum Mechanics of New Subphthalocyanines
14	Tin Nguyen and John Tan	Synthesis and Evaluation of the Peptide LEV
15	Kristie Hoyt and Lorena Rios	Pollution Carried by Synthetic Polymers in the Ocean
16	Sheena Styger	Insight Into The Silicic Rocks of Northwestern Iceland

**Poster Presentations II**  
**Time: 1:00 – 3:00 PM**  
**Room: GEO 108**

Poster#	Author(s)	Title
17	Lana Marengo	Wood-Firing in Pope Valley
18	Bonnie Roscelli	The Fall From Fortune
19	Cheri Kramer	Community Development: A Local Look at an International Issue
20	Megan Sanchez	Two for One: Make up Solutions for Back to Back Opera Productions

21	Alexander Lu-Pon	Accenture to the Rescue
22	Melissa Piffero	Tsunami and Responce from the Financial World
23	Missy Billard, Anne Buckley, Courtney Pyle, and Grace Tu	Attitudes Toward Homosexuality Among College Students
24	Tonetta Cantero, Tiffany Nicolos, Jaycee Davis, and Vanessa Evans	Media Effects On Attitudes Towards Patriotism
25	Stephany Crisolo, Iva Lewis, Pauline Cabales, and Michelle Horn	The Influence of Couple Composition on Helping Behavior
26	Daniela Gutierrez, Cheryl O'Riley, Melissa Romero, and Kathleen Sauler	Altruism in Stockton
27	Ashley Jarvis, Sarah Theobald, Anh Tonnu, and Denise Quiapo	Helping Behavior Differences Between Genders
28	Joshua Jessell, Kenny Yamamoto, Mahmoud Daher, and Nicole Morris	Complete Stops Compared by Gender in California
29	Lynn Huynh, Stephanie Moore, Shannon Murray, Vanessa Forero-Puerta, and Tara Yopp	Effect of viewing an execution on capital punishment
30	Jennifer Trajano, Terrell Leidstrand, Jaqueline Jasso, and Robin Terry	A Comparison of Relaxation Techniques on Anxiety

**Senior Engineering Design Demonstrations  
Afternoon  
School of Engineering and Computer Science  
(partial listing)**

Author(s)	Title
Tony Nguyen and Glen Sabellano	A Biodegradable Rice Wrapper
Nikola Njegovan and Ronnie Terry	Voltage Clamp Apparatus for Excitable Cells
Krystle Peterson, Ben Burton, and Nicholas Kim	Automated Spectrophotometric Assays of Water Quality
Michael Duong	Customized Wheelchair For Emphysema Patients
Brian Schardt	Lean Manufacturing: Redesign Of A Production Line
Makana Anicas and Kenny Her	Wireless Repeater Artificial Intelligence Transmission Hub
Arlen Cox and Robert Hasegawa	Video Game Console Design
Ashneel Singh	Behavior Emulating Robotic Toy
Tom Hindley	Algorithm Simulator And Development System
Ethan Owyang and Jason Faria	Magnetic Gesture Recognition Technology
Polo Nov and Tai Hoang	Wireless Camera
Andrew Amstrup and Lindsey Hill	Automated Beer Tap
Alex Graham	Golf Distance Tracker
Derek Herboldshimer	The Creepy Crawler
Aaron Lam and Rene Stein	Automatic Handsfree Garage Door Opener

Irene Maldonado and Hidajet Fific	Car nanny
Jane Ternavsky	Wireless Pulse Oximeter
David Wunsch and Kunal Mistry	Class D Audio Amplifier
Denise Bohannon, Huong Nguyen, Janet Nguyen, and Marina Borrel	PAN2MIME
Keith Walker and David Kelley	Spirit of Pacific
Kevin Lin	Firebot - Autonomous Firefighting Robot
Ryan Fournier	Hands Free Automated Wine Corkscrew
Jeremiah Henley and Matt Samuel	Automatic Beverage Dispenser
Mitch Moffet	LLNL Mechanics Of Materials Gas Gun
Stephen Morse	Portable 88-Key Electronic Piano Keyboard
Paul Wyman and Phil Lovell	Actuated Car Airfoil

**Oral Presentation: 11:00****THE SPECTACLE AS A COMMODITY: THE NEW YORK SENSATION SHOW**

Sarah Mansfield

I will be presenting the contents of my senior thesis paper, The New York Sensation Show: The Spectacle as a Commodity. This research paper will detail the history of the art show that exhibited in London, Berlin and finally New York between 1997 and 1999. The show presents art belonging to prominent British collector Charles Saatchi. It includes the work of young British artists such as Damien Hirst, Chris Ofili, Tracey Emin, Sarah Lucas, and the Chapman Brothers. Sensation was controversial each time it was exhibited criticized for being too focused on shock value but it was most controversial in New York when the mayor Rudolph Guliani threatened to cut public funding from the museum that exhibited the show if they did not shut it down. As a catholic, Guliani was extremely offended by a piece of art by Chris Ofili: a black portrait of the virgin Mary that includes elephant dung and pornography cutouts. Using the concepts of Marxist theoretician, Guy Debord, I will explore the way in which the exhibition was turned into a representation a spectacle and the way in which this spectacle was exploited in different ways by American political leaders museum and gallery officials and even the artists themselves.

**Faculty Mentor:** Merrill Schleier**Oral Presentation: 11:15****BEYOND THE BLACK AND WHITE: AUBREY BEARDSLEY S AMBIGUITIES**

Lauren Gallow

One of the most significant figures in English art in the last decade of the nineteenth century Aubrey Beardsley is an artist whose radical style and subject matter is still a topic of debate today. Part of the Art Nouveau style in England Beardsley was one of the primary composers of a new modern style which took hold at the end of the nineteenth century. Although his pen-and-ink drawings were black and white in color in meaning and implications they were anything but. This research project explores the ambiguities concealed within Beardsley's work as well as in his life and personal relationships and how these paradoxes parallel the social situation in Victorian England. In applying current critical theories of analysis to Beardsley's work namely the seventeen drawings he produced for Oscar Wilde's play Salome in 1894 as well as to the relationship between these two men my research uncovers ambiguities which go far beyond the surface of the visual.

**Faculty Mentor:** Merrill Schleier

**Oral Presentation: 11:30****PUNISHMENT FOR A WICKED – THE SAN FRANCISCO 1906 EARTHQUAKE**

Laura Laguna

On the morning of April 18, 1906, an earthquake of great magnitude ripped through San Francisco, destroying nearly one quarter of the city, leaving many dead, and thousands homeless and starving. Located on the San Andreas Fault line, San Francisco was susceptible to earthquakes. However, some believe that more than just shifting tectonic plates caused the 1906 earthquake. In fact, some people from the Los Angeles area believed that God had a hand in creating the earthquake to punish San Franciscans for their “sinful” and “wicked” ways. The lifestyle of San Franciscans was littered with prostitution, alcohol consumption, and corrupted government officials, all of which offended conservative Los Angeles residents. The southern California city was built, to a significant degree, on a foundation of conservative religious and moral ideas, brought by Protestant and “Puritan” migrants from the Mid-West at the end of the nineteenth and beginning of the twentieth centuries. In contrast, San Francisco was a city heavily populated and influenced by Irish-Catholics who had a history of drinking. In addition, gambling and prostitution had already been deeply rooted into the city’s daily life since the time of the California gold rush of the mid 1800’s. Using letters published in Southern Californian newspapers and collected in an early twentieth-century scrapbook archived at the University of the Pacific’s Holt-Atherton Special Collections Library, this paper argues that some conservative Southern Californians demonized San Franciscans, and believed they deserved the earthquake and fires as a punishment for their “wicked” and “sinful” ways. The ongoing feuds and disagreements between the two religions added to the already political differences among the cities fueled Southern Californian’s views that San Franciscans were to blame for the 1906 disaster.

**Faculty Mentor:** Edith Sparks**Oral Presentation: 11:45****PORTRAIT OF THE ARTIST AS A FADING YOUTH**

Jamie Cunningham

In my paper, “Portrait of the Artist as a Fading Youth,” I conduct a psychoanalytic reading of Dylan Thomas’s short story “A Visit to Grandpa’s” and James Joyce’s “The Dead,” the last tale from the author’s short story collection Dubliners. Originally written for Dr. Diane Borden’s Literature and Psychology class, this work compares and distinguished the operation of Melancholia and Mourning in both texts. Incorporating the ideas of psychoanalysts Sigmund Freud and Phyllis Greenacre with Joyce scholar Christine Van Boheemen, I argue that Thomas’s aging and emotionally fragile Grandpa is representative of a pathological Melancholia while Joyce’s protagonist, Gabriel Conroy, exemplifies a prevailing state of mourning. In my oral presentation, I shall be reading a revised copy my piece.

**Faculty Mentor:** Diane Borden

**Poster # 1****RESTORATION OF THE CALAVERAS RIVER**

Chantel Guinto and Ellen Woolard

This is the initial phase of a project to restore the section of the Calaveras River that runs between Pacific and Pershing Avenue in Stockton CA. This restoration will take place over a number of years and consists of several stages: Stage 1 - survey current plant species; Stage 2 - survey current animal species; Stage 3 - removal of invasive species; Stage 4 - reintroduction of native plants and animals; and Stage 5 – monitoring and adaptive management. Currently we are surveying the Calaveras River for plants and animals. Once restoration is completed it is hoped that this project will serve as a model for future restoration efforts on other parts of the Calaveras River. This presentation emphasizes four main topics: (1) ecological history of the Calaveras River; (2) methods used for plant and animal sampling; (3) current distribution and identification of plant and insect species; (4) future plans. To date we have identified forty-six invasive (non-native) and one native plant species (98% exotic) along the Calaveras River. During the fall and winter season of 2004 four invasive (non-native) and forty-two native insects (8% exotic) were collected.

**Faculty Mentor:** Greg Anderson**Poster # 2****CHARACTERIZATION OF GENES INVOLVED IN BLACK WIDOW SPIDER DEVELOPMENT**

Nancy Han, Donna Barnes, Meera Rakholia, Nimrit Gill, Lior Tamir, Joshua Ng, Krutav Patel, and Kinjal Patel

*Lactrodectys hesperus*, (black widow spiders), are reasonably close relative of the fruit fly, *Drosophila melanogaster*, yet have very different body plans. The development of the fly has proven to be similar in most animals, including us. To understand how spiders have tweaked this common animal developmental program, we chose to clone spider developmental regulatory genes. We created a Black Widow genomic library, a collection of clones containing all the DNA fragments from an organism. We are building a cDNA library (holding DNA versions of all active genes) and are using these libraries to identify spider developmental genes, including Pax-6 and others. We can use the fly genes to find the spider versions. These genes control development of body parts that differ in spiders and flies. For instance, in all studied animals, eye development is controlled by Pax-6, but all of these studied animals make only 2 eyes while spiders have 6 or 8. We can ask where spiders use Pax-6, and determine if Pax-6 defines all of the eyes, or if they use Pax-6 to pattern only 2 eyes. This will help us understand how a simple developmental system can be modified to change the body plan of organisms.

**Faculty Mentor:** Gregg Jongeward

**Poster # 3****KANAMYCIN AS A SELECTABLE MARKER FOR *PICHTIA PASTORIS***

Matthew Hashimoto and Christopher Hatae

The yeast *Pichia pastoris* is commonly used as a host organism in heterologous protein expression. One of the main problems of *P. pastoris* is that it does not have a wide range of selectable markers available for use in transformation processes. We adapted a kanamycin resistance selectable marker to fulfill the same function of the zeocin resistance selectable marker. With the use of Real-Time PCR, we have quantified the varying amounts of the cassette transformed in the yeast colonies. This data was consistent with the Southern Blot data from preliminary experiments which supported the fact that the sizes of the yeast colonies were roughly proportional to the number of cassettes that were transformed into their genome. In short, we have been able to produce a plasmid that contains the kanamycin selectable marker and a beta-lactamase reporter gene. Through the use of an activity assay we found that the larger colonies with a higher cassette count within their genome produced more beta-lactamase. The Southern Blot, activity assay and Real-Time PCR findings all have supported the hypothesis that the copy number of the yeast transformation can be linked to the size of the colonies, with the larger colonies having a higher copy number of the kanamycin selectable marker.

**Faculty Mentors:** Geoff & Joan Lin-Cereghino**Poster #4****ENHANCED SECRETION IN *P. PASTORIS* WITH MALTOSE BINDING PROTEINS**

Wilson Leung, Vincis Casuga, and Amy Yon

To increase the efficiency of protein expression in the yeast *Pichia pastoris* we have constructed a new plasmid which allows the heterologous protein to be expressed as a fusion with the Maltose Binding Protein (MBP). We have seen that the MBP is easily secreted extracellularly in high yields. With this knowledge we are working on creating a fusion between MBP with other proteins such as FKBP12 and EGFP. The overall goal of this project is to create a fusion partner expression vector teaming up a protein that secretes well extracellularly with a heterologous protein.

**Faculty Mentors:** Geoff & Joan Lin-Cereghino

**Poster # 5****THE STABILITY OF THE ZEOCIN RESISTANCE MARKER IN *P. PASTORIS***

See Xiong

The yeast *Pichia pastoris* is used for the heterologous expression of many valuable proteins. For instance, proteins such as human prion protein and insulin have been successfully produced in this yeast. In order to transform *Pichia pastoris* with a foreign gene, one must utilize a selectable marker gene to identify cells which have successfully brought in the foreign gene. The zeocin resistance gene is a common marker that is used for the transformation of *Pichia pastoris*. The zeocin resistance gene encodes a protein that confers onto a cell the ability to degrade zeocin. Thus, cells that have picked up the zeocin resistance gene can grow on media that contains this antibiotic. It is accepted that the zeocin gene stably integrates into a yeast chromosome and is stable for many generations. We have carried out a study to determine how stable the zeocin resistance gene is in transformed *Pichia pastoris*. In our experiments, cells containing the zeocin resistance gene were grown for varying amounts of time on nonselective media and then switched back to medium containing zeocin. This experiment should help in our understanding of the fate of the zeocin resistance gene in *Pichia pastoris*.

**Faculty Mentors:** Geoff & Joan Lin-Cereghino**Poster # 6****NMR SPECTROSCOPY OF *LATRODECTUS HESPERUS*'S TUBULIFORM SILK**

Irving Chao, Mike Ignacio, and Warren Cheung

Molecular properties of the tubuliform silk were studied for the cob web building black widow spider *Latrodectus hesperus*. From techniques we learned from micro-dissections of tubuliform silk glands we will be cutting longitudinally across the dorsal side of the abdomen. Collected silk gland will then be placed directly into a 5mm NMR tube filled with phosphate buffer. We hope to dissect twenty black widow spiders in 12 hours and send them to Eastern Illinois University for NMR spectroscopy on April 19 2005. We hope to receive results on April 21 2005. By comparing the NMR spectra of tubuliform lumen to the NMR spectra of spun tubuliform silk we are then able to determine the changes of secondary protein structure which are responsible for the physical properties of eggcase silk.

**Faculty Mentor:** Anne Moore

**Poster # 7****EXPRESSION OF ECP-2 THROUGH QUANTITATIVE REAL-TIME PCR**

Stephanie Davis, Olivia Martinez, Grace Mercado, Grace Pintor, and Jenie Rocetes

Spiders produce a variety of silks that display extraordinary molecular and mechanical properties. These different silk types are composed of distinct proteins that are formed in seven specialized glands for typical orb-weaving spiders. Previously in the black widow spider *Latrodectus hesperus* a novel gene encoding a protein that is part of egg case silk was isolated. Recent studies have shown that egg case silk protein (ECP-1) was expressed in the major ampullate (MA) gland as well as the tubuliform gland of the black widow spider. The gene encoding ECP-1 was isolated from a cDNA library using reverse genetic approaches. Current developments have shown the presence of another 'sister' gene called egg case protein-2 (ECP-2) which shows ~53% homology at the amino acid level to ECP-1. Using western blot analysis ECP-1 was shown to be expressed in the major ampullate and tubuliform glands. Because we have yet to generate an antibody against ECP-2 we are using quantitative real-time PCR to measure the levels of mRNA in different silk glands. Although ECP-1 and ECP-2 have similar nucleotide sequences as well as amino acid sequences two different primer sets have been developed to differentiate ECP-2 from ECP-1 and will be used to examine ECP-2 expressed by quantitative real-time PCR. Since ECP-1 is produced in the MA and tubuliform glands ECP-2 is anticipated to be found in the same anatomical locations. Further research is being conducted in order to determine the glands responsible for ECP-2 production.

**Faculty Mentor:** Craig Vierra**Poster #8****EGG CASE PROTEINS OF *LATRODECTUS HESPERUS***

Joseph Schooler, Caroline Lai, Robert Passamano, and Stephanie Phan

Spider silk has extraordinary mechanical properties and different silk types display different degrees of stiffness and strength. Dragline silk and capture silk have been the attention of many molecular studies because of their potential to be used as more environmentally friendly replacements for various industrial products while other silks have been ignored. In our studies of the black widow spider *Latrodectus hesperus* we discovered two different proteins present within egg case silk that display different chemical and physical characteristics. To date little information is known about egg case silk and their molecular constituents. Our studies were designed to investigate the expression level of 2 recently isolated genes from the spider. Different glands of the black widow spider were used to isolate mRNAs and proteins for expression analyses using molecular techniques such as western blot analysis and real-time quantitative PCR. Western blot analysis analyzes silk proteins by using antibodies that bind to specific antigens to determine their expression levels. We also analyzed patterns of expression using constructed primers to amplify egg case gene sequence of interest using real-time PCR. The results of these studies will be discussed.

**Faculty Mentor:** Craig Vierra

**Poster #9****'DESIGNING A GENETIC SCREEN TO SEARCH FOR GENES INVOLVED IN REPAIR OF DNA DOUBLE STRAND BREAKS IN FRUIT FLIES**

Amber Miller

The focus of our lab has been the study of two *Drosophila* genes, DmRad51D and DmXRCC2. The mammalian versions of these genes are part of an elaborate genetic pathway that helps repair double-strand DNA breaks created by x-rays, gamma-rays, and certain chemical carcinogens. When we look directly at how these genes function in mammals, we see that mutations in these genes in mice cause the mouse embryos to die, and it is difficult to carry out a proper analysis of a genetic pathway in dead mice. My project has been to design a genetic screen in fruit flies that will allow us to discover new genes involved in this DNA repair pathway, giving us new insight into how this pathway might work in human cells to repair DNA damage. I am currently using site-directed mutagenesis to build plasmids that will allow us to search for mutations that disrupt the repair of the *white* eye color gene after we have cut it with the I-SceI endonuclease to create a double-strand break.

**Faculty Mentor:** Lisa Wrischnick**Poster #10****IDENTIFICATION OF THE RAD51 GENE IN THE VAGINAL PARASITE *TRICHOMONAS VAGINALIS***

Khanh Ngo

I am using degenerate PCR to search for the homolog of the Rad51 gene in the single-celled protist *Trichomonas vaginalis*. In other eukaryotes, the Rad51 gene functions to promote recombination during meiosis and acts in DNA repair during mitosis. Meiotic recombination is the process where homologous chromosomes exchange DNA with one another, resulting in an increase in genetic variation within the daughter cells. While recombination appears to be absolutely required by most eukaryotes that reproduce sexually, meiotic recombination appears to be absent in many species of protists and used only as a stress response in many others. So far, no one has seen *Trichomonas vaginalis* have sex. One theory suggests that sex initially evolved as a DNA repair mechanism in single-celled eukaryotes like *T. vaginalis*. When we clone the Rad51 gene from *T. vaginalis*, it will help us understand whether this species uses Rad51 just for DNA repair, or if *T. vaginalis* uses Rad51 in a sexual stage that has yet to be seen.

**Faculty Mentors:** Lisa Wrischnick and Kirk Land

**Poster #11****COMPLEXES OF  $\text{Re}_2(\text{O}_2\text{C}_2\text{H}_3)_2\text{Cl}_4 \cdot 2\text{H}_2\text{O}$  WITH 1,9-DIETHYLADENINE**

Andrew Kim

Dimetal carboxylate compounds are proposed to exhibit antitumor activity by reacting with DNA nucleobases. Dirhenium complexes containing a *cis*-carboxylate core similar to  $\text{Re}_2(\text{O}_2\text{C}_2\text{H}_3)_2\text{Cl}_4 \cdot 2\text{H}_2\text{O}$  show anticancer properties. These complexes are known to preferentially bind to the purine nucleobases adenine and guanine. To model this reaction,  $\text{Re}_2(\text{O}_2\text{C}_2\text{H}_3)_2\text{Cl}_4 \cdot 2\text{H}_2\text{O}$  was reacted with a model adenine compound, 1,9-diethyladenine, which is isolated as an iodide salt. Anion exchange reactions were carried out to replace the iodide with different anions ( $\text{PF}_6^-$ ,  $\text{BF}_4^-$ ,  $\text{BPh}_4^-$ ). These salts were reacted with the dirhenium compound,  $\text{Re}_2(\text{O}_2\text{C}_2\text{H}_3)_2\text{Cl}_4 \cdot 2\text{H}_2\text{O}$ , and the green products were isolated and characterized. UV/visible, IR, and  $^1\text{H}$  NMR spectroscopic results will be presented.

**Faculty Mentor:** Elizabeth Day**Poster #12****DNA DAMAGE INVESTIGATED BY RESTRICTION ENZYME CLEAVAGE**

Monty Lo

Damage to the DNA contained in human chromosomes is one of the main causes of cancer. Examples of DNA damage are breaks in the chromosomes or chemical alterations of the bases, the letters of the genetic code. DNA damage can interfere with biological processes and the enzymes that catalyze them. Thus, enzymes can be used as a way of studying DNA damage. Restriction enzymes are proteins that cut DNA at specific sequences. If one of the code letters is blocked, they can not cut the DNA. Restriction enzymes produce a specific pattern of DNA fragments when used in conjunction with appropriate pieces of DNA. We used a readily available DNA structure called a plasmid for our studies. There are several advantages to using a plasmid. For example, it can be produced by bacteria in large quantities. We found the suitable restriction enzymes for cutting our plasmid by searching appropriate databases. Then we cut the plasmid with the enzymes and detected the restriction fragment by agarose gel electrophoresis and a fluorescent stain. We applied this method to the study of DNA damage caused by cis-platin, a drug used for killing cancer cells. The drug, cis-platin, usually reacts readily with DNA and does not require additional cellular factors to produce very high levels of DNA damage. We found that treating the plasmid with cis-platin prevented cutting with restriction enzymes. We extended our study to other DNA molecules that include fragments of genes that are known to be damaged in certain cancers. Next, we will study various conditions, including food that may increase or decrease the damage caused by cis-platin. Results from these studies may lead to recommendations for patients undergoing cis-platin chemotherapy.

**Faculty Mentor:** Uta Hellmann-Blumberg

**Poster #13****QUANTUM MECHANICS OF NEW SUBPHTHALOCYANINES**

John Soong

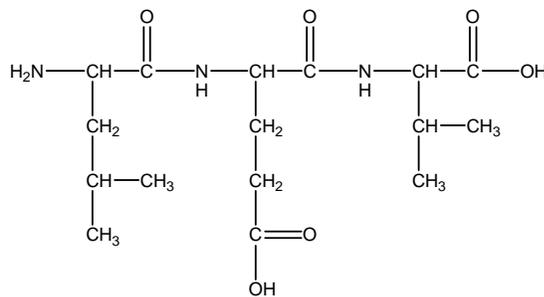
Subphthalocyanines are an important new class of compounds which have potential uses in optical recording media photopharmecutics and other applications where their non-linear optical properties may be important. Synthesis and study of symmetric subphthalocyanine compounds (Subpcs and Subnaps) have been reported previously. We have chosen to study mono- and disubstituted chloro-subphthalocyanines (one or two phenols one or two naphthal groups in addition to chlorine substituents) in order to tune and predict the non-linear optical properties of these compounds.

**Faculty Mentors:** Ron Nohr and C. Michael McCallum

**Poster #14****SYNTHESIS AND EVALUATION OF THE PEPTIDE LEV**

Tin Nguyen and John Tan

The tri-peptide Leu-Glu-Val (LEV) has a structure similar to that of Leu-Asp-Val (LDV). Studies indicate that peptides containing LDV have potential to serve as a target specific drug delivery carriers. LEV was synthesized and its gas phase fragmentation property was evaluated as compared to LDV. LEV was synthesized by using a modification of the Merrifield solid phase peptide synthesis technique in which amino acids are coupled sequentially to a solid resin to yield the peptide with the sequence Leu-Glu-Val. The LEV containing peptide was then cleaved from the resin. The gas phase fragmentation property of LEV was examined using a triple quadrupole mass spectrometer equipped with an electrospray ionization (ESI) source. Upon MS/MS analyzation, the protonated LEV produced three characteristic fragment ions shown as three peaks in the mass spectrum. The spectra data agree with the theoretical predictions for the dissociation of a peptide with the sequence LEV. The corresponding peaks were also observed in the mass spectrum for protonated LDV. The protonated LEV and LDV have similar gas phase fragmentation properties.

**LEV**

**Faculty Mentor:** Jianhua Ren

**Poster #15****POLLUTION CARRIED BY SYNTHETIC POLYMERS IN THE OCEAN**

Kristie Hoyt and Lorena Rios

Synthetic polymers are extremely useful for a wide variety of applications. Although there are many types and combinations of polymers, they typically share the property of being relatively resistant to biodegradation and they are cheap. This means they are widely used and discarded. An amazing amount finds its way into the oceans. Charles Moore (2001) found, far at sea in the Pacific, some six times by mass more plastic material in the ocean than zooplankton. These plastic materials are ingested by marine life. Moore has also collected samples of plastic parts from the bodies of sea birds that died with large amounts of plastic materials in them. Another research group, Mato (2001) has reported that the starting materials, polypropylene plastic pellets, used for fabrication by injection molding can be shown to concentrate polychlorinated biphenyls, PCBs, dichlorodiphenyldichloroethylene, DDE, and nonylphenol, NP. We are developing the analytical methods to extract, concentrate and identify persistent organic pollutants (POPs) that may have accumulated in plastic particles in the ocean. Cap. Charles Moore (AMRF) has provided samples collected in the North Pacific for our analysis.

**Faculty Mentor:** Patrick Jones**Poster # 16****INSIGHT INTO THE SILICIC ROCKS OF NORTHWESTERN ICELAND**

Sheena Styger

Silicic rock origin in Iceland is linked to a combination of fractional crystallization, crustal remelting, and magma mixing. The relationships between basic and intermediate rocks in northwestern Iceland, specifically in the Tröllafell area, provide evidence for fractional crystallization. Using stratigraphic, petrographic, and geochemical data from samples collected in addition to a fractional crystallization model, magma origin for the rocks collected can be traced back to two different sources. The lower basalt unit, main intermediate unit, and upper basalt unit can all be related by fractional crystallization to the most primitive basalt sampled. Fractional crystallization modeling provides evidence that crustal remelting and magma mixing did not play a significant role in formation of the main intermediate unit. The specific source of magma for the rocks can be attributed to one magma chamber or multiple magma chambers that evolved similarly through fractional crystallization. The chemical differences between Tröllafell and the other intermediate rocks cannot be explained by fractional crystallization. The source for Tröllafell is different than the other rocks in the area. Further investigation of the field area, in addition to the surrounding area, is needed to determine the magmatic origin of Tröllafell.

**Faculty Mentor:** Lydia Fox

**Poster #17****WOOD-FIRING IN POPE VALLEY**

Lana Marengo

The project took place from December of 2004 through January of 2005. All three members produced ceramic work to be fired in a wood kiln in Pope Valley California from Jan.1-20. Approximately two weeks were dedicated in December to making the work, 12 days to firing in Pope Valley, a separate visit to unload and return with the work, and finally to prepare the work for documentation/presentation (appr. one week). Student contributions for the entire project were at least 50% including some assistance to the professor in the transportation and documentation of the work as well as the firing process. The work was fired in a traditional Japanese style kiln with wood only over a twelve-day period round the clock. The entire body of work consisted of both sculptural works and pottery. Both students are advanced level students in the three dimensional program and this firing was their first introduction to a process dating back hundreds of years. Both students did preliminary research in wood fired ceramics to gain some insights that would inform their work and help them to understand the history of the process as well as several lectures from the professor regarding the approaches most suitable to this firing technique.

**Faculty Mentor:** Trent Burkett**Poster # 18****THE FALL FROM FORTUNE**

Bonnie Roscelli

My project is designed to show the direct connections between parts of Giovanni Boccaccio's Decameron and De Casibus Virorum Illustrium and Geoffrey Chaucer's Canterbury Tales, specifically "The Man of Law's Tale" and "The Monk's Tale". It will analyze these tales to show how all of them are interconnected. It is well known that Chaucer acquired many of his ideas from Boccaccio's work and it will further support this idea as well as introduce new thoughts on the matter. All of these stories show people falling from fortune and high standing into despair. "The Man of Law's Tale" and "The Second Story from the Fifth Day" are a direct correlation, as is "The Monk's Tale" with the De Casibus Virorum Illustrium. These four tales exemplify the "classic falls" and show this archetype is timeless. This project will explore the issues that these tales address and break them down using the elements of structure, plot line and historical evidence.

**Faculty Mentor:** Robert Cox

**Poster # 19****COMMUNITY DEVELOPMENT: A LOCAL LOOK AT AN INTERNATIONAL ISSUE**

Cheri Kramer

Community development has become a key component of both government and private organization action. Several varying approaches to such development have been applied in different areas of the world. Using studies of programs in Canada, France, Australia, and Britain, as well as the opinions of various researchers, the emphases of community development from across the world are compared to the needs of the local Midtown area in Stockton, California, as seen through an analysis of the Midtown Survey. Most of the other community development projects focus on employment and housing, as well as attention to community-specific problems, while the results of the survey show that the needs of the Midtown area center on racial issues and housing. It becomes apparent that, in order for any community development initiative to be successful in the Midtown neighborhood, race and housing issues must be emphasized

**Faculty Mentors:** Roy Childs**Poster #20****TWO FOR ONE: MAKE UP SOLUTIONS FOR BACK TO BACK OPERA PRODUCTIONS**

Megan Sanchez

Make up designs for the two one act operas presented by the Conservatory of Music and the Department of Theatre Arts in Spring 2005. The make up had to distinguish each opera individually, be in keeping with the different visual and artistic approaches in design as part of the collaboration with costume, lighting, and set design, and yet make it possible for the performers to accomplish the changes from the first opera to the second opera within the 15 minute intermission period.

**Faculty Mentor:** Cathie McClellan

**Poster # 21****ACCENTURE TO THE RESCUE**

Alexander Lu-Pon

Accenture, formerly Anderson Consulting, is one of the leading companies in the industry. Providing solutions to many businesses and governments, Accenture is world known for supplying in depth understanding and expertise in all of its capacities. Present in 48 countries around the world, this global giant has had many opportunities to help people by innovation and creativity.

When the Asian tsunami hit the coasts of southern Asia, Accenture's management sprang into action to assist in logically organizing information and strategizing how to tackle the problems that were arising from the disaster. Not only did the company pitch in as a whole, but individual employees contributed to a separate fund which totaled over \$500,000 in donations to help relief efforts.

The company has risen to meet the challenge of rebuilding the infrastructure, the cities, the governments and the people by offering services. What ought to be highlighted is not what the company itself has been doing, but rather how individual employees have risen to the challenge themselves and donated from their own pockets to help in the wake of this disaster. Accenture prides itself on being a great company because of its great people, and the donations from the hearts of the employees exemplify that the pride is well deserved.

**Faculty Mentor:** Carol Ann Hackley

**Poster # 22****TSUNAMI AND RESPONCE FROM THE FINANCIAL WORLD**

Melissa Piffero

Early on December 26, 2004, South Asia was shaken by a 9.0 earthquake 100 miles off the western shore of Indonesia's Sumatra Island. The fourth strongest earthquake in history would cause another disaster that affected more than 20 countries in the Indian Ocean region. In the next seven hours, the tsunami caused by the earthquake, carved a pattern of destruction across the 4,500km-wide Indian Ocean and onto the coasts of Asia.

When natural disasters strike, the major forces in the business world are expected to respond. After the Earthquake and the Tsunami, the world was shocked. In the wake of the 100 ft waves that destroyed countless lives and towns, there was an outpouring of sympathy from all walks of life from around the world. This Tsunami case study will focus on what different banks did in response to the disaster to aid the people in need.

**Faculty Mentors:** Carol Ann Hackley

**Poster # 23****ATTITUDES TOWARD HOMOSEXUALITY AMONG COLLEGE STUDENTS**

Missy Billard, Anne Buckley, Courtney Pyle, and Grace Tu

Discrimination against homosexuals is something that is all too common in today's society. In our experiment, the effect of different information on students' attitudes towards homosexuality was studied. The purpose was to find whether an individual's perception of homosexual people is determined by their personal experiences with them. Thirty-five undergraduate students from the University of the Pacific participated in the study by reading one of three short stories and filling out a revised version of the Attitudes Toward Gay Men Scale, a 21-item questionnaire on their attitudes toward homosexuality. One story portrayed a homosexual teen that was harassed for his sexual orientation, another about a happy, well-adjusted homosexual teen and the last story being irrelevant. The means obtained for the three groups showed that those who read the sad story had the least accepting attitude towards homosexuality and those who read the happy story had the most accepting attitude towards homosexuality. The differences between these means were not statistically significant. Possible reasons for the non-significance were discussed by the group and it was decided that changes could be made for future research possibilities.

**Faculty Mentor:** Gary Howells

**Poster # 24****MEDIA EFFECTS ON ATTITUDES TOWARDS PATRIOTISM**

Tonetta Cantero, Tiffany Nicolos, Jaycee Davis, and Vanessa Evans

Every day Americans are subject to various portrayals of political matters and figures. The aim of this study was to address the correlation between media one is recently subjected to and one's attitudes towards democratic and antidemocratic values. A pre-test of values of patriotism and survey of attitudes on democracy was administered before participants viewed both a "spoof" clip from *The Daily Show* of the Presidential Inauguration, or, a section from the actual Inauguration address. A Rokeach values test was administered to offer insight about the correlation of certain terminal values to one's attitudes about democracy, followed by a post-viewing test of attitudes. It was expected the responses on the attitudes surveys would change to align with the content of the media. Participants consisted of 40-50 college students volunteering from the psychology department. An ANOVA 2x2 mixed factorial test indicated that only scores on Free Speech and Political Equality Tests were significantly altered by media viewed. A number of terminal values however correlated strongly with multiple attitudes tests. Further investigations with a larger sample size and time frame between pretest and viewing/posttest would produce results of greater accuracy.

**Faculty Mentor:** Gary Howells

**Poster # 25****THE INFLUENCE OF COUPLE COMPOSITION ON HELPING BEHAVIOR**

Stephany Crisolo, Iva Lewis, Pauline Cabales, and Michelle Horn

The purpose of the current study was to examine the affects of couple composition on the likelihood of helping behavior. It was expected that the female/female couple would receive more helping behavior than the female/male couple. In a local shopping mall, confederates randomly selected 30 participants per condition. Each couple approached participants and asked for a cell phone. If the participants didn't offer a cell phone, the confederates asked for change for the pay phone. Helping behavior was recorded if the participants offered either their cell phones or change for the pay phone. There was no significant difference between the two conditions. This suggests that helping behavior is not influenced by couple composition.

**Faculty Mentor:** Gary Howells

**Poster #26****ALTRUISM IN STOCKTON**

Daniela Gutierrez, Cheryl O'Riley, Melissa Romero, and Kathleen Sauler

Altruism is basically the desire to assist another person even if there is a cost involved. It would be interesting to see whether or not Stockton California's residents are altruistic when it comes to simply signing a petition promoting breast cancer research. The cost involved to participants would be there time. After four different sessions of sitting at four different locations in Stockton, asking for signatures for the petition, analyzing the data using a chi-squared test, and comparing the results, our experiment did not have any statistical significance. Although the experiment did not result in significance, perhaps future experiments that would include more locations and more participants might result in statistical significance.

**Faculty Mentor:** Gary Howells

**Poster # 27****HELPING BEHAVIOR DIFFERENCES BETWEEN GENDERS**

Ashley Jarvis, Sarah Theobald, Anh Tonnu, and Denise Quiapo

This experiment studied the difference between males and females in willingness to help another in need. The experimenters went to Sherwood Mall in Stockton CA. They each dropped papers in an accidental manner and recorded which gender if any assisted them in retrieving their papers. The total sample group was 56 participants. Each experimenters results were then combined and examined to reach the conclusion that there was a statistical difference between male and females and their willingness to help. The results showed no significant difference between males and females. Recommendations for research in this area of study could include racial or ethnic differences in willingness to help.

**Faculty Mentor:** Gary Howells

**Poster # 28****COMPLETE STOPS COMPARED BY GENDER IN CALIFORNIA**

Joshua Jessell, Kenny Yamamoto, Mahmoud Daher, and Nicole Morris

Making a complete stop at stop signs in California has become such a problem within the state they have coined the term "California stop". The definition of the California stop would be to continue rolling at a stop sign and to treat it as if it were a yield. Many studies have been done to test how many people make a complete stop at major stop signs (California Stopping, 2004). However, our study experimented with gender. We hypothesized that more female drivers would make complete stops compared to males at major, local, campus stop signs at the University of the Pacific. There were 120 participants (60 male, 60 female) and we observed them at 9 AM and 3 PM. We found that our hypothesis was incorrect and the results were insignificant using a Multiple Comparisons t-test. However, the results may have varied due to pedestrians crossing the cross walk or multiple cars in the intersection at one time.

**Faculty Mentor:** Gary Howells

**Poster # 29****EFFECT OF VIEWING AN EXECUTION ON CAPITAL PUNISHMENT**

Lynn Huynh, Stephanie Moore, Shannon Murray, Vanessa Forero-Puerta, and Tara Yopp

The present study experimentally examined the effect of watching either a televised execution or a nature video on a person's attitude towards capital punishment. 21 Pacific students watched a televised execution and 20 Pacific students watched a nature video. Afterwards, the participants took a survey on attitudes of capital punishment. The purpose of this study is to determine if the students who viewed the execution video would be more or less likely to support the death penalty than those students who watched the nature video. This study was not significant. Our attitudes towards capital punishment reflect our value, or lack thereof, of human life and rights and may be hard to change with only a video clip..

**Faculty Mentor:** Gary Howells

**Poster # 30****A COMPARISON OF RELAXATION TECHNIQUES ON ANXIETY**

Jennifer Trajano, Terrell Leidstrand, Jaqueline Jasso, and Robin Terry

This study was an investigation of stress reduction techniques on perceived anxiety. Specifically the purpose of this study was to explore the potential increase of relaxation effectiveness by combining two stress reduction techniques music listening and progressive muscle relaxation. Participants took part in one of three experimental sessions: music listening progressive muscle relaxation or a combination of the two techniques. Perceived anxiety was measured before and after treatment with the Spielberger Self-Evaluation Questionnaire. Although all three sessions decreased states of anxiety the findings indicated no significant difference between the effectiveness of the three separate techniques  $F(2, 39) = .579; p < 0.05$ . This study does not recommend a combination of progressive muscle relaxation with music listening in treatment of anxiety.

**Faculty Mentor:** Gary Howells

## SENIOR ENGINEERING DESIGN PROJECTS

### A BIODEGRADABLE RICE WRAPPER

Tony Nguyen and Glen Sabellano

Biodegradable products have generated a wave of interest and research in potential commercial applications. The goal of this project is to develop a biodegradable film that will provide a green alternative to petroleum-based products.

After numerous trials, we have developed a novel biodegradable film formulated from rice starch, hydropropylmethyl cellulose, polyvinyl alcohol, and water. The starch provides the bulk of the substrate for the film. At high temperatures, solutions of starch form gels, which can be molded into a film. Hydropropylmethyl cellulose is a soluble fiber that we add to give the film strength. Polyvinyl alcohol is a plasticizer that we add to give the film flexibility.

We are measuring the tensile strength of our film samples using the ASTM D882 standard. In addition, water permeability of the film will be measured through the water vapor transmission test. Finally, a biodegradation test will consist of burying the film in soil to determine the rate of degradation under controlled conditions.

**Faculty Mentors:** Syed Imam (USDA), George Carman, and Jeffrey Burmeister

### VOLTAGE CLAMP APPARATUS FOR EXCITABLE CELLS

Nikola Njegovan and Ronnie Terry

The voltage clamp was first employed in Hodgkin and Huxley's classic studies of excitable membranes. A voltage clamp is implemented using a pair of electrodes inserted into a cell, one of which measures the transmembrane voltage, and the other of which passes current so as to maintain a constant voltage across the membrane. This apparatus and technique has been used to reveal multiple properties of ion channels, including: threshold potentials, ion-specific equilibrium potentials, ion current magnitudes and directions, the voltage dependence of ionic currents gated by various neurotransmitters, etc.

We present a voltage clamp circuit designed to hold the transmembrane potential of an excitable cell at a user-determined command voltage, and that will monitor the current passing through the membrane ion channels in response to chemical activation. Our apparatus is being developed using electrical circuit models of neurons, and being tested on frog oocytes, which are commonly used to express a variety of membrane proteins such as voltage-gated or ligand-gated ion channels. We will demonstrate the application of voltage clamp methods to the study of the pharmacologic properties of neurotransmitters and drug compounds, as performed in Dr. Halliwell's lab.

**Faculty Mentor:** Robert Halliwell, George Carman, and Jeffrey Burmeister

## **AUTOMATED SPECTROPHOTOMETRIC ASSAYS OF WATER QUALITY**

Krystle Peterson, Ben Burton, and Nicholas Kim

Water quality is assessed using a variety of assays. One is based on the amount of algae present in the water, as determined using spectrophotometer measurements of chlorophyll and its degradation products. Currently, such assays are performed in the laboratory by hand. We have designed a flow-through system that will enable automated assay of water samples with a spectrophotometer.

Our design consists of a fluidic system, which can accept an algae sample, deliver it to the flow-through cell in the spectrophotometer to take a measurement, add and mix reagents, and finally dispose of the sample and flush the system. The design consists of tubing connected to micro-valves, a micro-pump, a peristaltic pump, and reagent reservoirs which contain the following solutions: the algae sample, hydrochloric acid, deionized water, and acetone. The micro-pump injects acid into the system, and the peristaltic pump circulates fluids through the system to exchange and transport fluid samples. In our prototype, custom electronic circuits under control of National Instruments LabView software and a peripheral IO board drive the valves and micropump.

We expect to begin testing of our prototype soon. We will validate our design by comparing our results to those obtained from manual assays. We will describe these results, and our proposed final design, during our presentation.

**Faculty Mentors:** Gary Litton, George Carman and Jeffrey Burmeister

## **CUSTOMIZED WHEELCHAIR FOR EMPHYSEMA PATIENTS**

Michael Duong

This project develops a wheelchair specifically designed to meet the needs of emphysema patients who require constant use of a ventilator. Commercially available wheelchairs are available; however their bulk and design do not meet the specific needs of these patients. In particular their bulk and design do not allow their use within the patient's home (due to their turning radius and dimensions) and do not allow for patient access to ventilator controls (the patient has to rely on someone else to adjust the ventilator settings). This project makes maximal use of commercial off the shelf product components to develop a wheelchair that satisfies these needs. Furthermore the wheelchair developed has the potential to become a commercial product addressing this unmet need.

**Faculty Mentor:** Abel Fernandez

## **LEAN MANUFACTURING: REDESIGN OF A PRODUCTION LINE**

Brian Schardt

Greenheck Fan Corporation is an industry-leading manufacturer for commercial and industrial air movement and control products. At their Rocklin California facility they produced a brand of products using table-top assembly where one worker would assemble the product from start to finish. This project implemented Phase 1 of the conversion of the production line to lean manufacturing processes. Phase 1 consisted of redesigning the raw material inventory racking system and to construct the project timeline and changes. The discussion will include different changes to the overall design final plant layouts different work products that were developed during the semester and future work and goals for Greenheck.

**Faculty Mentor:** Abel Fernandez

## **WIRELESS REPEATER ARTIFICIAL INTELLIGENCE TRANSMISSION HUB**

Makana Anicas and Kenny Her

Wireless Repeater Artificial Intelligence Transmission Hub (W.R.A.I.T.H) WRAITH is an autonomous robot that has a wireless network signal repeater strapped to its back. WRAITH will boost the weakening wireless signal from a base wireless access point (WAP) to a wireless user by physically positioning and repositioning a wireless repeater to a location that will maximize the wireless signal strength to a user dynamically. The 3 main objectives that WRAITH will meet are: 1. WRAITH reads input value (signal strength digital compass timer and positioning data) from the User via the wireless network communication. WRAITH uses these values to calculate the direction and destination to which it must proceed (with the assumption that the user and WRAITH start at the same location (0 0)). 2. When WRAITH is nearing its transmission signal limit or when its battery is low it will transmit a signal to the user saying that it has reached its repeating limit. 3. The demonstration will include the WRAITH responding independently to a varying signal strength and wireless user s dynamic repositioning. The WRAITH will move the wireless repeater to improve the wireless user s overall reception automatically.

**Faculty Mentor:** Ken Hughes

## **VIDEO GAME CONSOLE DESIGN**

Arlen Cox and Robert Hasegawa

The Video Game Console design project was created to demonstrate how much technology has enhanced design productivity. Using modern design techniques and tools a game console capable of running 1980 s and 1990 s era video games can be created by two students rather than huge design teams and for minimal money compared to millions for the custom chips used then. In addition improved software techniques and tools allow game developers to write games faster. This is demonstrated through a simple easy to use and efficient application programming interface. The project implements video sound and input using modern microcontrollers and field programmable gate arrays.

**Faculty Mentor:** Ken Hughes

## **BEHAVIOR EMULATING ROBOTIC TOY**

Ashneel Singh

The intent of the Behavior Emulating Robotic Toy (B.E.R.T.) project is to have a vehicle mimic autonomous intelligent actions based on simple behavioral rules. The inspiration for behavior based systems stems from observations in nature and the belief that intelligent behavior can be implemented by increasing the amount of processing layers. B.E.R.T. will be a superficial photovore which navigates an obstacle ridden environment in search of light.

**Faculty Mentor:** Ken Hughes

## **ALGORITHM SIMULATOR AND DEVELOPMENT SYSTEM**

Tom Hindley

Today algorithms are developed in a computer's virtual environment. They are simulated and tested inside of the computer. Before these algorithms are implemented in critical system like the navigation systems of modern aircraft they must be tested in real world hardware. This system provides a means to implement and test these algorithms in hardware. This system makes all of the signals available for examination every step of the process. Nothing is hidden inside of a FPGA, PLD, or software. This system allows the entire process to be observed down to the bit level during each instruction of the algorithm. This close examination results in a level of confidence in the algorithm that would be impossible to achieve any other way.

**Faculty Mentor:** Rahim Khoie

## **MAGNETIC GESTURE RECOGNITION TECHNOLOGY**

Ethan Owyang and Jason Faria

The proposed project is to design a 3-d gesture recognition input device that is attached to the user's hands that controls a media based application. This idea was sparked from seeing a hand device that controlled a video interface from a science fiction film . This device could be used in various environments such as in hospitals education military and business to allow the users to not be bound to a keyboard and desk. The goal of the project is to provide a generic interface that allows the user to use gestures to easily and intuitively control media applications. A scaled-down prototype this device uses magnetic field sensing to detect motions in a three-dimensional axis. Although the gestures are currently restricted to linear movement along each axis the design opens the doors for the ability for rotational gesture recognition as well.

**Faculty Mentor:** Rahim Khoie

## **WIRELESS CAMERA**

Polo Nov and Tai Hoang

The purpose of this project is to assist in the comprehension and enhancement of macro-photography as well as wild life photography. The general concept of macro-photography is to take a photograph without shaking the camera, over a long period of time for an exposure shot, resulting in a picture without any blur. The second concept is to take pictures of wildlife animals from a far distance in order to prevent danger to the photographer. Individuals may select whether to trigger the camera using the infrared light beam placed on the ground or the wireless remote. The wireless remote triggering is done successfully using radio frequency. The picture is saved on the camera flash memory and can be access later by a computer.

**Faculty Mentor:** George Schroeder

## **AUTOMATED BEER TAP**

Andrew Amstrup and Lindsey Hill

Our project is to design and build a device that is able to pour a pitcher of beer by itself automatically. This project is meant for high traffic bars and breweries. The tilt of the pitcher will be controlled by a servo that is powered and operated by a PIC microcontroller. An LCD display will show the number of pitches served.

**Faculty Mentor:** George Schroeder

## **GOLF DISTANCE TRACKER**

Alex Graham

The Golf Distance Tracker is a device uses GPS and a digital compass to track your distance on each hole to the pin where it will read zero.

**Faculty Mentor:** George Schroeder

## **THE CREEPY CRAWLER**

Derek Herboldshimer

Within the last year my father started a home inspection company. One task that has become increasing tiresome is inspecting underneath the house. There were times before when we were just doing construction that we had to go underneath the house but now it is a task that occurs much more. After many hours of crawling underneath houses inspecting them and looking for reportable conditions we starting thinking that there had to be a way to make it easier on ourselves. We started brainstorming and came up with the idea similar to what a automobile mechanic might use when working under a car – something to lay on with wheels that you can maneuver on without having to crawl shimmy or wiggle your way under the car (house in our case). And thus the Creepy Crawler was born... It is a device which will be controlled by a remote device and have the following functions: forward right left and reverse. My presentation with include a prototype which will implement the proposed functions.

**Faculty Mentor:** George Schroeder

## **AUTOMATIC HANDSFREE GARAGE DOOR OPENER**

Aaron Lam and Rene Stein

The goal of this project is to design a “hands free” automatic garage door opener. The system authenticates a car using RF communication, then it opens the garage door when the car reaches a specified distance, which is measured using a transducer and ranging module. If the car is unauthorized, the system does not respond to the car. PIC Microprocessors are used to run both the control system and the remote transmitter located inside the car. These microprocessors communicate via ~400 MHz, amplitude shift key (ASK) modulated radio waves.

**Faculty Mentor:** George Schroeder

## **CAR NANNY**

Irene Maldonado and Hidajet Fific

Our project includes a data acquisition system that will measure the lateral and longitudinal forces of a vehicle once per second. A dual axis accelerometer produces pulse widths in the x and y directions which are used to calculate the g forces by a microcontroller. The g force values for each axis are stored in memory. When the system is connected to a computer the data is downloaded and graphed. This data acquisition system can be useful for any person that lends their vehicle to another individual and wants to be able to track how fast their vehicle is being driven how sharp turns are made or how fast they brake.

**Faculty Mentor:** George Schroeder

## **WIRELESS PULSE OXIMETER**

Jane Ternavsky

The Wireless Pulse Oximeter (WPO) is a medical acquisition device aimed at neonates, babies and children. Reasons for such a device are that children tend to be very mobile, thus giving ground for erroneous constant data acquisition when many wire connections are involved. That is why the WPO is an ideal solution. It can be optimized for use in neonate intensive care, where several sensor remote units could feed data to one main station.

The design of the WPO involved thorough research, which yields the product at hand. WPO uses an 8051 microcontroller as the core, which for this project acts on behalf of two separate units: main station and remote sensor unit. The WPO collects data by interpreting the relationship between the red and infrared light passage through a pulsatile bed. That signal is passed through a filter, filtering out large noise components that may be present, and is fed into the ADC of the microcontroller. There, the signal components received and a look-up table is used to derive the SpO<sub>2</sub> value, which is transmitted through the UART to the main unit. The main unit displays this information on a 7-segment LED display. The sensor unit is driven by the PWM function of the microcontroller, where each of the diodes is switched to conserve power.

**Faculty Mentor:** George Schroeder

## **CLASS D AUDIO AMPLIFIER**

David Wunsch and Kunal Mistry

The goal of this project is to complete a working Class D audio amplifier that can produce up to 30 Watts of peak-power in order to drive a speaker system from a high quality audio device. The Class D amplifier concept was first conceived in the early 1960's and implemented in 1982. Recently it has been re-examined and found to be a very efficient audio amplifier because of technological breakthroughs in the MOSFETs the amplifier uses for switching. This has led to Class D amplifiers becoming prevalent in today's consumer audio market. In theory a Class D amplifier can obtain 100% efficiency with ideal switching. Our design goal is to achieve more than 75% efficiency. We plan on presenting the theory behind Class D Amplifiers our pre-implementation design work the measurements we took of the circuit and of the audio output spectrum analysis. In the end we plan to obtain an amplified high-fidelity audio signal.

**Faculty Mentor:** George Schroeder

## **PAN2MIME**

Denise Bohannon, Huong Nguyen, Janet Nguyen, and Marina Borrel

History: Pre-visualization "Pre-Viz" is a technique used in the motion picture industry to emulate camera movement lens angles and character movements as a computer animation before a single frame of film has been shot. Even though it saves thousands in potential production cost the current methods of pre-visualization are cumbersome and very labor-intensive. Even with its awkward implementation pre-visualization is still widely used and will soon receive high publicity with the release of the new film Polar Express. Director Robert Zemeckis has merged the world of live action directing and pre-visualization. The publicity on this new technology that will follow the release of this movie makes it a good time for both the University of the Pacific and SWE to be involved with this project. Objective: The objective of this project is to create a full pre-visualization system centered around the Maya® platform. Alias System's Maya® software well known as an industry standard lets a user create digital imagery 3D animation and visual effects. The system we will develop code named pan2mime will have three major components spanning four engineering disciplines: mechanical electrical computer science and computer engineering. The pre-visualization system will replace the cumbersome user interface that now exists with more intuitive input devices making it much easier for a director to use as well as providing quicker turn-around time.

**Faculty Mentor:** Louise Stark

**SPIRIT OF PACIFIC**

Keith Walker and David Kelley

We have built a robot that is similar in function to a Mars rover. We gave ourselves similar constraints to those faces by a team designing a rover to explore another planet.

An example of a constraint we accounted for is communication latency. When communicating over such a great distance there is a delay. This requires the rover to be somewhat autonomous and driven by commands instead of direct control.

The rover is to navigate mild terrain, collect temperature and humidity data, and take pictures. The rover is controlled wirelessly from a command station and is to send the collected data wirelessly back to the command station.

We will be demonstrating the robots functionality and describing the process used to implement the various aspects of the robots design.

**Faculty Mentor:** Richard Turpin

**FIREBOT - AUTONOMOUS FIREFIGHTING ROBOT**

Kevin Lin

Each year Trinity College holds the “Annual Trinity College Fire-Fighting Home Robot Contest” where the goal is construct an autonomous robot that can locate and extinguish a flame as quickly as possible in a model house. This competition along with the implications of a real-world application provided the inspiration for a firefighting robot. Firebot is implemented using various hardware and software modules. A Devantech Ultrasonic Ranger aids in the detection of objects/obstacles while a Hamamatsu UVtron flame detector coupled with an infrared sensor are used for flame detection and a handheld fan is used in extinguishing the flame. All of the above modules are interfaced to a PIC16F877 microcontroller the ‘brain’ of Firebot. Combined with a wall-following navigational algorithm the net result is an autonomous robot that can effectively locate and extinguish a flame.

**Faculty Mentor:** Richard Turpin

## **HANDS FREE AUTOMATED WINE CORKSCREW**

Ryan Fournier

A prototype electromechanical device has been designed and built to automatically remove corks from wine bottles. With the exception of loading a wine bottle and pressing a button, the automated wine corkscrew operates hands free. The device operates independent of cork material and cork covering. The device incorporates two DC motors; one to vertically position the corkscrew and the other to rotate the corkscrew. One feature of the device is the ability to accept wine bottles of varying height. This system was designed to sense when the top of the wine bottle is reached as the corkscrew is lowered. Another feature of the device is the allowance for different diameter wine bottles. The purely mechanical system keeps the bottle in place and ensures proper alignment with the corkscrew independent of bottle diameter. The final feature of the automated wine corkscrew is an automatic cork ejection system. Once the cork is ejected from the corkscrew, the device automatically resets itself and will be ready to accept another wine bottle.

**Faculty Mentor:** Kyle Watson

## **AUTOMATIC BEVERAGE DISPENSER**

Jeremiah Henley and Matt Samuel

The purpose of our project was to create an automatic beverage dispensing device, for personal home use, that produces several different mixed drinks at the push of a button. The apparatus contains four bottles of liquid of any kind and a preprogrammed microcontroller which controls the type and amount of the liquids dispensed. Based on the combination of liquids that are currently in the apparatus, a variety of different mixed drinks are available. If a predetermined combination of liquids is used, common mixes are preprogrammed into the microcontroller and are automatically dispensed.

The microcontroller operates multiple pumps which deposit the required amount of each separate liquid needed for the chosen mixture. Depending on which drink is desired, certain pumps will operate for a specific amount of time, always creating a perfect mix. A pint sized mixed drink can be made in less than five seconds, so the machine is very user friendly. All the workings of the device are housed in a locking steel box that can be hung on a wall, so the stored bottles can not be tampered with while the device is not in use. The application of our project is to safely and easily dispense mixed alcoholic beverages, juices, and caffeinated energy drinks.

**Faculty Mentor:** Kyle Watson

## **LLNL MECHANICS OF MATERIALS GAS GUN**

Mitch Moffet

The Mechanics of Materials Group at Lawrence Livermore National Laboratory desired a gas gun capable of firing a 2.5 lbm flier at 100 m/sec. The gun design had to incorporate commercially available equipment and minimize maintenance requirements. The gun will be used for Split Hopkinson Bar testing, Dynamic Fracture experiments, and must be versatile enough for future unforeseen projects.

The final gas gun design uses a commercial 24 gallon air tank as a pressure source. The gun is fired by energizing a 2" solenoid operated valve. The valve is connected to the breech of the gun with a flexible hose, which eliminates hard plumbing alignment issues. The breech can be opened to allow access for system alignment and changing projectiles. The barrel is comprised of three sections of honed tubing with threaded ends. The sections can be connected in multiple orientations to allow different velocity ranges.

The gun is operated by pressurizing the air tank to a fire pressure based on desired projectile velocity, and then energizing the solenoid through the fire control circuit. The solenoid opens allowing the pressure to act on the back of the flier. The pressure acting on the flier accelerates it down the barrel. Flier velocity at the end of the barrel is a function of the barrel length and the initial fire pressure. In the 21 foot barrel configuration and air pressure at 125 psi, a 2.5 lbm flier will reach 100 m/sec.

The gun components are being manufactured both at the Laboratory and University of the Pacific. The gun is being assembled in place at the Laboratory. The gun will expand the current capabilities of the test group and improve test set up and turnaround time.

**Faculty Mentor:** Kyle Watson

## **PORTABLE 88-KEY ELECTRONIC PIANO KEYBOARD**

Stephen Morse

Existing 88-key electronic piano keyboards, while more portable than a piano, are typically five to six feet long and weigh anywhere from 40 to 70 pounds. Such an object is extremely difficult to store and transport. They are much too large and heavy to be taken as carry-on items for international flights. Keyboardists either have to mail the keyboard to its destination, pay a substantial fee to have it placed in the luggage hold of the aircraft, or purchase a second seat in the main aircraft cabin for the instrument. Their size makes storage in studio apartments and college dormitories quite a challenge.

The purpose of this project is twofold: to design a keyboard that can be taken by touring musicians as a carry-on item on international flights, and that people with limited storage space (such as college students) can accommodate. The scope of this project is to design and construct a model of a folding 88-key piano keyboard that is capable of being easily transformed between a collapsed state and an expanded (playable) state to facilitate easier handling, transportation and storage. This will be accomplished by designing a three-segment hinged folding mechanism such that the keyboard folds approximately in thirds. The collapsed configuration will yield outer dimensions not exceeding 22" x 13" x 9". The keyboard model weight is not to exceed 35 pounds. .

**Faculty Mentor:** Kyle Watson

## **ACTUATED CAR AIRFOIL**

Paul Wyman and Phil Lovell

The primary problem for this senior design project was to address two needs of an existing racecar, improved handling and braking. Prior to installation of the new wing system, the racecar was in need of a rear wing to generate additional downforce on the rear axle of the car. This was because at higher speeds the rear end of the racecar drifted, due to a lack of traction through corners. However, the wing was designed for a secondary function as well, to improve the overall braking power of the racecar. This was done by allowing the wing to rotate about the supports; an air pocket will be created between the wing and endplates generating a force that opposes the forward motion of the racecar and ultimately increases the overall deceleration of the racecar. The rotation of the wing is controlled by a decelerometer attached to an actuator powered by a compressed gas. When the threshold for deceleration measured in forward g-forces is broken, the wing rotates increasing the surface area and subsequently increasing the drag on the wing. The weight of the wing and all system components were minimized to keep the overall weight of the racecar from increasing drastically. Implementing the dual purpose wing provided an advantage to the racecar by increasing the overall performance of the car in both handling and braking.

**Faculty Mentor:** Kyle Watson

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