

**Program & Abstracts
for the 6th Annual**

**Pacific
Undergraduate
Research &
Creativity
Conference**

PURCC-2006

Compiled and Edited by
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May 6, 2006

Program

Oral Presentations

Time: 9:00 AM – 10:45 PM

George Wilson Hall

Time	Author	Title
9:00	Michelle Manson	Modigliani's New Definition of the Modernist Female Nude
9:15	Lauren Gallow	Mistakes Rebuilt: Parallels in the Construction and Reconstruction of the World Trade Center Site, 1973 and 2003
9:30	Erin Tinney	Secretion and Sex: Kiki Smith and the Abject
9:45	Harrison Inefuku	Pollution in Inner and Outer Spaces: Masami Teraoka's McDonald's Hamburgers Invading Japan, 1974-5
10:00	Purple Tayo	Improving Educational Environment For Autism
10:15	Melissa Anderson	America's Distraction: Astaire and Rogers Musicals in the 1930s
10:30	Daniel Guerra	A Personal Education: How Dialogue Prevented Radical Student Protest at the University of the Pacific during the Sixties

Poster Presentations

Time: 10:00 AM – 12:00 PM

Callison Hall

Poster#	Author(s)	Title
1	David Pratt	Physiological Changes Following Intravenous Saline Administration in a Patient with Chronic Fatigue Syndrome
2	Jarek Stanley	The Economics of Violent Resistance in Xinjiang, China
3	Lynn Huynh Carolynn Kohn	Social Influences of Body Image and Smoking
4	Paula Burt Rufaro Gwarada	Women Deserve Credit: Empowering Women through Microfinance
5	Sean Coletta	Who is Being Left Behind?
6	Michelle Manson	BIG DEAL: Tackling Child Obesity through Design
7	Molly Kennedy-Darling	Internship At The Career Resource Center
8	Chris Durkee	Preserving the Coral Reefs Through Science and Hobby
9	Chotika Ophaswongse	The Record: Graphic Design Internship
10	Krystin Fong	An Overview of Synthesis and Identification of Peptides
11	Andrey Samoshin Andreas Franz Vyacheslav Samoshin	Green Photochemistry: Sun-induced Aromatic Nucleophilic Substitution of Alkoxy Groups by Alkylamines

12	Gerardo Castillo Lorena Rios Charles Moore Patrick Jones	What is the Plastic That Has Invaded the Ocean?
13	Coby La Mattina Allyson Brooks	Characterization of a Glycine-Rich Protein, AgSp1, in the Black Widow Spider
14	Edward Reitnauer James Shaw Genevieve Shek	Characterization of the expression pattern for a putative toxin in black widow silk glands
15	Cu Huynh Joseph King Minh Vo	Identification and Amplification of a Novel Egg Case Silk Gene In <i>Latrodectus hesperus</i>
16	Jennifer-Grace Cabug Christine Liu Grace Pintor	The Effect of Dragline Silk Extraction on the Expression Patter of Egg Case Silk Components in the <i>Lactrodectus hesperus</i> Spider
17	Patrick DiTullio	Tensile Strength of Dragline Silk From the <i>Hololena nedra</i> spider
18	Shirley Vong Jimmy Du	Characterization of the Expression Pattern of a Novel Gene Product That is Assembled Into Black Widow Egg Case Silk
19	Phoebe Montemayor Janelle Mar	Blocking the Function of the Fruit Fly Rad51D Gene Using RNA Interference
20	Khanh Ngo	Analysis of the Rad51 Gene From <i>Trichomonas vaginalis</i>
21	Jill Himlan	More Than Fun and Games: Solving a Rubik's Cube Using Matrices

Engineering Design Demonstrations
2:00 – 3:30 PM
School of Engineering and Computer Science
(partial listing)

Author(s)	Title
Steven Granados, Matthew Conners, Chelsea Spier	Placencia Wastewater Treatment Facility
Kirk Ausban, Dorine Kuo, Elizabeth Regan, Crystal Roe	The Gathering Inn Transitional Housing Project
Brigitte Comrie, Jesus Lopez, Vaughn Lorenzo	The Fluorescence Of Algae
Kevin Jorgensen, Matthew Ward, Michael Knight	Designing A Better Place To Live: The Redbridge Community
Thuy Pham, Mark Quijano, Jayme Nonaka, Matteo Telli	The 3D Motion Capture System
Amos Mbong, Joshua Hansen, Nick Dean, Travis Legg	Digital Power Meter
Brad Pollock, Phong Quach, Adrian Sandstrom	Single Wire Power Monitoring Utilizing Non-Intrusive Current Measurement
Mike Baker, Philipp Klaschka, Byron Martin, Patrick Sabo	GWiz.. that was fast: Motion Activated G force meter
Keiichi McGuire, Henry Pham, Marc Takamori, Scott Spiro	Inertial Position and Orientation Tracking System
Kristen Shimizu, Chandani Patel	Cellular BioChip Impedance Analyzer
Miguel Perez, Byron Martyn	Two-Electrode Voltage Clamp Apparatus for Whole Cell Recordings using <i>Xenopus laevis</i> Oocytes
Serge Kucher	Automated Projector Mount
Chad Conzelmann, Don Parker	Rock Crawler
Janice Lee, Beth Stoll	Fill-A-Beer
Michael Matelski, Jess Edwards, Danny Goldsmith, Allison King	Hybrid Go-Kart

Patrick Grimes, Jacob Wiebe	Grill-o-mation
Steven Caldeira , Tu-Hai Le	Electro-Pneumatic Shifting System
Dustin Roelle, William Zurbrick	VAM to MAF Conversion Kit

**Senior Art & Design Exhibition
Reynolds Gallery
(partial listing)**

Author(s)	Title
Paulo Andrade	Mood Changing Design
Chelsea Davidson	Shirt off my back t
Chris Durkee	Sod's Law
KirstenHaltermann	Le Petit Jardin Joli
Molly Kennedy-Darling	Cultural Bean
Michelle Manson	Powerhaus Design
Chizuka Nakaya	“irodori”
Chotika Ophaswongse	What 2 Eat
John Piñano	Movie Eye For The College Guy
Purple Tayo	Liar, Liar, Pants On Fire

Oral Presentations

Oral Presentation: 9:00**Modigliani's New Definition of the Modernist Female Nude**

Michelle Manson

Amedeo Modigliani established a new definition of the modernist female nude, empowering and elevating women while capturing the psychology of the oppressive fate her body had inherited throughout art history. Seated Nude (1908) reaffirms the particular symbolic role of the female figure as “other” for Modigliani, whose alienation and sense of impotence in the face of modernity finds an “allegorical dimension in the various constellations of metaphors and images around the figure of the feminine” to express his own experience of alienation in the modern urban world as an Italian-Jew and as an artist. Despite the fact that Modigliani’s women strategically offer themselves, these “new nudes” also evoke a feeling of stability due to the simplicity of the setting and balance in the composition. The voluptuousness is always kept under control as the dignity of his immaculate style elevates this frankly erotic nude to a higher aesthetic level and therefore internal contemplation. It could be suggested that Modigliani is making a statement in response to past artists’ depictions of women and disputing the evil and corrupt sexuality that these artists portray as a sign of their power. The female nude could also stand indirectly for the self-fashioning of the artist, suggesting relations and hierarchies of gender and creativity. Modigliani’s struggle over the modernist body included the dissection and the depiction of extremes, such as intimacy and desire, in relation to the final work of art while employing characteristics of discipline and formality.

Faculty Mentor: Merrill Schleier

Oral Presentation: 9:15**Mistakes Rebuilt: Parallels in the Construction and Reconstruction of the World Trade Center Site, 1973 and 2003**

Lauren Gallow

On September 11, 2001, as terrorist planes crashed into the World Trade Center in New York City, few Americans were likely thinking of the rebuilding process that would inevitably ensue. However, since the site is so deeply invested with both commercial and public interests, the project to redesign the World Trade Center has become one of the most unique and challenging revitalization projects in history. While the political and commercial forces charged with rebuilding the World Trade Center site have outwardly appeared to be heavily concerned with the outpouring of public sentiment expressed concerning this project, in reality the redesign process has been anything but public. This research project seeks to show that rather than learning from the past, these private institutions heading the revitalization project seem to be repeating the same mistakes made by the designers of the original World Trade Center in their focus on commercial interests and the ensuing rejection of public sentiment. While the architectural redesign project has the potential to create a new American icon for freedom and independence, as well as position New York City to become the first true twenty-first century city, this decision to disregard the input of the American public has left the meaning of the new Freedom Tower as a response to the terrorist attacks both ambiguous and uncertain.

Faculty Mentor: Merrill Schleier

Oral Presentation: 9:30**Secretion and Sex: Kiki Smith and the Abject**

Erin Tinney

Contemporary artist Kiki Smith explores the theme of the female body in new and provocative ways. Smith tries to convey components of the female experience through her use of the abject, the grotesque, and the shocking. Focusing on her sculpture *Untitled, I* explore her use of bodily fluids and their secretion as a way to speak of the frustrations of the female experience. She follows former examples of artists' representations of the grotesque female body (e.g. photographer Cindy Sherman), and explores not only the abject, but also the idea of control, visceral shame, and bodily self-loathing. While Smith examines an expansive array of topics in this sculpture, the abject as defined by Julia Kristeva proves to be the most important instrument in exploring the frustrations and disenchantment of female existence. Smith lays bare prior objectifications of the body in order to construct a new interpretation of the female experience as a material body. In my research, I examine these topics and how her artistic practice is influenced by her own gender identity and ideas on femininity.

Faculty Mentor: Merrill Schleier

Oral Presentation: 9:45**Pollution in Inner and Outer Spaces: Masami Teraoka's McDonald's Hamburgers Invading Japan, 1974-5**

Harrison Inefuku

Arriving in Los Angeles from Japan at the height of the Pop Art movement in the 1960s, Masami Teraoka used his art to speak of the interaction between Japanese and Western cultures – the former, viewed as rigid and traditional and the latter, fast-paced and modern. In my paper, I focus on Teraoka's series *McDonald's Hamburgers Invading Japan*, completed between 1974 and 1975. Composed in watercolor, a Western medium, and made to resemble ukiyo-e woodblock prints, a Japanese medium, the series shows the impact of the American multinational corporation on a post-World War II Japan. I examine Teraoka's varied influences, both Western and Japanese, to show how he grapples with issues of class hierarchy, consumerism, pollution and nationality in a framework established by the ukiyo-e artisans of nineteenth Century Edo (present-day Tokyo). In my paper, I establish the connection between ukiyo-e woodblock prints, in the context of their production, with the Pop Art movement, as well as the appropriateness of the medium to depict themes of convergent cultures. Specifically, I focus on Teraoka's depiction of refuse to show the "pollution" McDonald's has brought about in Japan, both in terms of the opening of McDonald's restaurants on Japanese soil, and changing attitudes and etiquette regarding eating habits

Faculty Mentor: Merrill Schleier

Oral Presentation: 10:00**Improving Educational Environment For Autism**

Purple Tayo

Although all autistic children require special education initially, integration into a “normal” classroom is appropriate for some, broadening their horizon. But teachers in regular classrooms are not typically trained to work with special needs children and cannot devote all their time to the new task since the majority of their students are non-autistic. Thus teachers must be educated about the challenges concerning autism through an accessible, easy-to-use reference kit. A graphically-oriented kit is the best way to achieve this. The kit provides basic information on autism, propose helpful teaching methods, and provide solutions to the environmental distractions that often delay the learning process for autistic children. The educational video addresses these issues in a visual effort to communicate an autistic’s mentality, something a standard reference guide (such as a reference book) cannot accomplish. For maximum accessibility, the kit is composed of a three-dimensional box with an attached flap showing the visual components, which include an educational video and reference manual. The video addresses the manual but as an interactive vehicle. Incorporating this graphically-oriented kit into the classroom reduces confusion and stress for teachers and present a reliable guide for addressing a crisis in the classroom.

Faculty Mentor: Brett DeBoer

Oral Presentation: 10:15**America's Distraction: Astaire and Rogers Musicals in the 1930s**

Melissa Anderson

America was profoundly impacted by the economic and social upheaval of the 1930s. Film became an essential coping mechanism for Americans. At the lowest attendance point, 60 million Americans a week went to theaters. It was a period of instability, and Americans shifted their spending practices. Items that were once considered luxuries such as movies tickets were purchased to dull the edge of uncertainty created by the era. Thus, while many scholars have dismissed film, especially the musical, as lacking in historical significance, the size of American audiences constitutes a compelling motivation to explore the genre. For that reason, the films of two beloved musical stars, Fred Astaire and Ginger Rogers, critical reaction to their films and reactions of audiences present a window into the 1930s. The predictable romance of the Astaire-Rogers genre attracted viewers whose own lives were uncertain. Using ten Rogers-Astaire films, New York Times and Life Magazine reviews of the films, and secondary sources pertaining to the 1930s, this paper addresses the attraction of the genre to audiences of the time. It utilizes basic film criticism and gender theory in ascertaining the appeal of the two stars.

Faculty Mentor: Edith Sparks

Oral Presentation: 10:30**A Personal Education: How Dialogue Prevented Radical Student Protest at the University of the Pacific during the Sixties**

Daniel Guerra

Many Americans today associate the 1960's antiwar student movements with violence and chaos. Images of bloodied students and riots in the street are seared into the collective consciousness of America. At present we only know about student protests at universities such as Berkeley and Columbia because they made national headlines and have been researched by scholars. Simply stated, the vast majority of student movements on university campuses during the sixties and early seventies in America have not been researched. Thus, we cannot draw accurate conclusions about student protests in America until we study schools that did not garner massive media attention. Student unrest at the University of Pacific in 1970 presents an alternative case study since it challenges images of civil unrest. Before 1970, Pacific students were not engaged in protest activity. Rather, they were, to quote Professor Jerry Hewitt, "Busy being students." But this was not at all rare during the sixties and early seventies- the majority of students in America during this time did not protest at all. Indeed, most students were busy being students. The conception that most university students were radical and unruly in the sixties and early seventies is false. Thus, the call for more research in this specific field is even more pressing. When we examine the protest at Pacific, and look at student journals, the school paper, administrative records, and the yearbook, we discover that it came later and was never as radical as better known student movements in America. This lag and absence of radical behavior can be largely explained by the administration's actions to create a personal education for students, as well as establishing dialogue with the students.

Faculty Mentor: Edith Sparks

Poster Presentations

Poster # 1**Physiological Changes Following Intravenous Saline Administration in a Patient with Chronic Fatigue Syndrome**

David Pratt

Patients with Chronic Fatigue Syndrome (CFS) have diminished physical working capacity that could be due to low blood volume or abnormal sympathoadrenal activation. Purpose: This study aimed to investigate the effect of 1 l/day of 0.9% saline administration in a 38 yr old female with CFS. Methods: Primary outcome measurements were based on cardiopulmonary responses during maximal exercise testing and bioelectrical impedance analysis (BIA). A preliminary exercise test was performed prior to beginning saline administration, then follow-up exercise tests were conducted at 15, 55, 92, 125, 180, 249 and 417 days post first treatment. Results: Measures of peak oxygen consumption (VO₂ peak), minute ventilation (VE), VO₂ at anaerobic threshold (AT), peak workload (WL), heart rate (HR), and systolic blood pressure (SBP) increased during the saline administration:

To determine if these improvements were due to increases in fluid volume during saline administration (BIA) was used determined values for total body water, extra cellular water, intracellular water, extra cellular mass (ECM), and body cell mass (BCM) concentrations as well as phase angle following i.v. saline Conclusions: These findings indicate that intravenous saline administration improves physical working capacity and that these improvements may be due to small, but measurable differences in ECW levels.

Faculty Mentor: Mark Van Ness**Poster # 2****The Economics of Violent Resistance in Xinjiang, China**

Jarek Stanley

Social and economic development in the western province of Xinjiang is one of the most difficult questions facing China today. Although Xinjiang as a whole has prospered as a result of reform era economic policies, government sponsored colonization and economic directives have largely favored Han Chinese populations, creating a large economic and social disparity between Han and Muslim populations. These disparities in combination with ethno-nationalism and increased international linkages have inspired numerous political resistance groups. These groups have engaged in active opposition to the central government through a variety of methods, including numerous acts of violence, particularly in the 1990s. The following study is dedicated to understanding how incidents of violence in Xinjiang influence Chinese central government spending at the county level, and how those incidents fit into the larger body of work concerning the economic effects of conflict. Empirical analysis of government expenditures at the county level reveals no statistically significant relationship between incidents of violence and government spending, offering a first glimpse into how ideas concerning the economics of conflict play out in the world's largest country.

Faculty Mentor: Greg Rohlf

Poster # 3**Social Influences of Body Image and Smoking**

Lynn Huynh,Carolynn Kohn

Research suggests that individuals' perception of their bodies and weight are highly influenced by social factors particularly during adolescent and emerging adulthood stages. Most studies have concentrated on the relationship of body image to smoking in adolescents, and few have examined this relationship in college students. The present study examined the relationship of social influences of body image to smoking among college students. We hypothesized that participants who smoke would score higher on measures of socially-influenced body image (e.g. Have body images that are more influenced by social factors). The effect of smoking status on body image was not statistically significant. Limitations to the study were that a large number of participants were from a community college, older, and not in the emerging adulthood stage of their lives. Future studies should only concentrate on young adults who have moved away from home or living in dormitories.

Faculty Mentor: Carolynn Kohn

Poster # 4**Women Deserve Credit: Empowering Women through Microfinance**

Paula Burt, Rufaro Gwarada

Microfinance has come to be widely accepted as a powerful tool in poverty reduction among the very poor in society, especially women. Its benefits are both tangible and intangible, and of the intangibles, empowerment strikes us as being of utmost importance. This project explores the impact of microfinance on the empowerment of women by focusing on two main issues. The first issue has to do with whether the trend of commercializing microfinance institutions affects the empowerment of women and the second seeks to gauge to what extent non-monetary contributions of male partners in female microfinance clients' lives affects the success of said clients.

In the last few years, many Latin American microfinance institutions have transitioned from non-profit organizations to fully regulated financial institutions. The effects of the commercialization on the empowerment of women are explored and whether social development has taken a secondary role. The project offers a statistical analysis of the current relationship between women empowerment and commercialization of microfinance institutions.

In Africa gender relations play an important part in socio-economic and political outcomes such that the empowerment of women needs to be explored focusing on the role that gender relations play in the success or failure of female microfinance clients. Three countries are surveyed (Ghana, Uganda, South Africa) so that one can decipher if there are significant cultural differences in West, East, and Southern Africa that would color the findings of this project. This project focuses on qualitative data, which for the most part is not being addressed in the microfinance industry and research.

Faculty Mentor: Dave Keefe

Poster# 5**Who is Being Left Behind?**

Sean Coletta

Passed in 2001, George W. Bush's "No Child Left Behind" Act established that schools would be allocated federal funds according to their student body's performance on standardized tests.

What have the effects of this performance driven system of federal funding been? In an attempt to shed light on this pivotal inquiry, I recently submersed myself within two dissimilar public schools in the Sacramento City Unified School District: Genevieve Didion and Charles M. Goethe. My examination of newly instituted teaching techniques, survey of student attitudes, and review of standardized testing scores, have allowed me to identify some of the striking impacts public school funding allocation policies have had upon Sacramento's public schools.

Are the elevated expectations we are setting for our children truly motivating them to succeed, or are they simply advancing what we believe to be their inevitable educational demise? Who truly benefits from performance based funding allocation? In theory, performance driven funding allocation should work to raise the standard of education in these neighborhoods by motivating students and teachers to strive for academic excellence. Does this theory hold true?

Although much research has been conducted on the effects of unequal public school funding in major metropolitan cities, relatively little attention has been paid to ethnically and financially diverse suburbs which are in abundance within California. By forging relationships with students and teachers and by carefully examining standardized test scores, I believe that I have effectively deciphered a link between school funding and academic performance. My paper, in turn, addresses the questions outlined above and brings light to the validity of performance driven public school funding allocation.

Faculty Mentor: Xiaojing Zhou

Poster # 6**BIG DEAL: Tackling Child Obesity through Design**

Michelle Manson

This positive and motivating graphic campaign will encourage exercise and healthy eating in young children, therefore decreasing the rate of child obesity.

"This epidemic must be turned around, not next year or next decade, but now. Medical care won't do this, only environmental and social changes can save our future."

—State Public Health Officer Dr. Richard Joseph Jackson

Why is a design approach going to make the necessary changes in children's lives? Children are bombarded daily with information from teachers, parents, and friends. My comprehensive design approach will be centered on capturing the attention and interest of children. Relating to their interests will create a lasting impact on the minds of young children, as opposed to a teacher or parent telling them what to do. Bold color combinations, dynamic graphics, engaging compositions and by following established theories of communication will combine together in order to create an effective visual message.

Faculty Mentor: Brett DeBoer

Poster # 7**Internship At The Career Resource Center**

Molly Kennedy-Darling

This semester, I had the opportunity to step outside of the classroom to work as a graphic design intern at Pacific's Career Resource Center. At the University of the Pacific, the Career Resource Center relies on their printed materials as means of reaching their targeted audiences. Which consist of students, employers, parents, alumni, and faculty. When I started my internship, the staff at the Career Resource Center was not satisfied with the design of the printed materials, which also lacked an established unified look. My goal as an intern was to redesign their printed materials and create a new unified look for the Career Resource Center. My main challenge was to ensure that the new look made the Center stand out from the rest of the University; yet, at the same time, incorporate the University's identity standards. I created a brochure for each of the different targeted audiences, a guide for employers, a guide for parents, and a brochure containing general information about the Center. I will also be creating an additional guide for faculty and alumni. While this internship has been challenging, I have learned a lot about working directly with a client. Poster Molly

Faculty Mentor: Brett DeBoer

Poster # 8**Preserving the Coral Reefs Through Science and Hobby**

Chris Durkee

Coral reefs are a diverse underwater ecosystem that contains a vast number of species. They serve many human needs, such as protection from storms and economical benefits. Many travel to view coral reefs and some keep them in their own homes. Despite the importance of coral reefs they are slowly disappearing. Many human-induced and natural causes have lead to the destruction of natural reefs. Along with the devastation, there are scientist and hobbyists working to save the precious coral reefs. Science continues to help hobbyists learn more about the reefs and how they can play an active role in protecting the natural reefs. Both parties will agree that the general public must be more aware of the problems in order continue coral reef preservation. In order to raise public awareness I am proposing to create a film that investigates both sides of coral reef preservation. By visiting and filming at the National Coral Reef Institute, as well as conducting interviews from the staff, I will obtain footage of how researchers are working to preserve reefs. From the hobbyist prospective, I will meet with members of the Central Valley Reefers club to film their tanks and conduct interviews. I will also film events and techniques used by hobbyists to promote coral reef preservation. The film will be produced and distributed over the Internet as well as in local fish stores and through different clubs. This way the film will effectively raise public awareness and promote the issue of coral reef preservation.

Faculty Mentor: Brett DeBoer

Poster# 9**The Record: Graphic Design Internship**

Chotika Ophaswongse

The objectives of this graphic design internship are: to experience working as a real designer in the real working environment, to learn to create designs with restrictions, requirements, and time frames, to improve the ability to communicate the artistic ideas clearly, and to improve the skill of adjusting creative styles of designs that will provide the most appropriate solutions to the design problems. To be able to fulfill the objectives, I will interact with co-designers to learn the routine and the development of the creative projects from the beginning until the final production part of the process, and also to have my creative works critiqued by professional designers. I will be assigned to take a full creative responsibility for the redesigning of one of the company's major promotional programs from developing a new identity to applying it to different applications. The project will be completed in the time period of eight months and the design process will be presented as a poster to show the evolution of the creative solutions and how one idea inspired another.

Faculty Mentor: Brett DeBoer

Poster # 10**An Overview of Synthesis and Identification of Peptides**

Krystin Fong

As part of ongoing projects, short peptides including Cys-Gly-Gly-Gly (CGGG) and Arg-Gly-Asp-Val (RGDV) were synthesized using the method of Solid Phase Peptide Synthesis (SPPS).

First, an initial coupling of Fmoc-protected amino acid to the resin of choice was carried out. After deprotecting the N-terminus of the first amino acid, further coupling and deprotecting steps were systematically completed in a peptide synthesis vessel continually agitated by an automatic shaker, until the peptide chain of desired composition was attained. The peptide was then cleaved from the resin with a cleavage cocktail of varying composition, depending on peptide identity. The peptide-containing solution was next subjected to the low pressure of a rotovap that concentrated the peptide, preparing it for chloroform extraction and subsequent centrifugation under a vacuum pump. Successful synthesis of peptides was confirmed when sample obtained (in gel-like form) was identified, using fragmentation analyses based on MS/MS spectra from the Electrospray Ionization Triple Quadrupole Mass Spectrometer (ESI-3Q).

The two peptides synthesized are of specific interest to us. Synthesized CGGG will be further analyzed for its chemical properties before utilizing it as a reference in studies on C(A)_n helical peptides. RGD is known to have biological significance in protein binding with cell membranes, so our study of tetrapeptide RGDV may lend insight into how this occurs.

Faculty Mentor: Jianhua Ren

Poster # 11**Green Photochemistry: Sun-induced Aromatic Nucleophilic Substitution of Alkoxy Groups by Alkylamines**

Andrey Samoshin, Andreas Franz, Vyacheslav Samoshin

Solar photochemistry proved to be efficient for the nucleophilic substitution of alkoxy groups by amines in alkoxy nitrobenzenes. The results of the sun-induced photochemical substitution were comparable to the outcome of the same reaction under irradiation by a low-pressure mercury lamp. Using 4'-nitrobenzo-15-crown-5 as a starting material, we obtained a polyether amino alcohol which will be used as a precursor for the synthesis of benzoazacrown ethers - the agents for selective binding of heavy metal salts.

Faculty Mentor: Vyacheslav Samoshin

Poster # 12**What is the Plastic That Has Invaded the Ocean?**

Gerardo Castillo, Lorena Rios, Charles Moore, Patrick Jones

Plastics are primarily synthetic organic polymers derived from petroleum. Many of these polymers are not biodegradable with the consequence that they stay in the natural environment for a very long time. Plastic debris and minute plastic particles, including pre-production plastics called nurdles, resin beads, or pellets are floating in the ocean. These synthetic polymers are extremely useful for a wide variety of applications and they are cheap: One pound of pellets costs about \$1 and contains approximately 25,000 pellets. At this time, there are a few studies about impact of contamination by plastics in marine environment. More than 80% of the marine debris is PLASTIC, it has the potential to interfere with a wide range of species including turtles, birds, fish, marine mammals, and other wildlife by entanglement and ingestion (Moore C. 2003). In recent studies we found that pellets and debris plastic can concentrate, transport persistent organic pollutants (POPs) (Mato et al., 2001, Rios et al., in process). The plastic debris can enter the ocean in different paths and can accumulate (Moore et al., 2001, Thompson et al., 2004). In our Research, we work with plastic debris samples from the ocean in North Central Pacific Gyre. This is an area of high pressure with a clockwise ocean current. The circular winds produce circular ocean currents which spiral inward and dip slightly at the center, this tends to trap the debris from different sources in the North Pacific. In the center of the gyre the winds are sufficiently calm that floating debris is not mixed deeply into the water column. The types of plastics found were identified using a Shimadzu 8300 Fourier Transform Infrared Spectrophotometer (FT-IR). The spectra were corrected for background and compared to spectra with our database for polymers using virgin pellets as standards.

Faculty Mentor: Lorena Rios

Poster # 13**Characterization of a Glycine-Rich Protein, AgSp1, in the Black Widow Spider**

Coby La Mattina, Allyson Brooks

The orb web spider's artistic, uniform web is more complex than what the eyes can see. Each web is comprised of an assortment of different silk fibers ranging in strength and elasticity depending on their particular function. Seven glands are housed within the abdomen of the spider, which produce these varying fibroins. The aggregate gland, in particular, is believed to produce glue proteins, which form sticky droplets that are used to assist in capturing prey and may have a mechanical role in the fiber. These sticky droplets are rich in glycine amino acids. We hypothesize that the glycine rich protein AgSp1, previously obtained from a genetic screen performed using a spider DNA chip, is manufactured in the aggregate gland. To test this hypothesis, we performed quantitative real time PCR analysis on mRNA isolated from different silk producing glands. The findings from this experiment will be discussed.

Faculty Mentor: Craig Vierra

Poster # 14**Characterization of the expression pattern for a putative toxin in black widow silk glands**

Edward Reitnauer, James Shaw, Genevieve Shek

Studies have shown that *Latrodectus hesperus*, black widow spiders, produce silks that illustrate remarkable strength and toughness that can be compared to steel. The ultimate goal, in the future, is to decipher the exact primary sequence for the silk protein so that it may be mass produced and integrated into many beneficial products, such as bullet-proof vests or a new type of medical suture. Using the silk could not only make our industrial products stronger, more elastic, cheaper, but also biodegradable, which would reduce much waste produced from non-bio-degradable products and be environmentally friendly.

However, there has been an interesting discovery in recent years regarding black widow spider silk. Our lab has recently discovered that there may be neurotoxin proteins present in black widow spider silk-producing glands. This was discovered when researchers were analyzing the components that constitute black widow silk. However the glands that are responsible for producing toxins are located in glands near the fangs of the spider in the cephalic region, by the head. The glands that are responsible for producing silk are in the abdominal region of the spider, clearly away from where toxin proteins are produced.

For our research we have decided to confirm if toxin proteins are being produced in web glands. We have selected to study the tubuliform gland, aggregate gland, major ampullate gland, and minor ampullate glands to look for the expression of toxin RNAs where they are not typically expressed. We have designed an experiment where we have created primers that use real time PCR to amplify the mRNA sequences in each of the glands. Using this analysis, we will examine whether some recently identified putative toxin proteins are expressed in silk-producing glands. Results will be discussed.

Faculty Mentor: Craig Vierra

Poster # 15**Identification And Amplification Of A Novel Egg Case Silk Gene In Latrodectus Hesperus**

Cu Huynh, Joseph King, Minh Vo

Spider silks are characteristically strong and elastic. The potential of using spider silk for various industrial applications is enormous once mass production of spider silk becomes possible. Made by seven different glands of certain orb-weaving spiders, multiple types of silk are produced with unique chemical and mechanical properties. The seven glands are the major ampullate, minor ampullate, flagelliform, pyriform, aciniform, aggregate, and tubuliform glands. In this experiment, degenerate oligonucleotides were designed based on the peptide fragments obtained from tryptic digestion of Strong-1, a large molecular weight protein identified to be a major component of *Latrodectus hesperus* egg case silk. We are currently screening a cDNA library using polymerase chain reaction (PCR) to amplify pieces of the gene corresponding to Strong-1. Results will be discussed.

Faculty Mentor: Craig Vierra

Poster # 16**The Effect of Dragline Silk Extraction on the Expression Patter of Egg Case Silk Components in the Lactrodectus hesperus Spider**

Jennifer-Grace Cabug, Christine Liu, Grace Pintor

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, such as the black widow spider *Latrodectus hesperus*. Previous investigations have identified one of the principal, specialized glands as being ampullate-shaped, which has been named the major ampullate gland. The major ampullate gland's main purpose is to produce silk that will hold the weight of the spider as a dragline, which is referred to as the safety line for the spider. A second silk-producing gland, the tubuliform, is responsible for the production of egg case silk which protects the spider's offspring during development and is very important in the reproduction of the spider. After one day of gravity silking, the spider's major ampullate and tubuliform glands were dissected out and particular mRNAs were analyzed through quantitative real time PCR for changes in their expression pattern. In particular we investigated transcripts that encode proteins involved in either dragline or egg case silk. Our hypothesis is that after one day of extracting dragline silk from the female *Lactrodectus hesperus*, the tubuliform gland will not show a significant change in mRNA production for two chief components of egg case silk, TuSp1 and ECP-1. Conversely, we anticipate that mRNA levels for MaSp1 and MaSp2, which are important constituents of dragline silk, will show increased mRNA synthesis. Results will be discussed.

Faculty Mentor: Craig Vierra

Poster # 17**Tensile Strength of Dragline Silk From the *Hololena nedra* spider**

Patrick DiTullio

This project studied the tensile strength of dragline silk of the *Hololena nedra* spider. The *Hololena nedra* spider is a member of the RTA clade, making it more distantly related from other spiders whose silk has been more thoroughly studied. Measurements were taken by stretching the silk using an AuroraScientific Force Transducer and Length Controller until breaking. The strain ($\Delta L/L$) and stress (F/A) were calculated using data obtained from the tensometer readings and a scanning electron microscope (SEM) to find the diameter of the silk. a stress strain curve was plotted. The yield point occurred at a much higher stress than other spiders studied. The dragline silk was found to be single stranded and to have a breaking stress of 1311.6 ± 170 MPa. The breaking strain was found to be $.197 \pm .1$. This leads us to conclude that although there are some similarities between *Hololena* dragline and that of other spiders, there are enough differences to suggest molecular differences and should be examined at a molecular level.

Faculty Mentor: Anne Moore**Poster # 18****Characterization Of The Expression Pattern Of A Novel Gene Product That Is Assembled Into Black Widow Egg Case Silk**

Shirley Vong, Jimmy Du

Spider egg case silk has many benefits and practical uses. They are highly recognized for their mechanical properties. The strength and elasticity of the silk makes it one of the toughest known natural fibers. It has a wide range of applications such as, body armor, medical devices, textiles, specialty ropes, and many more. Even with these favorable properties of spider silk, spiders have not been controlled for industrial or large-scale use because of their territorial and cannibalistic nature. In order to start making copies of silk fibers for further uses, more information is needed regarding the identities of the silk proteins involved as well as their specific functions in the fibers. When most of their properties are elucidated, then it could potentially be used for engineering applications. By using protein engineering, high yields of the spider silk protein can be generated for industrial and large-scale applications. Recently our lab has isolated a new gene that encodes a protein found in the black widow egg cases (used for reproduction), which has been named egg case silk protein 3 (ECP-3). We hypothesize that ECP-3 is expressed in the tubuliform gland, since other characterized egg case silk components (TuSp1, ECP-1, and ECP-2) all have been demonstrated to display tubuliform-restricted patterns of expression. For our experiment, we have dissected spiders to isolate RNAs from several different silk-producing glands. To examine the expression pattern for ECP-3, we have performed quantitative real time PCR analysis. Our supposition is that ECP-3 will display similar restricted patterns of expression which is similar to TuSp1, ECP-1 and ECP-3. Our findings and results will be discussed.

Faculty Mentor: Craig Vierra

Poster # 19**Blocking the Function of the Fruit Fly Rad51D Gene Using RNA Interference**

Phoebe Montemayor, Janelle Mar

Rad51 is a key gene responsible for homologous recombination during meiosis and DNA repair in eukaryotic organisms. In mammals it is helped by 5 related genes, called paralogs, which show differences in where they are expressed and which appear to have some novel functions on their own. One focus of our lab is to study the role of two of these paralogs, called Rad51D and XRCC2, in fruit flies. The goal of our project is to knock out the function of the fly Rad51D gene and see how it affects the development of the flies, their ability to undergo meiosis, and their response to drugs that damage DNA. We have helped to clone the Rad51D gene into a vector that will make a double-stranded RNA copy of this gene, which can then be used to block the expression of the Rad51D protein when injected into flies. We are currently injecting this DNA construct into fly embryos to create transformed flies which can be used for an analysis of Rad51D function.

Faculty Mentor: Lisa Wrischnik

Poster # 20**Analysis of the Rad51 Gene From *Trichomonas vaginalis***

Khanh Ngo

Rad51 is a gene responsible for homologous recombination during meiosis and DNA repair in eukaryotic organisms. *Trichomonas vaginalis* is a unicellular protist from an ancient lineage that is the causative agent for a sexually transmitted disease called Trichomoniasis. One of the major drugs used to treat the parasite has been suggested to kill the organism by generating DNA damage, so a better understanding of DNA repair pathways in this organism, such as the Rad51-dependent homologous repair pathway, could help us understand the mechanism of action of this drug (and others). In addition, though no form of sexual recombination has yet been seen in cultures of this organism, it contains genes used during meiosis in other organisms, including Rad51. Our goal is to understand the role of Rad51 in drug response and its potential role in meiosis in *T. vaginalis*. I have begun an analysis of Rad51 using techniques such as RT-PCR, real time PCR, Southern analysis, and transfection of *Trichomonas*. I am currently working on determining when the protein is being expressed, localizing the protein product in *Trichomonas* cells, and expressing the protein in bacteria in order to make antibodies against it and to test its function in DNA recombination.

Faculty Mentor: Lisa Wrischnik

Poster # 21**More Than Fun and Games: Solving a Rubik's Cube Using Matrices**

Jill Himlan

The childhood puzzle called the Rubik's Cube is more than a simple toy. The puzzle was invented in 1974 by the Hungarian interior design artist Erno Rubik, and soon became a worldwide fascination of children and adults alike. However, the Rubik's cube is more than a simple game; it is actually a very precise and advanced mathematical puzzle. This project aims to use mathematical tools to study and solve a 2x2x2 Rubik's cube. Each possible variation of the cube can be represented by a 24x24 mathematical model known as a matrix, and by using matrix multiplication to represent possible rotations of the cube, the 2x2x2 Rubik's cube can be solved given any starting state

Faculty Mentor: Christopher Goff

Senior Engineering Design Presentations

SENIOR ENGINEERING DESIGN PROJECTS

Placencia Wastewater Treatment Facility

Steven Granados, Matthew Conners, Chelsea Spier

The village of Seine Bight, located on the Placencia Peninsula in Belize, is home to approximately 2,000 people. Due to conditions in the area, there are no provisions for treating the wastewater that the village creates. The current disposal method in the village is simply to empty buckets of waste into the ocean. Environmental and health concerns, in addition to increased population growth, have led to the need for a higher level of sophistication in collecting and treating the village's wastewater. To meet this demand, we have developed a two-pronged approach to solve this emerging problem. A pressure sewer system will be installed inside of the village to collect wastewater and prevent its discharge into the ocean. By doing this, the village of Seine Bight can continue its population growth without endangering the local ecosystem. The second part of our design is focused on treating the collected wastewater to a level where it can be either safely discharged into the environment, or used to irrigate certain crops in the surrounding areas. The designs have been focused to meet the criteria of sustainability, constructability and affordable cost. Through the implementation of these designs, Seine Bight will offer its residents a higher standard of living while also being able to keep protection of the local environment a top priority.

Faculty Mentor: Gary Litton

The Gathering Inn Transitional Housing Project

Kirk Ausban, Dorine Kuo, Elizabeth Regan, Crystal Roe

Four senior engineering students at the University of the Pacific in Stockton, California, formed ARRK Engineering for their Engineering Synthesis class. They currently work in conjunction with the Sacramento Professional Chapter of Engineers Without Borders on The Gathering Inn Transitional Housing project. This project will provide a new facility that will help homeless men reintegrate society in Roseville, California. ARRK Engineering agreed to take responsibilities for the site development, the design of the site layout, and the structural design of this new facility. It will be a one-story wood-framed building incorporating energy efficient systems such as photovoltaic panels to supply the estimated 2 kilowatt electrical demand. Ten Sharp poly-crystalline 200 watt panels (ND-200U1 module) will be placed in two rows in the middle of the south facing roof. Excess energy generation will be credited to project. The major living elements of this building include three bedrooms, an exercise room, a laundry area, a kitchen, a social area, an office, a conference room, a reception area at the entrance of the facility, and a three-car garage next to the kitchen. Since The Gathering Inn has not purchased land for this facility, ARRK Engineering selected a theoretical site in Stockton for the purpose of the class. As a result, ARRK Engineering will comply with the regulations set by the State of California, the City of Roseville, and the City of Stockton.

Faculty Mentor: Gary Litton

The Fluorescence Of Algae

Brigitte Comrie, Jesus Lopez, Vaughn Lorenzo

A healthy river contains large amounts of dissolved oxygen created from algae; therefore, algae are very important for water quality. One parameter used in algal characterization is to measure the concentration of the photosynthetic pigment, chlorophyll a, and its degraded product pheophytin a. The measurement of these two pigments is a convenient and highly practiced way to represent the physiological health and biochemical oxygen demand. Researchers currently use a fluorometer with an acidification process to degrade chlorophyll a to pheophytin a to isolate the fluorescent response of the two pigments. The ratio of fluorescence response of the sample before and after acidification is used to estimate the concentration of chlorophyll a in the sample. For accurate results, collected samples need to be measured as soon as possible or properly preserved. The most accurate representation of chlorophyll a concentrations in a river occurs when measuring is done in the field. Currently an in situ method and/or device that continuously measures both chlorophyll a and pheophytin a does not exist. The purpose of the project is to develop an automatic and continuous measurement of both chlorophyll a and pheophytin a concentrations with a fluorometer. The acidification process is used to measure both fluorescent excitation of chlorophyll a and pheophytin a concentrations. This device will benefit researchers by providing a faster and more accurate way to gather algal population data, specifically in the San Joaquin River.

Faculty Mentor: Gary Litton

Designing A Better Place To Live: The Redbridge Community

Kevin Jorgensen, Matthew Ward, Michael Knight

The Redbridge Community project consists of two major tasks: design of a parking lot and a recreation structure for a newly developed community within the City of Tracy, CA. The access to and parking for an existing community store and post office is necessary to reduce traffic congestion and improve public safety. A traffic study was performed to attain specific data required for design. The parking lot was designed for maximum occupancy and one-direction traffic flow. Potential stormwater runoff and associated hydraulic flows were calculated and proper drainage facilities were incorporated into the design. The second portion of the project involves the structural design of a fitness center for the community. The fitness center will be approximately 1500 square feet in size and will be located on an adjacent lot to the community store. The fitness center was designed according to the Uniform Building Code, California Building Code, and City of Tracy Standards. The structure was analyzed for seismic and wind loads including applicable dead and live loads. The aesthetics and materials used for the structure match similar existing buildings within the community.

Faculty Mentor: Gary Litton

The 3D Motion Capture System

Thuy Pham, Mark Quijano, Jayme Nonaka, Matteo Telli

In today's entertainment driven world, the search for more accurate and realistic computer generated animation is ever so increasing. This project is a portable position-sensing system which will record the position and orientation of an object as the object moves. The data collected by this design will be stored onto a memory card and will be downloaded to a computer for analysis of the device's motion. This will provide the capability of having a more life-like movement in animation. Our solution to this problem will be the combination of sensors and a microcontroller to measure and calculate the position and orientation of the object that or device could be attached to. To solve the data memory storage dilemma, MMC memory storage will be integrated into our device along with using a 9V battery to make this system portable. At the same time, it will be made as small as possible to be more applicable in diverse application. Other applications this device can be used for could be for measuring joint movements in physical therapy or capturing a football being thrown to detect if the football is being thrown correctly.

Faculty Mentor: Ken Hughes

Digital Power Meter

Amos Mbong, Joshua Hansen, Nick Dean, Travis Legg

The power meter is a device to measure the power consumed by a small consumer appliance. The meter must operate non-intrusively, without interrupting the power to install the measuring device. Current and voltage supplied to the consumer electronic are to be measured given a 3 volt (rms) sinusoidal power source operating at 60 Hz.

Current is measured non-intrusively by measuring the magnetic field produced from the alternating current supplied to the appliance. A current transformer converts the sensed magnetic field into a voltage signal. Analog circuit conditioning converts the voltage and current signals into the appropriate levels to be inputted into a microcontroller. A microprocessor interprets the conditioned signals and calculates the power consumed by the device. The calculated consumed power data is displayed in real time on an LCD display. Data is also streamed to a PC in real time using a serial connection. Software residing on the PC displays the power and energy consumed given a user specified time interval.

Faculty Mentor: Ken Hughes

Single Wire Power Monitoring Utilizing Non-Intrusive Current Measurement

Brad Pollock, Phong Quach, Adrian Sandstrom

In order to determine the power consumption of an unknown load circuit both its current and voltage must be determined, as well as any phase difference between them. The current measurement is made non-intrusively by using a Rogowski coil, which picks up the magnetic field created by the current through either the supply or the return wire. The coil outputs a voltage which is proportional to the rate of change of current through the wire. This voltage is integrated and sent to a PIC18 microcontroller for further processing and storage. The PIC also implements a voltmeter via the onboard A-D converter to determine the voltage dropped across the load. The current and voltage signals are analyzed to determine the phase difference, and the actual rms current, rms voltage, power factor, and average power are computed. These values are displayed in real-time on an LCD screen, and all data can be uploaded to a computer for graphical analysis.

Faculty Mentor: Ken Hughes

GWiz.. that was fast: Motion Activated G force meter

Mike Baker, Philipp Klaschka, Byron Martin, Patrick Sabo

The main use of GWiz is to fulfill a parents' desire to have piece of mind. Automobiles today are capable of producing high speeds with incredible amounts of acceleration, and in the hands of a young and/or irresponsible driver, they can become deadly weapons. The GWiz is a device that is installed within and powered by a car to monitor longitudinal and lateral acceleration forces within a vehicle. The device saves an hour worth of acceleration data (into three banks of SPI memory), which can later be transferred to a computer (through serial communication protocols) and displayed in graphical format. This data is preconditioned with circuitry to conform to the limits of the ADC included within the 8051 microcontroller and is then parsed accordingly to be interpreted through an Excel worksheet program. The GWiz has been calibrated to sense accelerations on the order of 1/128th the acceleration caused by gravity. Demonstrations will include real time data acquisition and graphical analysis.

Faculty Mentor: Ken Hughes

Inertial Position and Orientation Tracking System

Keiichi McGuire, Henry Pham, Marc Takamori, Scott Spiro

In this project a prototype design is implemented for an IPOTS (Inertial Position and Orientation Tracking System). The problem of tracking position and orientation of a filming device using GPS will be limited to its slow refresh rate, proximity resolution and the inability to be used indoors. The IPOTS will be used to track the position and orientation of a filming device while sampling at equal to or greater than the recording device's frame rate, as well as an increase in navigation space resolution, which is crucial for filming purposes that need high time resolution. The design acquires raw inertial voltage via accelerometers and rate gyroscopes and then stores the data on an on-board multimedia storage device with FAT16 file system which can be accessed through most operating systems. The files stored on the media card are then extracted with our conversion software that calculates position and orientation data that can be used by the user.

Faculty Mentor: Ken Hughes

Cellular BioChip Impedance Analyzer

Kristen Shimizu, Chandani Patel

Bioassays are a type of in vitro experiment used to measure the effects of a substance on a living organism. In regards to drug toxicity testing, the current method of analysis involves fluorescent microscopy and can be a time consuming process. CytoDiscovery Inc. is developing a microfluidic chip-based system capable of performing biological assays to provide important and useful information about the functionality and health of cells growing in confined “channels” on a chip.

The goal of this project is to develop hardware and software for an automated bioimpedance assay system. The hypothesis to be tested is that the electrical impedance of a microfluidic channel will increase quantitatively due to the displacement of cell culture medium by cells growing in the channel.

We are using LabVIEW to automate the measurement process. In addition to LabVIEW, a relay board is used to switch between the channels on the chip. The LabVIEW program will be able to save and export the collected data to a LabVIEW measurement file which is compatible with Microsoft Excel.

We will conduct a growth kinetics test to plot the relationship between impedance and cell growth. For our project, we are using an A-375 Melanoma cell line. The data from this study will also be used to validate our software as well as the entire set-up of the system.

Faculty Mentors: Doug Modlin, Camille Troup, Xiaoling Li, George Carman, Dr. Deborah Schenberger

Two-Electrode Voltage Clamp Apparatus for Whole Cell Recordings using *Xenopus laevis* Oocytes

Miguel Perez, Byron Martyn

Neuroreceptors and ion channels mediate signaling in the nervous system. Scientists have been studying and characterizing them for years in order to get a deeper understanding of the nervous system and of various neurological disorders. One technique used to study them is the two-electrode voltage clamp. This technique holds the oocyte at a constant voltage and allows researchers to measure any and all changes in the membrane current as a result of exposing the oocyte to various different ions and drugs. A two-electrode voltage clamp (TEVC) apparatus, dubbed “The Cell Biter 1”, was developed a year ago by another senior project team. It was developed and built for Dr. Robert Halliwell in the School of Pharmacy and was meant to be a simple and cheap alternative to other expensive TEVC that are out on the market. The team, however, was unable to complete the device by the deadline. Our team has decided to pick up the project and make modifications to the existing design. Our task was to optimize the amplifier so that a minimal amount of internal noise is present inside of the system. It was also specified by Dr. Halliwell that a breakaway circuit be added into the Cell Biter 1. The breakaway circuit would allow researchers to manually turn the voltage clamp mode on and off. Once finished, this device will prove to be an invaluable tool for Dr. Halliwell's team to use for their neuropharmacological studies.

Faculty Mentor: Robert Halliwell

Automated Projector Mount

Serge Kucher

My design concept holds its beginnings from a need that arose at my local church. Recently the youth group bought a digital projector which needs to be mounted on the sanctuary ceiling. A chandelier is mounted near the projector screen, requiring the projector to be suspended about seven feet below the ceiling in order for the chandelier not to interfere with the projection. When the projector is not in use it must be retracted up to the ceiling so that it would not block the chandelier. The project is to create a projector ceiling mount that will automatically retract the projector with the use of a motor device and a wireless switch. This device must be accurate in retaining the original projector positioning, and would have to automatically stop upon reaching either the fully extended or fully retracted position. Since the projector will be hanging in the front of the sanctuary the design must be aesthetically pleasing. Safety is of prime concern; the mount must be constructed so that it could not accidentally fall, causing injury to a person. The Automated Projector Mount Project focus is maintained on the following three main criteria: mount function, safety, and aesthetics. This projector mount and its housing is custom designed to fit into the attic of the church building at hand. The final product, drawings, engineering analysis and report are the deliverables that must be submitted at the end of the senior year.

Faculty Mentor: Kyle Watson

Rock Crawler

Chad Conzelmann, Don Parker

The purpose of this project is to take a stock 1981 Jeep CJ-5 and modify it to tackle two of the most challenging trails in the U.S.; the Rubicon in California and the Golden Spike in Moab, Utah. While components are available on the after market, the needed parts for building an extreme off road vehicle are limited and expensive. This project will focus primarily on four areas of interest: roll cage design, suspension design, drive train design and steering design.

This project will focus on optimizing the functions of the above systems, thus building a vehicle capable of tackling the most extreme trails. Design of the roll cage will add structural integrity and protection of the occupants. Design of the suspension system will improve articulation and ultimately yield a high Ramp Travel Index. The engineering of the drive train will provide the desired torque to the wheels, and will include: engine swap, transmission swap, transfer case swap, axle swaps, lockers installed in axles and various other upgrades. Design of the steering will consist of a fully hydraulic steering system that will provide adequate steering force for extreme off road conditions.

Faculty Mentor: Kyle Watson

Fill-A-Beer

Janice Lee, Beth Stoll

The Tilt-A-Beer project was designed to help bartenders save time by pouring the “perfect” beer for them with the push of a button and then automatically shutting off. The system involves a cup holder that is initially at a tilt due to a spring. A start button is pushed on the tap tower, which turns on a timing relay that times the flow through a solenoid and then cuts the voltage to stop the flow through the solenoid once the glass is full. During this time, the weight of the glass and beer gradually compress the spring, bringing the glass to a fully upright position. This design also features a moment switch, which can be used in place of the timed switch when a glass simply needs to be topped off. Also, there are two cup holders mounted on a sliding bar and manufactured stand, allowing the operator to use two of the three faucets at once. All parts to the stand and cup holders can also be easily disassembled to ensure that they can be thoroughly cleaned. Testing and analysis were done to choose some of the design components, including the spring, timing relays, and solenoids. The result of this project is a user-friendly, timesaving system that will ensure that a bartender can save time while pouring a beer and be able to easily clean up at the end of their shift.

Faculty Mentor: Kyle Watson

Hybrid Go-Kart

Michael Matelski, Jess Edwards, Danny Goldsmith, Allison King

In these times of amazing technology and sophistication our society has become used to easy, safe mobility, and fast efficient results. One major factor of this is the standard automobile. For years now people have been able to go from point A to point B with the push of a pedal, but there is now a threat to this mode of easy transportation. The source of power for these vehicles, also known as gasoline is depleting. This problem can cause a huge cripple to society due to the fact that independent automobiles will have no source of power to be used. This problem can not come to pass, therefore alternative sources of power are being researched. We four undergraduate mechanical engineering students understand the importance of this new phase in the automotive technology industry. That is why our team is developing our own kind of hybrid vehicle.

The overall objective of the group is to complete a hybrid vehicle that is capable of running on electric and gas power. The team has identified a few main components to achieve this goal by looking at other types of hybrid designs as well as analyzing the constraints of this project. Our team does not expect to beat the professional manufacturers at designing the best type of hybrid vehicle. We do expect this to be a valuable learning experience for the team as well as a stepping stone for the team members to gain employment in the automotive industry.

Faculty Mentor: Kyle Watson

Grill-o-mation

Patrick Grimes, Jacob Wiebe

This report is a synopsis of the senior project conducted by Patrick S. Grimes and Jacob J. Wiebe. The name of our design is “Grill-o-mation” and has the capabilities of cooking a steak to the desired doneness requested by the operator with the only additional input being the steak thickness. The “Grill-o-mation” is marketed to the ordinary consumers who are lacking the capabilities of cooking steaks to their preference. Due to its universal design, it can easily attach to any home B.B.Q.. Through the painstaking efforts of conceptual, mechanical, and electrical design iterations, we arrived at the final prototype known as the “Grill-o-mation.” A proprietary steak doneness algorithm incorporates the use of a thermocouple wire to take “dynamic” internal steak cooking temperatures, with time, which allows the “Grill-o-mation” to calculate the precise doneness of the steak while flipping the steak at calculated doneness algorithm intervals. Upon completion of prototype manufacturing, field testing revealed that the design was successfully able to cook a steak to an operators’ request.

Faculty Mentor: Kyle Watson

Electro-Pneumatic Shifting System

Steven Caldeira , Tu-Hai Le

The purpose of the project is to modify the existing mechanical shifting arrangement on the Pacific Motorsports Formula SAE vehicle to an electro-pneumatic system such that the shift sequence is executed in the shortest possible period of time. The system will allow the driver to shift gears by pressing buttons mounted on the vehicle's steering wheel, and will replace the current mechanical shifting mechanism that utilizes a "push-pull" cable and manually operated clutch. The benefits of our electro-pneumatic system includes providing faster shift times, allows the driver to keep both hands on the steering wheel at all times, and eliminates the possibility of transmission damage due to human error. The electro-pneumatic shifting system design necessitates the use of a circuit that networks a microcontroller, solenoids, sensors, additional circuits, and pneumatic actuators with compressed air being used as the driving fluid. When either button is pressed, the prompt sends a signal to the microcontroller that controls the condition of the solenoids, which indirectly control the actuators. The electro-pneumatic shifting system is an innovative alternative to how formula vehicles are traditionally operated.

Faculty Mentor: Kyle Watson

VAM to MAF Conversion Kit

Dustin Roelle, William Zurbrick

This report describes the process of creating a control circuit that allows an engine control unit (ECU) to read a mass air flow meter (MAF) as if it were a vane air meter (VAM). The specific VAMs that would be changed were flow tested and their voltage outputs were plotted. The MAF that would be replacing the VAMs was also flow tested and its voltage outputs were plotted. The respective outputs for the VAMs and the MAF were mathematically related and scaled from 0 to 255 as the respective inputs and outputs for the electronically programmable read only memory (EPROM). The control circuit was then created using an analog to digital converter (ADC) that sends the digital signal to the EPROM, which outputs the correlated digital value to a digital to analog converter (DAC), which outputs the analog voltage to the ECU. The circuit was tested using a voltmeter for the 0 to 5 input voltage yielding the proper 0 to 5 output voltage. Standard weatherproof car connectors were then wired into the circuit and connected to the factory wiring harness between the MAF and the ECU. The engine was then run from the new MAF with the control circuit to verify its operation.

Faculty Mentor: Kyle Watson

Senior Art & Design Presentations

Mood Changing Design

Paulo Andrade

Our moods are constantly influenced by all things around us, many of which we have no control over. My proposed concept is designed to give an individual control over what their mood is. My idea is to create a line of mood kits, each containing different items that assist and individual in achieving a desired mood. Currently the available mood kits are: energy, pure relaxation, euphoria and passion. The common item that will be in all of the kits is a music cd, because music can very strongly influence one's mood. Each kit will then consist of a box, a cd, and other items that influence one's mood. Every item contained in each of these kits, including the packaging, serves the purpose of leading the individual to achieve their desired mood. During the process of designing this line of mood kits I will engage in thorough research of what images, colors, sounds, and shapes that influence and individual's mood. I will use color, typeface, and shapes to affect each of the moods. The four kits will each be different, according to the mood this kit is designed to influence. But being that this a line or a series, there will be common design visuals in all of the kits. Each one of the mood kits is an individual piece, as well as part of a series and part of a brand. The boxes will be visually strong and capable of conveying the mood, even if the mood were not clearly listed on the box.

Faculty Mentor: George Wenzel

Shirt off my back

Chelsea Davidson

Shirt off my back began as an inspiration from an idea that was originally for a branding campaign associated with missionary work. I then expanded it into a conceptual and literal metaphor for charitable giving.

The concept begins with the donation of a used, unwanted shirt, which is then turned inside out, the physical act of taking it off one's back, and a new design is applied to it. The shirt is then re-sold as a unique, novelty item. The proceeds go to aid the "clothe a village" program by World Vision.

The donor of the shirt is likely to be the commissioner and buyer of the re-design. In this way, design is helping to exponentially increase the usefulness of the fortunate's discarded items, using their own belongings to entice them to re-buy them and further the cause.

Each design contains a quote related to basic human need for clothing or consideration of the less fortunate from various respected persons such as Gandhi, Shakespeare, and Kanye West. The designs use typography and metaphoric imagery that associates with the quote.

My product proposal stems from a desire to fill a need or purpose greater than myself; that which makes a social difference or could perhaps be brought to the attention of those who could take it further than I.

Faculty Mentor: Brett DeBoer

Sod's Law

Chris Durkee

An Independent study project. Sod's Law is a short film that was created to study the technical and artistic forms of filmmaking. The artistic aspects focused on the art of storytelling and exploring the medium through the use of experimental imagery and a different style of film. The technical aspects focused on pushing the programs and equipment learned from other classes at Pacific. The process included developing a story and filming on location and then editing together the film on the computer.

Jim Sod was an ordinary lawyer, but after a set of unfortunate circumstances he ends up with more problems than he can count. "In any situation if anything can go wrong, it will."

Faculty Mentor: Brett DeBoer

Le Petit Jardin Joli

Kirsten Halterman

Le Petit Jardin Joli "the pretty little garden" is a line of home garden products. For this line, I have integrated graphic design, art history and domesticity to create visually enticing pieces. Five famous artists (William Porter, Claude Monet, Vincent van Gogh, Georgia O'Keeffe, and Andy Warhol) have been featured with their unique flower painting in the design of the products. For this line I have created a seed packet and an artist / flower care packet for each individual artist. I have also created a host of other products to accompany this line including an apron, garden gloves, a gardening hat, a designed dirt bag, a pot, and watering can. This unique "pretty little garden" is meant to be given as a gift or enjoyed by the consumer.

Faculty Mentor: George Wenzel

Cultural Bean

Molly Kennedy-Darling

Cultural Bean is a line of coffee accessories from around the world. These products focus on different countries where coffee is grown. These countries include, Guatemala, Colombia, Ethiopia, and Indonesia. I chose these countries because of their different locations in the world, and the role that coffee plays within the culture. These products include, coffee cups, espresso cups and saucer, magnets, stickers, greeting cards, posters, and gift bags.

Faculty Mentor: George Wenzel

Powerhaus Design

Michelle Manson

Athletic apparel and inspiration designed by an athlete and a designer. Very few student-athletes are graphic designers, so for this market, though there are many athletic products, there are very few that are motivational. These products cheer on individuals and their teams, by simply getting dressed before practice or a game. As I run, a shirt that says, “keep up” on the back, will help the teammate behind me push them and therefore me as well. Female athletic gear has become increasingly popular, as have female sports throughout the last 30 years, though most companies have started with male sports gear. This doesn’t discredit any existing companies in fact that is my inspiration, though I wanted a company to start with empowering female products and then expand to include male sports. Because of the original and creative concept this will elevate both female and male sporting good products and motivate a healthy lifestyle and healthy body image for both men and women. Starting with the concept of a redesign of my existing locker room, I applied my knowledge of color psychology and simple but bold graphics that would inspire in a daily basis. Input from my teammates and fellow student-athletes helped me move in the right direction. As a locker room designer, a consult with the team would be in order to get a feeling for the team dynamic and make it a comfortable place for these athletes who spend most of their time here.

Faculty Mentor: George Wenzel

“irodori”

Chizuka Nakaya

All the images and patterns by “irodori” are inspired by Japanese traditional Kimono patterns. Today, Japanese people do not wear Kimono daily except only for special occasions such as New Year’s day.

I wanted to introduce more people about the beauty of Kimono by applying the Kimono patterns into paper products.

The name “irodori” came from the idea that “Kimono colors and designs would decorate our life beautifully”.

The logo is made to suggest soft and playful, but also some traditional feel by using many curved lines, circles, and colors. I took off all white areas from the types so that they all look like just shapes, instead of reading as texts. There are 7 colors that I picked for “irodori” color pallet. All “irodori” patterns and products are made by the combinations of these 7 colors.

Faculty Mentor: George Wenzel

Graphic Design Thesis Project: What 2 Eat

Chotika Ophaswongse

We all have different eating habits and we know it. There are animals lovers, and also people who love TO EAT them. There are people who seem to be scared of carbs. There are people who are such picky eaters, and of course, there are people who want to be in a diet 24/7.

The idea of “What 2 Eat” was inspired by seeing how different people around me eat. My friends and everyone in my family all have their own preferences when it comes to food. Therefore, I wanted to create sets of dinnerware that fit with how different people eat. Personalities and how we dress show who we are, and so does eating habits.

“What 2 Eat” is a line of dinnerware that consists of five different sets of dinner plates, drinking glasses, and placemats. Designs on each set are based on the widely recognized eating habits, which are: dieters, vegetarians, meat lovers, picky eaters, and carb watchers, so that every customer can make a connection with the products. Designs are humorous and provide playful guidelines of how to eat the meals according to the eating habits.

Whether “What 2 Eat” makes fun of you or gives you the pride of how you eat, that’s only for you to decide.

Faculty Mentor: George Wenzel

Movie Eye For The College Guy

John Piñano

The theme of our thesis project is "Designer as Producer". In other words, we have to create and design a product that we would be able to sell to the public. Because of my love for movies, I decided to create a movie critic personality that is aimed at college students. Most college students are too busy to read long and complicated reviews. In the form of a website, I'm going to write reviews that is short and straight to the point. I'm also designing merchandise to help promote the website.

Faculty Mentor: George Wenzel

Liar, Liar, Pants On Fire

Purple Tayo

It is common, unspoken, knowledge that parents lie to their children. The reasons will vary, depending on the intentions of the adult. They may be driven by deceit and malice or love and protection. But does this justify their actions? The products for *Pants On Fire* exposes these "white" lies to the public in the form of playful hand-drawn scenarios. The scenarios reveal how easy it is for parents to get away with serious issues such as adultery, emotional abuse, and drug abuse. The protagonists are the victims—the innocent children. The products dabble into the closed doors of society. Though they may be humorous, they are controversial. *Pants On Fire* has given the public a shocking look into the parental world's unspoken sin.

Faculty Mentor: George Wenzel