Parents’ Attitudes Toward College: A Case Study of Padres Promotores
Arthur Aragon & Luis Fonseca
Mentor: Jeanett Castellanos

Various studies have examined the impact of parents on their children’s educational aspirations and occupational success. Research suggests that parents’ attitudes toward education have a significant effect on their offspring’s educational aspirations. In addition, specific outreach programs have demonstrated effectiveness in influencing parents’ knowledge and attitudes toward college. Limited research, however, has examined Latina/o parents’ role in their children’s education, Latina/o perceptions of higher education, and the factors that influence their perceptions toward their children’s pursuit of a college degree. The purpose of this study was twofold: to examine Latina/o parents’ attitudes towards a higher education, and to examine the role and influence of a community program (i.e., Padres Promotores) on Latina/o parents’ attitudes of higher education. Through a qualitative design, seven Latina/o parents and five leaders of the Padres Promotores program were interviewed on their perceptions toward college. In addition, program facilitators were observed during program meetings. Preliminary findings suggest both positive and negative perceptions of college. Specifically, Latino parents reported feeling more confident about their children’s being able to attend a four-year university due to the information they gained from participating in Padres Promotores. Others expressed concern about financing a university education and the negative social pressures their children might encounter if they reached the university campus. These findings will assist university officials to better work with Latino parents and with the recruitment and retention of their children in higher education.

Movable-Mass Control System for Aero Vehicles
Mathew Garcia & Cesar Rivadeneyra
Mentor: Kenneth Mease

Current control surfaces on aircraft work by deflecting airflow, which generates moments about the vehicle’s center of gravity. Moving an internal mass is an alternative means of creating a moment. Some advantages a movable-mass control system has over conventional controls are reduced drag, fewer moving parts, and no external moving parts. The goal of this research is to prove the concept of a movable-mass control system and demonstrate its capabilities in a flight-capable, scaled model. This research is investigating the challenges and advantages in designing, building, and flying an aircraft employing the movable-mass control system vs. a conventional control system. During the past year, two prototypes have been designed and analyzed. One prototype has been flight-tested and the second is on the verge of first flight and subsequent flight-testing. Future plans involve the design, manufacture, and flight-testing a third aircraft.

The Phenotypic Plasticity in Flowering Time in Brassica rapa
Esther Ko & Angelene Ng
Mentors: Steven Franks & Arthur Weis

When an organism faces environmental fluctuations over time, the fittest genotype becomes the dominant trait. Hence, plasticity may be important in plants, because they must adjust to the given conditions, even if unfavorable. Plasticity can be observed by looking at the effects of different water treatments on the flowering time of Brassica rapa, commonly called mustard seed. Two strains of B. rapa were collected, Back Bay (BB) and Arboretum (Arb). The BB strain came from a dry environment of sandy soil that tends to be fairly consistent throughout the years, while the Arb strain came from an environment of moisture-rich soil and more variable conditions. The question of plasticity arises in response to water availability in Brassica rapa. Our experiment will see if a specific genotype adjusts its specific phenotype in response to the environment. We expect the Arb seeds will be more plastic than the BB seeds, since the Arboretum environment is more variable. Arb seeds should be better suited to adapt to the different water treatments. The BB seeds however, are better suited to a constant environment; therefore, their response to the different water treatments should be less plastic. In addition, it is also expected that seeds from the 2004 generation will be more plastic than 1997, since 2004 plants have been previously exposed to drought conditions, they may be more adapted to different water treatments; thus, increasing their plasticity.

The ARC, vLPAG, and the rVLM Contribute to the Reduction of High Blood Pressure During Electroacupuncture
Brian Baek & Don Nguyen
Mentors: Peng Li, John Longhurst & Stephanie Tjen-A-Looi

Electroacupuncture (EA) on the P5-6 acupoints can reduce high blood pressure. These acupoints lie on the median nerve that impinges the arcuate nucleus (ARC) and the ventrolateral periaqueductal gray (vLPAG). The median nerve also projects into the rostral ventrolateral medulla (rVLM), an important integrative region that regulates cardiovascular function. Previous studies show that ARC neurons provide an excitatory input to vLPAG neurons and the vLPAG, in turn, decrease firing of sympathetic cardiovascular neurons in the rVLM. We there-
fore examined for a possible inhibition of rVLM neurons by EA through excitation of the ARC mediated by the vlPAG. In intubated and α-chloralose anesthetized cats, gallbladder (GB) or splanchnic nerve (SN) stimulation induced cardiac pressor reflexes or evoked neuronal activity, respectively. EA application decreased the change in mean blood pressure (ΔMBP) and rVLM firing for a prolonged period of time. Microinjection of D, L-homocysteic acid (DLH), an excitatory amino acid, into ARC neurons produced comparable results to EA. Injection of Kainic acid (KA), used to deactivate neurons, in the ARC during effect of EA nearly restored responses back to control. Microinjection of DLH into ARC, which imitates EA, was followed by a microinjection of KA into the vlPAG, removing the EA effect. These results suggest that excitation of ARC neurons during EA diminishes rVLM firing and ΔMBP. In addition, the vlPAG receives excitatory projections from the ARC and provides inhibitory signals to the rVLM. In conclusion, both the ARC and the vlPAG regulate the inhibition of rVLM firing during EA.

**The Effects of AMPA-Type Glutamate Receptor Modulators on Sexual Behavior of Aged Male Rats**

Cheng-Ling (Greg) Chen & Vincent Van  
* Mentor: Danielle Simmons

Sexual behavior decreases as a mammal ages, due to decreases in testosterone (T). T acts in the brain, including the medial preoptic area (MPOA), to control male sexual behavior. In the MPOA, T can affect male sexual behavior by regulating the signaling of the neurotransmitter glutamate. Both types of glutamate receptor, AMPA and NMDA, are present in MPOA cells that also contain T receptors. This study’s purpose is to investigate the effects of positive AMPA modulators (called AMPAkines) on the sexual behavior of aged male rats. Sexually experienced aged male rats were either given AMPAkines (CX614 or CX689) or vehicle for one test and then given the opposite treatment for another test. The treated rats were given a sex behavior test with a receptive female, and measures of sexual motivation (e.g. mounting) and performance (e.g. ejaculation) were recorded. We found that when aged rats were given AMPAkines, the time to their first mount and ejaculation was decreased, as was the time they waited after ejaculation to start copulating again compared to when they received vehicle. Also, the number of times they ejaculated was increased with AMPAkine. The AMPAkine increased both sexual motivation and performance. Thus, our results further support the importance of glutamate in sexual behavior. In addition, our results suggest that AMPAkines can increase sexual behavior. This is important because its shows that AMPAkine may provide a treatment for sexual dysfunctions caused by age.

**Plasma Pump for MEMS**

Christina Kang & Mingye Liu  
* Mentors: John LaRue & Richard Nelson

Micro-Electro-Mechanical Systems (MEMS) have the potential to revolutionize almost every technologically related field and device. Through the application of MEMS, it may be possible to eventually integrate entire systems onto one chip; therefore, more investigation into MEMS is necessary to advance towards this goal. Conventional microfluidic pumps require a different mechanism to control the direction and the motion of fluids. This project aims at developing a microfluidic pump using the concepts of plasma flow in an attempt to create a device that can control both the fluid motion and direction; furthermore, this process is surface machinable.

**The Peculiarity of Perception and the Space Between: An Interdisciplinary, Collaborative Approach to Research in the Arts**

Jessica O’Connell & Christina Zabat-Fran  
* Mentor: Kevin Myers

Introducing individuals to contemporary art practice has become seemingly difficult as the art object transitions into visual, interactive research. However, as artists impel further, inspiration can still be found in the classic foundations of thought. Plato suggested that color is neither what is represented nor what is sensed by the perceptor, but something that has risen between the two and is peculiar to each participant. This Platonic interval is central to the theory, practice, and appreciation of art in a contemporary context. The content of research in the arts is found, not simply in the body of work, but in an ongoing conversation among the theory conception, the art objects, the artist, and the individual. The objective, then, is to find the most effective way to share our research and define a thesis in dialogue. Our discourse investigates and manifests the notion of perception in and around art through the application of creative research to a body of work. We summarize our findings in an exhibition open to the community, and in a catalogue documenting our process. In the exhibition of our collaborative body of work, the art object is able to commence and continue (that is, to communicate) a dialogue with each individual. We stimulate others, and thus ourselves, to consider not only what one perceives, but also the underlying dialogue between object and viewer, the blurring definition of these roles, and how perception is neither one nor the other, but the space between. Our work seeks to initiate an interdisciplinary approach to art, inclusively engage everyone as the art community moves forward.
Analysis of Toxic Gas Emissions from Diesel Transports and Non-Diesel Commuter Vehicles at both the 710 and 405 Freeways, and Diesel Emissions at Newport and Long Beach Harbors: A Comprehensive Study
Yanina Barrera & Stephanie Webb
Mentor: Don Blake
Southern California has long been known to possess some of the highest levels of air pollution in the country. The natural geography of the Los Angeles basin makes it prone to such concentrations. One significant site of pollution is the nation’s second largest port, the port of Long Beach. Nearly all transport ships moving in and out of the harbor are powered by diesel fuel. Diesel combustion engines release nearly double the particulate matter than do regular gasoline engines. In a recent study performed by the California Air Resources Board, the particulate emissions from diesel combustion in the harbors of Los Angeles and Long Beach were determined to cause an additional 50 deaths per million people. Many studies have been conducted on the effects of particulate matter; however, there has been little focus on gaseous emissions, in and around the harbor area. Through air collection at theport of Long Beach, as well as other sources of diesel exhaust (local freeways) and non-industrial harbors, we have identified and quantified toxic gases emitted at the Newport, Dana Point, and Long Beach Harbors, and the 710 and 405 Freeways. It is known that diesel combustion produces toxic gases, some of which include: benzene, carbon monoxide, formaldehyde, 1,3-butadiene, and toluene. Therefore, we have focused on these volatile organic compounds (VOCs) in our analyses. All of these compounds have known adverse affects on human health and the environment. Concentration profiles of selected gases in and downwind of the harbors and freeways will be discussed.

Studies of the Pacific Pond Turtle (*Clemmys marmorata pallida*)
Lauren Jackson & Barry Nerhus
Mentor: Peter Bowler
The Pacific Pond Turtle (*Clemmys marmorata pallida*) is a Species of Special Concern whose populations have declined dramatically in recent years. In this study, we built 22 wooden basking platforms and placed them in 11 experimental ponds in the Phase 1 area of the Marsh Reserve. In each pond, one platform was placed in open deep water and a second was tethered in deep water but near emergent California bulrush or broad-leaved cattail vegetation (*Scirpus californicus* or *Typha latifolia*). Walking transects were established to visually detect turtles on the platforms in the 46 acre, 11 pond primary study area. We hypothesized that the turtles would prefer open water sites to avoid predation, but our data indicates that they readily use both open water and near-emergent stand basking sites. This study was designed to be maximally passive and non-intrusive to this rare species; no animals were handled and disturbance was minimal. Based upon our ongoing survey, we are developing an estimate of the population, the time of day and weather conditions the turtles prefer for basking, and a better understanding of their behavior and habits. Our estimates suggest that at least 10 turtles use the basking platforms and two sites in older ponds.

Garlic Chemistry: Mechanisms of Sigmatropic Rearrangements in Compounds in Garlic
Nancy Lee & Jenny Suh
Mentor: Fillmore Freeman
Not only is garlic used to season food, it is also used for medicinal purposes. Recently researchers have begun to isolate various components in garlic, and have found that it is Allicin that triggers the formation of other beneficial compounds. Some of the health benefits of substances derived from garlic include lowering of cholesterol and prevention of colon cancer and heart disease, among many other health issues. Research was conducted by observing sigmatropic rearrangements within compounds derived from Allicin. Since Allicin is an unstable molecule, it was of interest to study the mechanisms that it undergoes to result in its various forms. A computational program, Gaussian, was used, which enabled us to calculate molecular properties on various compounds at different levels to better understand their stability. Understanding each compound within garlic allows for the discovery of specific substances that contain healing properties.

The Evolution of Drought Tolerance in *Brassica rapa*
Lynn Hua & Phuonganh Le
Mentors: Steven Franks & Arthur Weis
There are two ways in which plants respond to drought: 1) escape the drought by flowering early (phenology), and 2) become tolerant to the drought by adjusting water use efficiency (physiology). In the years right before 1997, El Nino greatly affected California’s climate—providing a surplus amount of water. However, between 1999 and 2004, a drought caused the growing seasons to be shorter and drier. Studies have shown that plants can escape the drought by flowering early, so that they can reproduce at optimum water levels. Previously, we found that at least one plant species, *Brassica rapa* (wild mustard), evolved a faster flowering time between 1997 and 2004. Another way that plants can cope with drought is through tolerance. Plant tolerance is determined by its ability to adjust its water use efficiency (WUE), which is defined as the rate of photosynthesis divided by the rate of transpirational water loss. The higher the WUE, the...
better the plants are at using water. We hypothesized that drought-adapted plants (2004 genotypes) had higher WUE than plants not adapted to drought (1997 genotypes). Alternatively, the drought-adapted plants may have lower WUE, which could allow them to flower earlier and escape the drought. We produced light response curves, which showed saturation levels of 700-800 micromoles per meter² per second, so WUE measurements were taken at this light level. Preliminary results of plants grown in the greenhouse showed no differences in WUE between 1997 and 2004 genotypes. However, plants already in flower had lower WUE than plants not in flower, supporting the drought escape hypothesis.

Construction of a Turbine Engine
Raymond Hsu & John LaRue
Mentor: John LaRue

The turbine engine is one of the monumental inventions in our current history that has affected our society dramatically. It has made flights to other countries more readily available and safe for the average consumer. The benefits lie in the fact that, with an economical and fast way of reaching a destination, it has changed the way we live. The goal of this project was to create a functioning turbine engine with the purpose of thrust production. We used an aftermarket turbocharger that contains the turbine and compressor, so most of the design lay in the combustion chamber and flame tube. The design of each component was done with Computation Fluid Dynamics software and design journals. Through my research I have found out that there are two design concerns for these engines. The problems are in the flow conditions and mixing of the fuel and air. In the design of a turbine engine, all factors will have adverse effects on its performance so it is a balancing act of these to achieve the desired results.

Styles of Engagement: Productive Reading
Amelia Acker & Mason Gibb
Mentor: Dina Al-Kassim

Reading is never a singular experience, there are a myriad of ways to engage text. This project will propose an outline to an alternative style of engagement with the work of Michel Foucault. This reading will attempt to enter the debate that highlights Foucault’s refusal to provide foundations for ethical action by questioning the critique’s implication that political resistance is a single unified program. In this reading practice, resistance results from an engagement best defined as a simultaneous alliance and alteration with the archive, a style termed productive reading. Emphasizing the inventive character of textual engagement, rather than identifying absences, productive reading provides a strategy to enact a pedagogy concerned with the interconnectedness of reading and writing in and through the archive. Because productive reading is concerned with making connections, the encounter between actual multiplicities of power, subjects, and texts in the archive become the primary touchstones of this outline to a theory of reading practice.

Posttraining Intra-Basolateral Amygdala Infusions of Clenbuterol Increase Expression of the Immediate Early Gene Arc in the CA1 Region and Dendritic Layer of The Dorsal Hippocampus
Amin Abdinezhad & Saba Motakef
Mentors: James McGaugh & Christa McIntyre

Previous findings suggest that infusions of the β-adrenerceptor agonist clenbuterol into the basolateral nucleus of the amygdala (BLA) enhance memory consolidation for aversive tasks, such as inhibitory avoidance (IA). While training alone significantly increases levels of activity-regulated cytoskeletal-associated (Arc) protein and mRNA in the dorsal hippocampus, memory-enhancing, posttraining intra-BLA infusions of clenbuterol increase levels of protein without significantly without increasing mRNA levels. Because Arc mRNA is localized to stimulated synapses, these findings suggest that posttraining amygdala activation may modulate local translation at synapses that are already stimulated by exposure to the training context. This study sought to identify the specific group of neurons in the hippocampus that demonstrate an increase in the levels of Arc expression as a result of posttraining intra-BLA infusions of clenbuterol, and to determine whether the increase may be seen in the dendritic layer. Male Sprague Dawley rats were trained on the IA task and given immediate posttraining infusions of clenbuterol into the BLA. They were euthanized 45 min after training, and Arc expression was assessed using immunohistochemical analysis. Preliminary results indicate that there is a significant increase in Arc expression in the CA1 region of the hippocampus. In addition, Arc expression is also observed in the dendritic arbor of the CA1 region, suggesting that Arc is locally translated following posttraining intra-BLA infusions of memory enhancing dose of clenbuterol. These findings further support the idea that noradrenergic activation of the BLA modulates synaptic plasticity in downstream brain regions such as the hippocampus.

The Effects of Fraud on the Evaluation of Health Care
Bryan Burton & Joey Miller
Mentor: Paul Jesilow

Healthcare studies are important for determining evidence-based healthcare. Our research focuses on studies published in the journal, Medical Care, from the years
2000 through 2005. We reviewed healthcare studies journal that relied on various types of data, including clinical trials, surveys of a population, surveys of medical records, interviews, and claims data. Using this data, we explored whether there is a growth in the percentage of articles using claims data; and, if there is, the rate of growth, and the types of studies that have decreased. Our initial results reveal an increase in the use of claims data. We discuss the implications of this trend.

Development of Packages for Optical MEMS
Erwin Edillon & Paul Pak
Mentors: John LaRue & Richard Nelson
MEMS (MicroElectroMechanical Systems) have complexities not experienced in integrated circuits. For use in various applications, the packages for these devices may require that electrical currents, light, atmosphere, sound, or fluids in the environment have access to the device. These necessities complicate the package, because there are no standard packages available that offer this degree of flexibility. The package we developed will be integrated into a test set, and data will be acquired on a programmable optical filter. We designed two printed circuit boards, one of which will wire bond between the pads on the chip and metal pads on the board. We also designed a mechanical switch box that will attach to the other circuit board to control the voltage inputs for the optical filter. All of our devices will integrate together to precisely control the filter, which is a 4x4 array of mirrors, each of which can be adjusted at 3 points, depending on the voltage input.

Computational Analysis of Complex Syntactic Data
Dirk Groeneveld & Natalia Komarova
Mentor: Natalia Komarova
Natural language is the foundation of human communication and society, and its study is often thought to be the gateway to understanding human cognition as a whole. Our project’s goal is to devise algorithms that can put words into different syntactic or semantic categories. We started by building a parser for the English language that extracts syntactic information from a string of words. For example, it identifies subjects, verbs and objects. However, it goes far beyond that, handling relative clauses, imperatives, and many other uncommon syntactic configurations. Parsing large corpora of text generates large amounts of syntactic data, which is then analyzed to determine the similarity of the nouns, verbs, adjectives, and adverbs encountered. We then used a hierarchical clustering algorithm on this data, generating a binary taxonomy of words that reflects their distribution in common English. Our current results are mixed and not always as stable as we would like them to be. However, we still see patterns, like the times of the day being separated from all other nouns, or distinctions being made between the cases words can appear in. With more time we want to obtain more stable and more general results such as separating animate objects from inanimate objects.

Structure and Reaction of Group 14 Carbenes: Silylene, Germynes, Stannylenes, and Plumbylenes
Ladan Nasiry & Zhongwei Ren
Mentor: Fillmore Freeman
Singlet carbenes (XXC:) undergo intramolecular rearrangements, intermolecular insertions into X-H bonds, cycloadditions to alkenes to form cyclopropanes, and cycloadditions to alkynes to form cyclopropenes. These valuable reactions are of special interest to theoretical, mechanistic, and synthetic scientists. Although these reactions of singlet carbon carbenes have been extensively studied, relatively little is known concerning the reactions of other Group 14 carbenes, such as silylene (XXSi:), germynes (XXGe:), stannylenes (XXSn:), and plumbylenes (XXPb). In this research project, we have used computational chemistry to explore the geometrical parameters and reactions (vide supra) of hydrogen and methyl substituted Group 14 carbenes. The calculations were carried out with the Gaussian 03 computational program using density functional theory (B3LYP, B3PW91) with the Stuggart/Dresden (SDD) and LANL2DZ basis sets. The transition states were located for the reactions, and intrinsic reaction coordinate calculations were used to connect the transition states with their respective minima. These data were used to describe the mechanisms for the above reactions.

Linna Lee & Melody Liu
Mentor: Caesar Sereseres
Global Connect @ UCI is a program that brings the University of California, Irvine—through its Social Sciences faculty and undergraduate students—to secondary schools to supplement their academic programs. The program focuses on creating innovative curriculum on twenty-first century forces and issues of globalization. Acknowledging the importance of the different components of the research process, Global Connect undergraduate curriculum planners developed a guided research project for high school students. One of the project’s primary objectives is to introduce students (grades 8-12) to the process of discovering resources, analyzing the materials, and presenting the findings as a well written expository research document. The content focus is China because of the increasing influence of China on the United States and our personal futures. Over a six
week period, the secondary students at Newport Mesa Unified Schools (TeWinkle Middle School, Costa Mesa, Estancia and Newport Harbor High Schools) have the opportunity to address one of six prompts on contemporary China: 1) China: The 21st Century’s Fastest Growing Economy; 2) China’s Cultural Changes and Westernization; 3) China’s Environmental Concerns China; 4) The Two Faces of Today’s China: Urban vs. Rural; 5) Globalization and China’s Internal Migration; and 6) Media and Censorship in China. Three original media presentations were created to support the curriculum: “The Rise of China and the Implications for the United States;” “The Olympics and Globalization in China;” and, “The Changing Role of Media in the Age of Globalization.” These presentations are published (Spring 2006) in the School of Social Sciences’ Global Scope Curriculum Quarterly.

Characterization of the Estuarine Zone Extending from Upper Newport Back Bay into San Diego Creek
Elizabeth Hook, Alyssa Lai & Barry Nerhus
Mentor: Peter Bowler

The uppermost reach of the Newport Back Bay estuary extends from Jamboree Road Bridge at the head of the Upper Bay to the Campus Drive drop structure, 2.25 km upstream. Between the head of the Bay at Jamboree Bridge and the MacArthur Drive Bridge, the estuary is a narrow channel, approximately 20-30 meters wide, that has a rich upper-estuary fauna of mollusks and barnacles with daily tidal influence at all but the lowest tides. Our study focuses upon the uppermost region of the estuary, the channelized San Diego Creek between the drop structures at the MacArthur Drive Bridge and Campus Drive. In this estuarine zone salinity levels fluctuate and a pycnocline travels up and down the reach due to tidal influence at levels above 3 MLLW that flow over the picnocline. Evaporated metals are used over the ends of the carbon to create a contact for resistance measurements. The experimental apparatus will also be fabricated to conduct the resistance measurements over the temperature range. The resistor chip is enclosed within a temperature variable aluminum housing which is designed to make accurate, repeatable measurements. Nitrogen is flowed into the testing apparatus to ensure an inert environment.

Resistive Properties of Thin Pyrolytic Carbon
Farzaneh Bakhshi, Justin Little & Hideo Morita
Mentors: John LaRue & Richard Nelson

The objective of this project is to investigate the resistive properties of pyrolyzed carbon created from SU-8 photoresist. The relationship between carbon thickness and resistivity will be studied over a specified temperature range. Carbon resistors are fabricated through photolithographic patterning of the SU-8 resist on silicon oxide wafers followed by heating in a pyrolysis furnace. Evaporated metals are used over the ends of the carbon to create a contact for resistance measurements. The experimental apparatus will also be fabricated to conduct the resistance measurements over the temperature range. The resistor chip is enclosed within a temperature variable aluminum housing which is designed to make accurate, repeatable measurements. Nitrogen is flowed into the testing apparatus to ensure an inert environment.

Relative Energies of Prebiotic Chemicals in Primitive Earth
Vickie Bui, Mahshid Gomarooni & Judy Pham
Mentor: Fillmore Freeman

Hydrogen cyanide and its dimmers, trimers and tetramers are found in the Outer Solar system and have been implicated in prebiotic synthesis in Primitive Earth. Telescopic observations have identified cyano-groups containing molecules in the very dark solids on the surfaces of asteroids, the dust of some comets, and the rings of Uranus. The covalent dimers of hydrogen cyanide are thought to be precursors to vital components of life such as amino acids, adenine, purines, and pyrimidines. One of the objectives of this research is to analyze the structural parameters, vibrational frequencies, and relative energies of the covalent isomeric dimers of hydrogen cyanide, which include iminoacetonitrile, azacyclopropenylideneimine, aminocyanocarbene, aminoisocyanocarbene, cyanomethylnitrene, C-cyanomethanimine, and N-cyanomethanimine, using ab initio theory, Moeller-Plesset second order perturbation theory (MP2), and density functional theory (B3LYP). The singlet-triplet gap, the 1,2-migrations (rearrangements), and the transition states for the addition reactions of aminocarbene, aminocyanocarbene, and aminoisocyanocarbene and some of their derivatives to double and triple bonds have also been studied computationally. The singlet-triplet gap and the mechanisms of the addition of the carbenes to carbon-carbon double and triple bonds are influenced by electron donating groups, electron withdrawing groups, and steric factors. The E and Z isomers of iminoethanenitrile and iminoethanenitride are close in energy. The respective E and Z isomers in the cyano series...
and in the isocyano series are the most stable covalent dimers and may be involved in prebiotic synthesis.

**Design Fabrication and Testing of an Analog-to-Digital Conversion System**

Shun-Wen Hu, Rita Kuo & Tsaocheng Peng  
*Mentors:* Allen Kine, John LaRue & Richard D. Nelson

Our research goal is to build an analog-to-digital conversion system. An analog-to-digital converter transfers data from analog voltages to digital information. The device transfers analog signals that constantly vary from instruments that monitor such conditions as movement, temperature, sound, into binary code. For this project, we used the IGOR Pro interactive software with its wide range of capabilities for scientific and engineering analysis and graphing. Data was transferred from the PC to the USB-1616FS measurement board. This board provides 16 simultaneously sampled 16-bit analog inputs with sample rates up to 50 kS/s per channel with continuous module throughputs of 150 kS/s, and 32 kisample bursts up to 200 kS/s. The USB-1616FS also provides one 32-bit counter and 8 bits of digital I/O.

**Theoretical Studies of Sulfinyl Carbenes and Sulfonyl Carbenes**

Jung Hwang, Thang Nguyen & Tarang Safi  
*Mentor:* Fillmore Freeman

Theoretical studies of sulfinyl carbenes were conducted by seeking the effects of added substituents at the carbene carbon. The four carbenes studied, in increasing number of substituents, were sulfinyl carbene, disulfinyl carbene, methanesulfinyl carbene, and dimethanesulfanyl carbene. Initial experiments included the determination of the most stable rotamers and the singlet-triplet energy gaps. This energy gap was found via the HF, B3LYP, MP2, and CCD methods with various basis-sets. Results from methanesulfinyl carbene and sulfinyl carbene showed correspondence with the hypothesis that the triplet state of the carbene was more stable, while the disulfinyl carbene and dimethanesulfanyl carbene showed that the singlet was more stable. Upon this information, the activation energies for each carbene is to be studied as it reacts with various reactants in order to determine the effects of substituents on the reaction mechanisms and products. All calculations are being done with the Spartan 02 Unix and Gaussian03 computational programs using Coupled-cluster theory (CCSD), quadratic configuration interaction theory (QCISD), Hartree-Fock, and density functional theory (DFT). The reactions of sulfinyl carbenes being studied are isomerization to sulfines, insertions into a C-H bond of methane, cycloadditions with alkenes, and cycloadditions with alkynes. Also, the relative energies of the singlet and triplet states of sulfonyl carbenes (CH\textsubscript{3}SO\textsubscript{2}CX) were obtained at the HF/6-311+G(d,p), CCSD, and QCISD levels of theory. The triplet states are more stable than the singlet states. The effects of substituents effects and activation barriers for the reactions of sulfonyl carbenes are compared with those of the sulfinyl carbenes.

**Conservatoire de Paris and UCI’s Dance: 2006 Artistic Collaboration**

Elizabeth Chasteler, Marci MacDonald & Michelle Wagner  
*Mentor:* David Allan

The artistic and cultural exchange of dance between the Conservatoire de Paris and UCI has reached its pinnacle in 2006. Eight dancers from UCI travel to Paris in May to share a dance program with the dancers from the Conservatory of Prague. In previous years, any exchange of dance has been one-sided with either school hosting while the other performed. However, this year’s program is the artistic presentation of UCI and the Conservatory of Prague in the Conservatoire de Paris’ theatre. This is a unique experience and opportunity for the dancers to share a cultural exchange with two renowned dance schools. This exchange also provides for cultural acceptance and artistic approval between these three countries. This collaboration is one of great importance and enlightenment for all involved.

**The EcoRaft Project**

Grace Chiang, Bryant Hornick & Stefan Marinov  
*Mentor:* William Tomlinson

The EcoRaft project is an interactive educational simulation intended to educate children between the ages of eight and twelve about ecological restoration principles and processes. This project was used to evaluate the effectiveness of animation, embodied interactions, and gameplay in educating those engaging with the simulation. Evaluations were conducted by interviewing participants on their understanding of ecology before and after their interactions with the project. Questions were also asked about the participant’s exposure to technology and their experience interacting with the technology used in the simulation. We discovered that the technology was not an obstacle in successfully engaging with the simulation and, instead, facilitated the learning process of the participant. The majority of participants in the evaluation interviews walked away with a better understanding of restoration ecology as well as the effort involved in restoring a devastated ecosystem.

**Worklights**

Meghan Brown, Melissa Munich & Amy Tasker  
*Mentor:* Donald Hill

Culture Shock Theatre is a playwriting group on campus dedicated to producing original student written work involving students in all UCI majors. During its most
recent production, *Worklights*, eleven different scripts were critiqued, selected, and produced onstage with a team of about 40, including actors, directors, designers, and production team members. Over a 10-week period, we learned how to create an entire stage production from scratch, from ideas and concepts for scenes, to scripts, and finally to having actors performing it onstage. Part of this process was learning how to communicate effectively with the various members of our production and design team on what needed to be done, and how to go about doing so to foster collaboration. We also learned how to work in cooperation with the UCI Drama Department Production Staff to properly use resources on campus such as rehearsal and performance spaces, as well as lighting and sound equipment. With our two performances, we were able to showcase our work for free to a wide audience of parents, faculty, and majors who found our characters and stories unique and endearing. Thus, we learned to effectively create and produce original stories as a collaborative team and make something to which audiences respond and relate well.

**UCISAT-1**

Matthew Bennett, Hung Nham, David Wang & Andria Welsh  
*Mentors:* Derek Dunn-Rankin

In 1999, Stanford and Cal Poly San Luis Obispo (CPSLO) collaborated and developed an organization called CubeSat to create small, cost-effective space research opportunities for universities around the world. Following the lead of these two universities, 20 engineering students from various disciplines teamed up in November 2003 to form the University of California Irvine Student Satellite Project (UCISAT) with intent to design, build, and launch their own satellite. The mission objectives are to: launch a pico-satellite into Low Earth Orbit (LEO), stabilize attitude about all three axes, capture an image of Earth with an onboard Complementary Metal Oxide Semiconductor (CMOS) camera, and transmit the image back to the K6UCI Ground Station. The pico-satellite structure will weigh less than one kilogram, and will have 10x10x10 cm cubic dimensions. Although the size and mass restrictions present a formidable challenge, the advantage of developing pico-satellite technology will allow satellite manufacturers to replace larger commercial satellites with the same functionality while reducing launch and construction costs in addition to development time. With nearly two years of development completed, the team is rapidly approaching the subsystem integration and testing phase, and will soon be ready to launch the first pico satellite in the United States with a CMOS payload.

**“Empty Sky…The Rising”: A Response to Catastrophe Through Acting Based Dance Choreography**

Rachel Bell, Heather Castillo, Nicholas Hendricks, Janelle Junio, Sarah Luna & Christopher Wyman  
*Mentor:* Robert Boross

“Empty Sky…The Rising” was an evening length dance theater piece, choreographed by Professor Bob Boross, that explored the hardships endured by many as a result of the tragedy of 9/11. The piece was a unique collaboration, in that it was danced to twelve songs by rock composer Bruce Springsteen. To tell the stories of many individuals, it was necessary to add storytelling and gestures to the standard dance movement vocabulary and, therefore, created a new way of communicating with dance movement. The piece debuted in Red Bank, NJ, at the Two River Theater, in six performances from September 7-11, 2005. The research project was unique in the choreography devised, the theme of the project, the skills needed to execute the project, and also in the nature of the project—a touring production in which we had to learn how to travel to another location, live in hotels, interact with professional dancers from NYC who were also cast members, and to successfully execute and perform a full length dance theater piece.

**UC Irvine Rocket Project**

Travis Gomez, Matthew Hung, Adrianna Leung, Justin Little, Miguel Martinez, Raul Martinez Jr., Hung Nham, Cesar Rivadeneyra, Kelly Sewell & Paul Zelaya  
*Mentors:* Derek Dunn-Rankin & Kenneth Mease

In November 2005, a group of multidisciplinary engineering students formed the first rocket project in the history of UCI. The goals of the UCI Rocket Project are to: 1) design, build, launch, and recover a rocket capable of delivering a CanSat-type payload of at least one pound to an altitude of at least 12,000 feet; 2) demonstrate attitude control of the rocket; and 3) analyze post-flight rocket performance from trajectory, video and control system data. The requirements, design process, and decisions for the subteam areas of airframe and propulsion, guidance and control, data and video telemetry, and recovery system are presented. The Airframe and Propulsion System (APS) subteam used rocket performance simulations, CAD modeling and Finite Element Analysis (FEA) software to design the external and internal rocket structure and select a hybrid rocket motor. The Guidance and Control System (GCS) subteam is using computer programming skills and control design theory to develop a control algorithm for roll attitude hold that commands aerodynamic surface positions based on data from an Inertial Measurement Unit (IMU). The Data and Video Telemetry System (DTVS) subteam has set up avionics for data acquisition with...
real-time telemetry. The Recovery System (RS) subteam has analyzed various configurations and descent rates for a safe and reliable parachute system for rocket recovery. The first test launch is scheduled for the Lucerne Dry Lake bed on June 3, 2006. Flight data will be analyzed to determine system performance and to decide if the project goals were achieved.

**SAE Aerodesign: Anteater Air**

Robert Barlow, Julio Flores, Shena Howell, Preben Nielsen, Michele Pham, Alejandro Puga, Sam Rahimian, Kia Ravanfar, Theodore Reynolds & Peter Tanmanee

*Mentor:* John LaRue

The SAE Aero Design competition provides an opportunity for engineering students to use their knowledge, creativity, and skills to construct an airplane that will successfully fly and carry a maximum payload within the given constraints. The constraints this year include having a wing span of 7.84 ft. and payload bay dimensions of 3in. x 5in. x 16in. Due to these constraints, our team had to research and consider new designs to allow us to carry a large payload while being able to take off within 200 feet. We researched different wing configurations, such as mono-wing, biplane and triplane, and found that a biplane configuration will allow us to take off within the runway length and carry a payload of 20 pounds. We analyzed materials and stresses felt on the aircraft to create a vehicle that is a light and strong as possible. We hope to compete in June against universities around the country.

**Bare Bones Dance Theater: Gravity**

Clare Bayens, Rachel Bell, Briana Bowie, Alexandra Bradshaw, Marika Csapo, Genevieve Ernst, Ann Fischer, Felicia Flores, Jami Lugo, Jessica Morreale, Charlotte Perebinossoff, Kathleen Rooney & Courtney Zimmerman

*Mentor:* Israel Gabriel

Entering into its 19th successful year, Bare Bones Dance Theater is a completely student-run non-profit organization that encourages and supports an artistic meeting of the minds. As Bare Bones does not receive departmental funding, the committee depends heavily upon the generous support of UROP to help realize its annual activities, including master classes, works in progress showings, dance concerts, and outreach programs. This past March, Bare Bones Dance Theater hosted the Gravity Dance Concert at Winifred Smith Hall. Through the production of this annual dance concert, undergraduate dancers and choreographers, production designers, and the community collaborated to produce a professional-quality theatrical experience. In addition, Bare Bones extended its artistic endeavors beyond UC Irvine by hosting a performing arts outreach program for high school students from the Santa Ana School District. Bare Bones Dance Theater welcomes undergraduates from all over the UCI campus to actively participate and share their creative abilities in every capacity to further a goal of wholly enriching UCI and the Orange County community. Several dance works from the Gravity Concert will be showcased at the UROP Symposium Dance Performance.

**AIAA Design/Build/Fly Competition**

Lawrence Alexander, Praveen De Silva, Lino Delli Quadri, Mathew Garcia, Kevin Hung, Nathan Jarvis, Alex Jordan, Will Kim, Jessica Lawson, Cesar Rivadeneyra, Rhett Roback, Ji Son, Anthony Tran, Michael Tran, An Vu, Jeff Wilschke & Albert Ye

*Mentor:* Robert Liebeck

The AIAA Design, Build, Fly Competition provides students with an opportunity to design, fabricate, and demonstrate the flight capabilities of an unmanned, electric powered, radio controlled aircraft designed to best meet the specified mission profile. These missions include carrying payloads through a specified flight path. The payloads include 48 tennis balls, two 2-liter soda bottles filled with water, and a wood block weighing eight pounds. The goal is to create a balanced design possessing good demonstrated flight handling qualities and practical and affordable manufacturing requirements, all while providing a high level of flight performance. This aircraft will compete against those of other institutions, and will be rated according to a given score formula. To achieve the best score, the plane needs to focus on a lightweight design that can accomplish the required tasks. Time for loading and unloading of payloads, take-off distance, and the written report score also affect the overall score. The purpose of the project is not only to design the aircraft effectively, but also to provide students with a chance to apply their academic knowledge towards practical applications in a competitive environment.

**UCI/UCSB Dance Exchange**

Liane Aung, Stacey Aung, Shana Bowie, Alexandra Bradshaw, Evan Campbell, Olivia Eng, Felicia Flores, Nicholas Hendricks, Krystal Matsuyama, Sue Murray, Mary Neville, Omar Olivas, Elisa Roe, Kathleen Rooney, Kimberley Shimasaki, April Tra, Carlina Villaverde & Courtney Zimmerman

*Mentor:* Donald McKayle

The goal of the Dance Exchange is to foster and promote creative, artistic and academic dialogue between emerging and imminent university dancers. In its third year, the Dance Exchange will reunite the UCI Etude Ensemble with the UCSB Dance Company for another exciting collaboration in dance. The two-day format...
(May 24th and 30th 2006) of the Dance Exchange allows each company to experience the educational and artistic environment of the other. The Etude Ensemble will host the UCSB dancers during their day-long visit to our campus. Both companies were able to share a deepening of their craft both artistically and academically; highlights of the program included technique classes, an evening performance showcasing both companies’ unique repertoires, and an open Q&A session for the audience with directors and dancers from both companies. The performance will feature Donald McKayle’s *Songs of the Disinherited*: *I’m on My Way, Upon the Mountain, Angelitos Negros, and Shaker Life* as well as new works by undergraduate choreographers within the Ensemble. The Etude Ensemble will have an opportunity to experience company life by traveling to UCSB to complete the second leg of the exchange. The Dance Exchange, ultimately, will allow both students and educators a larger perspective on the validity of dance as a worthwhile academic pursuit in a university setting.