

Industry Partnered Projects

1. Solar panel deployment mechanisms Kedward/Kiefer

This project is in cooperation and partnership under a gift with ATK Space Systems.

This project involves the design of mechanisms for satellite solar panel deployment. Students will review current mechanisms and will address potential designs to improve performance and reliability.

In the aerospace industry ATK Space Systems is the leading independent supplier of deployable structures, providing hardware for NASA, the military and nearly every major aerospace prime contractor. ATK Space Systems produces deployable booms, solar arrays, antenna structures, and many other aerospace mechanisms while continuing to maintain a 100% in-flight success rate.

Students will have an opportunity to work with the company from design concept, prototyping, and testing.

Students may be required to sign a Confidentiality Agreement and Invention Agreement.

Students may be required to be a United States citizen.

2. Rapid cranial closure system Laguette

This project is in cooperation and partnership under a gift with Medtronic Neurosurgery

The project involves the design and development of a new and improved cranial closure system. Medtronic Neurosurgery is a local medical device company that is a leader in the field of neurosurgical implants and devices. Medtronic currently has a cranial closure device that is commercially available. There is a need for an improved device that addresses performance characteristics, new materials, and costs.

Students will have an opportunity to work with the company from design concept, prototyping, and testing.

Students may be required to sign a Confidentiality Agreement and Invention Agreement.

3. Raytheon

Bennett

This project is in cooperation and partnership with Raytheon.

The project will involve sophisticated testing under cryogenic testing of focal plane arrays. There is a need for precise measurement of deformations and displacement. Test method development may be necessary. Various design solutions will be explored to limit deformations and displacements.

The project requires US citizenship and a Confidential Disclosure Agreement.

4. Silicone Gel Sheet Manufacturing Machine

Lagette

This project is in cooperation and partnership under a gift with Implantech.

The project involves the development of an automated or semi automated piece of equipment that will be used to fabricate a pre-existing product (Silicone Gel Sheeting).

Implantech is the recognized leader in manufacturing innovative silicone facial implants for aesthetic and reconstructive surgery. Implantech is located in Ventura and will require that students occasionally drive to the facility for planned meetings and engineering efforts.

Students will have an opportunity to work with the company from design concept, prototyping, and testing.

Students may be required to sign a Confidentiality Agreement and Invention Agreement.

Research Partnered Projects

1. Lightweight payload design **Lubin**

This project will be under the direction of Prof. Lubin (Physics) and his graduate students in the Physics department. This is a NASA funded research project.

Lightweight payload design - we fly balloons to study the early universe and would like to build an ultra lightweight balloon borne payload for a new class of balloons that can stay aloft for 100 days. To do so we need an extremely lightweight structure that will involve carbon composites. Students would design and build the basic payload structure in collaboration with one of our graduate students. They would do FEA analysis to NASA balloon standards.

2. Pump with Feedback Control for Micro-fluidics Testing **Meinhart**

This project will be under the direction of Prof. Meinhart. The design efforts involve thin walled tubes and feedback control.

Professor Meinhart's research group investigates fundamental fluid mechanics problems at the micro-scale and nano-scale, with special emphasis on transport issues in MEMS-based sensors for detection of specific biological molecules. The BioMEMS research is highly interdisciplinary and involves the development of InP-based integrated lasers that are flip-chip bonded to Si-based microfluidic flow channels, and the use of dielectrophoresis to enhance binding reactions near a laser sensor.

3. UHV chamber for MBE equipment **English**

This project will be under the direction of John English to support Materials research efforts.

The idea would be to have an Ultra High Vacuum (UHV) chamber that could be used to heat/bake clean various parts before introducing them to the Molecular Beam Epitaxy (MBE) equipment. Items would include the use of adaptive platens. High purity materials with low out gassing rates at temperatures up to 800°C would be required. Some water cooling and layers of refractory materials lining the sides of the container for radiation shielding. Quartz lamps could be used in the heater assembly.

Student Organizations and Design Competitions

1. SAMPE Bridge Competition **Kedward/Kiefer**

The Society for the Advancement of Material and Process Engineering (SAMPE®), an international professional member society, provides a student competition at the annual congress in Long Beach at the end of April or early May. There are several competition categories. Past universities that have competed include Stanford, University of Washington, the US Naval Academy and other prestigious universities. UCSB has competed very strongly with the support of Prof. Kedward and our carbon fiber materials technology. The contest rules should be available in December. (This year we will limit to 2 teams.)

2. SAMPE Wing Competition **Kedward/Kiefer**

The Society for the Advancement of Material and Process Engineering (SAMPE®), an international professional member society, provides a student competition at the annual congress in Long Beach at the end of April or early May. There are several competition categories. Past universities that have competed include Stanford, University of Washington, the US Naval Academy and other prestigious universities. UCSB has competed very strongly with the support of Prof. Kedward and our carbon fiber materials technology. The contest rules should be available in December. (This year we will limit to 2 teams.)

3. Supermileage Vehicle Competition **Fields**

This project is a collegiate competition sponsored by the Society of Automotive Engineers (SAE). The Supermileage® competition provides engineering and technology students with a challenging design project that involves the development and construction of a single-person, fuel-efficient vehicle. Vehicles are powered by a small four-cycle engine. Students have the opportunity to set a world fuel economy record and increase public awareness of fuel economy. Engines are donated by Briggs & Stratton. Contest rules are available for review on the SAE website <http://students.sae.org/competitions/supermileage/>.

4. Mini Baja Car Competition **(Mathys/Bradford)**

This project is a collegiate competition sponsored by the Society of Automotive Engineers (SAE). The object of the competition is to provide SAE student members with a challenging project that involves the planning and manufacturing tasks found when introducing a new product to the consumer industrial market. Teams compete against one another to have their design accepted for manufacture by a fictitious firm. Students must function as a team to not only design, build, test, promote, and race a vehicle within the limits of the rules, but also to generate financial support for their project and manage their educational priorities.

This project will require outside fund raising. Contest rules are available for review on the SAE website <http://students.sae.org/competitions/minibaja/west/>.

This project may be limited to a sub-system design in the context of course requirements.

5. SAE Aero Design Competition Beltz

This project is a collegiate competition sponsored by the Society of Automotive Engineers (SAE). The Aero Design® Competition challenges engineering students to conceive, design, fabricate, and test a radio controlled aircraft that can take off and land while carrying the maximum cargo. This gives students the opportunity to apply the knowledge learned in the classroom on a practical problem. Contest rules are available for review on the SAE website <http://students.sae.org/competitions/aerodesign/>.

6. RERC-AMI Design Competition Laguette

This project is a collegiate competition sponsored the Rehabilitation Engineering Research Center (RERC) on Accessible Medical Instrumentation (AMI).

Accessible Medication Dispensing Device:

Problem: A wide range of medication storage and dispensing systems are available, from simple and cheap to complex and expensive. Automated devices can dispense drugs only to a specific patient, and with patient-specific doses. Such devices, especially if linked with hospital bar coding, can reduce medication errors.

Project funding up to \$2000 is available from RERC-AMI. More information may be reviewed on the website:

<http://www.rerc-ami.org/ami/projects/d/2/2/year3/index.aspx>

7. EWB Project Bothman

Engineers Without Borders–USA (EWB-USA) is a non-profit organization established to help developing areas worldwide with their engineering needs, while involving and training a new kind of internationally responsible engineering student. EWB–USA projects involve the design and construction of water, wastewater, sanitation, energy, and shelter systems.

This years project: **Development of Malian Jatropha biofuel technology – the basis for a sustainable energy supply and economic growth in Mali & the Sahel**

Student and University created Projects

1. Laryngoscope Laguette

This project is proposed by one of our students, a laryngoscope with active suction.

Intubation currently takes two hands, and if the victim requires suction, it requires another rescuer entirely and a substantial amount of wasted time. By attaching suction, the rescuer could intubate in more difficult situations.

Students will work with local health care professionals.

2. Resistance Trainer for the UCSB Swim Team Bothman

This project will support the needs of Jeremy Kipp, UCSB swim team coach.

Jeremy is interested in a device to provide resistance to swimmers. Current equipment is somewhat crude and is a spool of rope fixed to the deck, with the end of the rope attached to waist band on the swimmer. The winch is configured to provide a regulated amount of resistance to the swimmer. This project will entail the understanding and development of novel sports equipment and testing.

3. Solar assisted surfboard Lubin

This project will be under the direction of Prof. Lubin.

Solar assisted surfboard - The basic idea is to cover the surfboard with solar cells and charge a Li ion battery pack that is used when needed to power a 0.5-1 HP water jet. This would be extremely useful to help paddling out, catching waves and for vectored thrust dynamics. Assuming a 2 x 1/2 meter board with typical 15% efficiency Si solar cells and a 500 Watt-Hr Li ion battery (150 w-hr/kg typ) gives a 150 watt solar power. With 20% duty cycle (you only use the power when needed) you can get over 1 HP for the time needed. Adding a small piezo gyro and vectored thrust allows for stabilizing the board and some very interesting dynamics possibilities. Testing would be done locally!