TEAM: 3Direction
Bioprinting Senior Design

Current research suggests that tissue engineering scaffolds can serve as substrates for cell transplantation and offer alternatives to partial or whole organ transplantation. Successful application of tissue scaffolds requires that their structure and architecture be produced in an accurate and consistent manner. Presently, three-dimensional printing extrusion technologies offer significant promise into achieving this task but lack the proper pressure and temperature control to reliably prototype the desired scaffold designs. A three-dimensional printing extrusion system with the capability to provide precise temperature and pressure control would allow for the ability to repeatedly produce intricate tissue engineering scaffolds. Furthermore, the design of such a system in a cost-effective and universal manner has the potential to revolutionize the field of tissue scaffold fabrication through widespread implementation.

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Carolina White
Gabrien Clark
Joseph Vento
Alberto Lopez

Notes:

Breakout Room: 212

TEAM: Aether
AIRPLANE

Design, Build, and Fly a model airplane for entrance into an intercollegiate competition in spring 2013.

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Duke Njie
Jhonatan Da Ponte Lopes
Linda Bahloul
Hamdi Ghorbel
Mohamed Amine Guettat

Notes:

Breakout Room: 212

TEAM: Agitation Squad
Harvesting green energy from human movement

The human body is constantly in motion. Throughout the day, humans expend energy running errands, walking, working out, etc. Our technology will harvest energy from human activity. Currently very few solutions exist, and those that do, fail to operate in diverse scenarios and are not ergonomic. A range of 2-8 watts of electrical power has been set as the standard. This amount of power would be sufficient to operate various electrical devices or, even someday, an artificial heart. An ergonomic device that can continuously provide renewable energy will revolutionize the use of portable electronics.

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Carlos Armada
Julian Castro
David Morilla
Tyler Wiest

Notes:

Breakout Room: 212

TEAM: AlumniAdvice
AlumniAdvice

Using the individual internal strengths of any given network (either for a firm or a university), AlumniAdvice will provide a user-friendly, customizable platform for exchanging taggable advice for organization members.

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Veronica Saron

Notes:

Breakout Room: 212
TEAM: Artemis
ARROW
The goal of this project is to develop a new arrow which takes into account the higher velocities and kinetic energy levels provided by current bow technology. These arrows should impart the maximum amount of the arrow’s kinetic energy to the target. A successful design will promote the humane harvest of whitetail deer.

Nathan Martin
Nicolas Rivera-Valdivia
Andrew Sydow
Kyle Valley

Notes:
Breakout Room: 212

TEAM: BioLink
Monitor Sensor 1
Team BioLink seeks to alleviate the issues associated with low nurse-to-patient ratios in under-resourced neonatal hospitals, where the medical staff is incapable of tracking--and responding to--all of the patients' vital signs. A reliable, low-cost, low-power vital-signs sensor device will significantly reduce the amount of time that the nurses must spend with each individual patient and will allow much faster responses to medical emergencies. This device and its array of biosensors--including measurements for respiratory rate and temperature--will wirelessly interface with a scalable central “brick” to permit round-the-clock tracking and alerting of infants’ health in real-time.

Eric Palmgren
Fabio Ussher
Rahul Rekhi
Nathan Lo
Abhijit Navlekar

Notes:
Breakout Room: 212

TEAM: Breakaway Bin
Designing the Container of the Future
The goal of the project is to create a new design for Waste Management’s 8 cubic yard Front End Loading Container. This new design will successfully lower the total deliverable cost by approximately 20%, while maintaining the current strength. In order for this to be accomplished the new design will need to reduce the transportation cost.

Julian Rodriguez
Spencer Randall
John Lloyd
Michelle Green
Isadora Calderon

Notes:
Breakout Room: 216

TEAM: charity PR agency
charity PR agency in China
It is PR Agent focused on Charity Cause-related Marketing. Through extensive survey of recipients and enterprises, we will provide medium and small domestic enterprises with customized projects. By executing the project, the enterprise will receive both financial and social benefits, while the recipients will also receive proper supports. Thus, all these will help the match of supports and needs and the formation of charitable culture in China.

Yuan Chang

Notes:
Breakout Room: 216
### TEAM: Chemomatic
**Automated Syringe Pump for Chemotherapy in Developing World Medical Clinics**

Design an automatic syringe pump that can accommodate a variety of syringes that can run at low flow rates for 24 hours without medical intervention.

**Notes:**

**Breakout Room:** 216

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### TEAM: Drill Busters
**Fatigue**

Team DrillBusters is improving a fatigue-testing machine used with drilling assemblies in the oil and gas industry in order to more closely replicate the downhole environment. These modifications will result in more accurate testing results which will ultimately help to minimize the occurrence of costly downhole failures.

**Notes:**

**Breakout Room:** 216

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### TEAM: DRISSLE
**ROTOR**

The purpose of this project is to examine the feasibility of a reusable rotorcraft design for a space capsule that will allow it to control the direction of its descent and land with negligible impact loads. Towards that end, design solutions for critical system functions will be developed and the feasibility demonstrated through design, fabrication, and testing of pseudo-scale prototype model(s).

**Notes:**

**Breakout Room:** 216

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### TEAM: Electric Owl 2
**Unmanned Aerial Vehicle**

Unmanned Aerial Vehicles (UAVs) are increasingly being used around the world for various tasks from military applications to commercial operation, surveillance, firefighting, and a broad variety of other tasks. However, no sufficiently robust control system exists to allow these UAVs to operate autonomously without some direct human intervention because of high error rates and the sheer difficulty of robust autonomous aerial navigation. Many applications for UAVs have never been fully explored because of the need for human interaction with the system, such as Mars exploration and the US military’s Constant Hawk program. Additionally, these systems need to be secure and redundant, adding to the complexity of the system.

**Notes:**

**Breakout Room:** 217
**TEAM: Hermes**  
**Integrating Low-Power Sensors With Passive RFID Tags for International Space Station Carbon Dioxide Monitoring**

The microgravity environment on the International Space Station (ISS) causes gases to diffuse irregularly, leading to the formation of hazardous carbon dioxide pockets. The purpose of this project is to design a low-power sensor system which integrates with radio-frequency identification (RFID) tags to monitor carbon dioxide levels. Eventually, sensors to monitor other environmental conditions can be incorporated into the system.

There are several reasons to use RFID for this project. First, RFID is already used for inventory purposes onboard the ISS. A passive RFID device can be powered by energy harvested from its interrogator, allowing the overall system to be low-power. Finally, using RFID tags allows for a modular solution which can be easily implemented with the existing infrastructure of the ISS.

**Notes:**

**Breakout Room: 217**

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**TEAM: Hot Wheels**  
**Mobility**

This project aims to design and construct a system that will detect obstacles using various sensors, and respond to each obstacle appropriately. Obstacles include drop-offs, such as sidewalks; static objects, such as walls or chairs; and dynamic objects, such as moving people. Appropriate responses to obstacles include decreasing speed, steering away from the obstacle, or coming to a complete stop. The system must be able to detect the obstacle, analyze the movement of the obstacle, and initiate a quick and safe response.

**Notes:**

**Breakout Room: 217**

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**TEAM: Illuminate**  
**Neurostimulation**

We aim to use optogenetics to stimulate neurons to define neural connectivity and connection strengths. The project involves building a microscope that interfaces with a DMD controlled LED light source and a CCD camera. These produce output images and data which are analyzed through a computer to research neuron behavior and examine neural activity.

**Notes:**

**Breakout Room: 217**

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**TEAM: Innovate**  
**3-D modeling and personalized clothing**

3-D modeling program, Personalized clothing, Uniqueness

**Notes:**

**Breakout Room: 217**
TEAM: IV DRIP
Low-Cost, Mechanical IV Volume Regulator for Developing Countries

IV DRIP (Intravenous Dehydration Relief in Pediatrics) is a mechanical volume regulator for IV therapy in the developing world, where 1.5 million children die annually to dehydration. Dehydrated children who are treated with IV therapy in the developing world are at risk of overhydration because clinics are chronically understaffed and cannot afford standard volume regulators. Because the risks of overhydration include edema, tissue damage, and even death, clinicians use oral rehydration for treatment. However, this is ineffective in severe cases of dehydration, which require intravenous therapy. IV DRIP must deliver fluid in 50 mL increments within a 10% error without supervision. Additionally, because IV DRIP is targeted toward low-resource clinics, it must be low cost, durable, and easy-to-use.

Notes:

TEAM: Lolrus
Augmented GPS

A more interactive GPS for your car. It displays an arrow over the path you should be travelling by using input from a basic GPS, a camera mounted on the car, and image recognition software.

Notes:

TEAM: Los Tres Amigos
Quick Question

A tool for developing a self-sustaining online help community for tutoring fellow classmates.

Notes:

TEAM: Magneto-Optics
Magneto-Optics

Our goal is to design and implement a novel system for terahertz time-domain spectroscopy in high magnetic fields. Our system will permit groundbreaking research in the field of solid-state physics.

Notes:
TEAM: muSee
Music Visualizer, Synthesizer and Platform

We propose to create a music visualizer with the potential to develop a drawing based music synthesizer and an online sharing platform.

Notes:

TEAM: NEUROWLS
NEURON

1. Develop a system for recording a MEA of at least 64 channels.
2. Develop software interface for recording and visualizing activity.
3. Develop SW/HW interface for stimulation.
4. Design system for scalability to 1024 channels.

Notes:

TEAM: PEDS
Modeling tonsils for holistic pediatric physical exam mannequin

We will design the tonsils for a pediatric simulation mannequin that teaches medical personnel basic physical examination techniques, eliminating the need to perform repeated training examinations of a child. This mannequin will simulate both common and uncommon exam findings in a low stress environment that allows for multiple examinations. We aim to model several tonsil disease states, including pathologies with swelling, redness, and pus exudate, using electronic control. The ultimate goal of this project is to revolutionize medical training, improve physician competency, and reduce the incidence of preventable medical errors.

Notes:

TEAM: Perfusion Solution
Perfusion

Creation of a pump (appr 0.7 cm X 1.5- 2 cm) which can be placed at the opening of the coronary sinus. The coronary sinus is the final common conduit for venous drainage of coronary vasculature. If this pumps creates a negative “suction” (extruding blood from the coronary sinus) a resulting pressure gradient may improve forward flow and thus perfusion in these severely debilitated patients.

Notes:
**TEAM: Pressure Sores RX**

*Pressure Sores*

*Our challenge is to design a portable sensor that can be used by a patient in their home to monitor skin perfusion. The device needs to detect +/-1.5C temperature change on possible problem areas of the body. The device needs to notify the user where possible pressure sores may develop.*

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**TEAM: PythiaDx**

*PythiaDx*

*Cancer kills 560,000 Americans per year. One of the crucial challenges in cancer prevention is early detection; the cancer diagnostic industry is rapidly growing to an expected $5.3 billion in 2015. Current detection methods are invaluable, but many, such as mammograms for breast cancer, have been criticized for their invasiveness, cost, sensitivity, and often wastefulness assessing low risk groups. Many other cancers are difficult to detect through traditional imaging or self-examination, especially in their early stages. Numerous recent studies have implicated a DNA modification called 5’ cytosine methylation as viable biomarker for early detection of cancer, systemically, and with minimal invasiveness. Work in ovarian and head and neck cancers have demonstrated that methylation modifications can detect cancer signatures in blood and saliva before metastasis, and markers specific for certain classes of cancers such as colon and lung cancer are already well characterized. We propose a technology for a methylation based routine cancer screening technology that can detect early stage cancers in blood utilizing protein based sequence sensing and simplified chemical treatment based protocols. Current screening methods for methylation are mostly sequence based and are time consuming and costly; our technology could detect methylation quickly at point of care, for low cost. We seek funding to initially develop, prototype and patent this assay technique, with the eventual goal of developing a low cost, accessible point of care device for cancer detection.*

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**TEAM: Rad**

*Radiation Therapy Treatment Chair*

*The current standard of care for patients receiving radiation therapy requires that patients get their treatments in a supine position. However, there is a significant subset of patients, such as those with compromised lung function or Hodgkin’s Lymphoma, that would benefit from being able to receive this same treatment in an upright position. Team Rad has accepted the challenge to develop a positioning device that allows patients to sit upright while still maintaining the same effectiveness and safety of the current supine positioning method. This device has the potential to minimize the risk of secondary cancer, present radiation conditions that are more easily tolerated, alleviate safety concerns, and reduce treatment side effects.*
**TEAM: Revolutionary Trashcans**  
Behavior Modification System to Reduce Negligent Waste  

In an effort to revolutionize the way people think about trash, we have developed a system that gives immediate feedback on waste. We want to optimize the way people approach their personal waste and become intrinsically motivated to consider their effects on their surroundings. Our system can seamlessly make people aware of their food waste in cafeterias, aware of correct recycling practices and aware of the effects their waste has on our environment.

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Samuel Tormey  
Thor Walker

**Notes:**  
Breakout Room: 314

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**TEAM: Rice SUN Gods**  
Autoclave

The current methods of waste disposal in underdeveloped areas such as Kenya is insufficient to prevent the spread of disease, and the modern methods used by the western world require a high investment that prohibits their employment in these regions. Autoclave systems neutralize potentially infectious microorganisms by exposing them to high temperature pressurized steam for approximately 30 minutes depending on the size of the load and the contents. We propose using solar energy driven nanoparticle absorbers to generate high pressure/temperature steam to power autoclave systems that are low cost and energy efficient. The development of a cheaper, energy free, and safe toilet that properly sanitizes human waste will go far to decrease the mortality due to diseases, health care costs, and other issues related to waste disposal for these areas.

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Ben Crabtree  
Zach Casias  
Micaela Blank  
Anjie Dong

**Notes:**  
Breakout Room: 314

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**TEAM: SAFE Vaccine**  
Vaccine Refrigerator with Temperature & Storage Logging

To design and evaluate a vaccine refrigerator with electronic temperature, stock and immunization logging capability that prevents spoilage and includes out of parameter alarm notification.

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Amanda Walborn  
Josh Mrozack  
Max Chester  
Andres Martin de Nicholas

**Notes:**  
Breakout Room: 314

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**TEAM: Scalable Wireless Alert Generator**  
Neonatal Vital-Signs Monitoring System for Developing-World Clinics

Our team seeks to build a scalable, affordable, easy to use, and robust vital signs monitoring system for use in a third world clinical setting. Our device should respond to the needs of these clinics, meeting their price constraints and allowing for flexible expansion as new capabilities become available.

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Chris Metzler  
Kiran Pathakota  
Matt Johnson

**Notes:**  
Breakout Room: 314
TEAM: Seize and Assist
A Novel Multi-Sensor Device for Seizure Detection

Develop a noninvasive, wearable multi-sensor device for detecting seizures in patients with Epilepsy. The device should be designed for long-term, continuous monitoring of people ages 6+ in an outpatient setting. Additionally, it must cost less than $100 to manufacture, minimize power consumption, and wirelessly report data to a computer.

Notes:

Breakout Room: 314

TEAM: Smooth Saline
Catheter Maintenance - Low-cost challenges in the developing world

In the developed world, single-use, pre-filled saline syringes are used to maintain the integrity and sterility of a catheter port. This technology is not appropriate for use in low-resource medical settings due to its high cost and reliance on disposables. Our team aims to design a multi-use flushing device that minimizes the risk of saline contamination and catheter colonization while reducing product costs by at least 50%. This design has the potential to save clinician time and patient life in low-resource settings.

Notes:

Breakout Room: 316

TEAM: Solar Artois
Solar Processing of Biofuels

Create a process for integrating the production of steam from solar-heated nano-particles immersed in water, a technology developed by Dr. Halas and her team, with a process for breaking down cellulose into sugars. Our project will be primarily focused on this first step in creating bioethanol but, time and resources permitting, will also aim to design methods for the other processes involved, including fermentation and distillation.

Notes:

Breakout Room: 316

TEAM: SoundControl
SoundControl

The thing that often differentiates the smart and prepared from the rest is the ability to notice environmental clues. To receive an outside stimulus and respond in a logical manner– which is now increasingly being incorporated into technology. We have glasses that turn darker with more sunlight, and can identify a song with a phone app. Given how smart our technology has become, and in particular the evolution of our phones, why are we always surprised by loud ring volumes, or conversely, why do we miss calls because we couldn’t hear them? This is the idea behind SoundControl, and we aim to fix that problem and more.

Notes:

Breakout Room: 316
TEAM: Sphygmo
Solar Powered Periodic Blood Pressure Monitor Measurement System

Periodic, or ambulatory, blood pressure (BP) monitoring is difficult for health care providers in the developing world due to high patient volume and lack of trained staff. Further, current electronic BP monitoring devices that would alleviate this burden are cost-prohibitive and difficult to run and maintain in the long term. Given this challenge, our team of bioengineering senior design students will improve upon existing products to create an inexpensive, self-powered, ambulatory BP monitoring device that is easily employed and maintained. This device will feature an auditory and visual alarm, custom monitoring and vital ranges, and rechargeable solar batteries.

Notes:

TEAM: The Think Tanc
Energy Point System

The energy point system allows for the visibility of energy usage without actually showing the students energy usage in an intimidating fashion like dollars.

Notes:

TEAM: ThetaMark
Improved Goniometer

Patients’ range of motion in joints can be reduced by a variety of conditions including physical joint trauma to diseases affecting the muscular and/or nervous systems. These patients depend on therapists, doctors, and other practitioners to accurately assess their joints and mobility, including accurate measures of joint angles, carried out with an angle measuring device called a goniometer. The Owl Anglers team have designed a goniometer which improves both the ease of use and accuracy of the current goniometer.

Notes:

TEAM: Timekeepers
Beer Bike Finish

Currently Beer Bike is timed by judges with stop watches. This system results in significant human error causing uncertainty in the race outcome. Our project aim is to develop an automated system that can be used by the Beer Bike organizers to eliminate timing error and crown a true champion.

Notes:
TEAM: VitaSign
Monitor Sensor-2

Neonatal wards in developing countries are challenged by limited resources and overwhelming need. These conditions contribute to high neonatal mortality rates (NMR). A vital sign monitoring and alarm system could help reduce NMR by giving doctors valuable health-trend data as well as allowing nurses to focus more on high need patients. At present, there are no solutions designed for resource limited settings. Current solutions are expensive, power hungry, and often require disposable components. As a result, these resource limited hospitals have requested a reliable, low-power, vital monitoring system capable of trend monitoring and alerting hospital staff when a patient is in distress.

We are designing a low cost, low power, durable heart rate sensor for neonatal infants. Our sensor will interface with the monitoring system designed by the SWAG OWLS design team. As such, our sensor will be uniquely positioned to save lives and improve the neonatal mortality rate in developing countries.

Notes:
Breakout Room: 317

TEAM: W.A.T.T. - Wind Accelerated Tactical Turbine
High Efficiency Low Profile Turbine for Energy Harvesting

Our design challenge is to build a miniature turbine that can be used to harvest energy. The system is primarily being design to be used with Air Force munition systems and must generate 8.3mW of power and be less than 5 cubic inches and 0.5 inches thick.

Notes:
Breakout Room: 317

TEAM: washBOT
WINDOW

Through international collaboration between Rice University students and Tunisian students, team washBOT proposes to build an intelligent robot to wash windows, with the goal of making large-scale window washing safer and more efficient. Our robot will clean windows on high-rise buildings, and help avoid injuries caused by inclement weather by using a control guided from a remote location.

Notes:
Breakout Room: 317

TEAM: Wyvern Cloud Technologies Ltd.
Wyvern PwnedU Education

An app store (or Steam, Zynga) for educational games. Gives educational game developers easy access to the market, allows teachers to evaluate the educational content in games and assign them instead of homework, and allow students to learn class materials through video games.

Notes:
Breakout Room: 317