

Spring 2015 Senior Design Showcase

Friday, April 24, 8 a.m. – 2 p.m.
Engineering I and II Bldgs., and Harris Engineering Center

and

7th Annual Symposium on Renewable & Sustainable Energy

Friday, April 24, 9 –11 a.m. (ENG II, Room 102)



KEYNOTE SPEAKER

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(UCF 1998)

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**** Projects listed in green text are sponsored for the Renewable & Sustainable Energy Symposium**

Electrical and Computer Engineering

Automatic Guitar Tuner

Controlled with a mobile device, and automatically tunes each string of the guitar to the desired setting that is selected by the user. For use by beginners to artists. (Table #40, ENG I Atrium)

Pegasus Producer 3D Printer

Desktop 3D printer for non-engineers to use at home or office. (Table #41, ENG I Atrium)

DroneHunt

Entertainment, competition come together in a drone. This is a game drone, which hasn't been done before. Users can play laser tag -- shoot the drone with laser sensors. This concept could be applied in military training. Ground station monitors score, GPS location of drone. Can switch between autonomous mode and user-controlled mode. (Table #42, ENG I Atrium)

SARS – Search and Retrieval System

Controlled with Android system (to control search areas), quadcopter searches for objects, uses object detection; GPS chip relays location to the user. Ground rover physically retrieves the object. Once object's coordinates have been transmitted from quadcopter, the rover will move to that location. (Table #43, ENG I Atrium)

Gasoline Electronic Management (GEM)

Device monitors driving habits to help increase fuel economy. Think "Fitbit" for your car. Helps drivers reduce fuel usage by not braking as hard or as often, driving at proper speed, not over-accelerating, etc. System increases fuel economy by 5 percent and will work with older and newer vehicles. (Table #44, ENG I Atrium)

Intelligent Programmable Prosthetic Arm

Taking 3D printed prosthetics to a new level with off-the-shelf electronics to grasp, point, and other gestures that are part of expensive prosthetics. Incorporation of commands through voice recognition. Includes mobile app to allow user to change arm features from an available list or create their own arm movement or hold pattern. (Table #45, ENG I Atrium)

Inexpensive Robot with Interior Mapping (IRIM)

This project bridges the knowledge gap between software programmers and hardware engineers in robotics. Electrical engineers can work on improving a robot platform without having to program the autonomous system; and at the same time software developers can work on solving a computer program without meddling with the hardware. Programmers can test out an idea, or an electrical engineer can test out an idea on this robot without technical support from others. (Table #46, ENG I Atrium)

Project Alfred: The Building Master

An electronic "butler" for a building that details what's in every room, down to the electrical outlets, supply inventory, meeting room schedule, ties into one system on the main server. The main server knows the location of every room/ directions. System includes a small device at every door with touch screen that manages and stores that room's data. Goal: to help people navigate, manage and be informed about their buildings to increase efficiency, information and organization. (Table #47, ENG I Atrium)

SCREAM: Speech Controlled Responsive Electronics and Mechanics

Home automation system using the existing wireless infrastructure. Project eliminates hardware such as touchpads or phones. Wi-fi controlled, uses programmed voice commands, which are sent to microcontrollers that control lights and door locks. (Table #48, ENG I Atrium)

PRESS: Pressure Reactive Stepping Stones

Solar-powered landscaping stepping stones that light up when someone steps on them. As a security feature, an alert is sent to owner's phone when a stone is activated. Project will include programmable colored lights and strobe options. This project aims to provide lighting safety, security alert and have potential entertainment uses. (Table #H1, HEC 101)

Automated Brew Extractor

Brings professional quality manufacturing to the home beer brewer. System helps users (hobby brewers as well as brewing companies) acquire important information and data during the process with the goal to improve quality. Brings connectivity, control and automation to home brewing process. (Table #H2, HEC 101)

Charge Du Soleil

A vehicle mounted with a sun-seeking solar panel to charge electronic devices. (Table #69, Outside ENG II)

AIR-STRIKE: Aerial Intruder Removal

Automated defense turret system in a cylinder shape. Fires on balloon targets to pop them. This project is a proof-of-concept for possible laser-based anti-air systems. Lasers require no ammunition, system aims to be self-contained that requires no user input aside from initial settings. (Table #H4, HEC 101)

Navigational Aid Using Google Glass and Bluetooth for Visually Impaired

Inexpensive, low-power, expandable infrastructure for an indoor positioning system. Provides navigational support to the end-user's Bluetooth-enabled receiver. The Android system connect to a building's navigation network. The user inputs their destination inside the building and then receives audio guidance to that location. A small device placed in a building will communicate with google glass and android phone to tell users the path to take to get to a destination or specific room #. (Table #H5, HEC 101)

Glove Drummer

Play the air drums with these smart gloves. Intuitively maps an electronic drum set to a pair of gloves. Play the drums with no sticks or drum set. Same quality as electronic drum set but much less cost. This project intends to produce a sound as close as possible to the real thing. (Table #H6, HEC 101)

Telepresence Chess Board

Play chess with a distant opponent using an app and a board with magnet. With this system, your friend moves a piece on his phone and the piece moves in front of you. (Table #H7, HEC 101)

UniverSOL Charge Station

Solar powered phone charging station for use in high foot-traffic areas (shopping malls, theme parks, etc.) that charges personal devices. Features a motor-controlled solar panel that seeks the optimal angle of sunlight. Minimizes reliance of electric power from wall outlets. Would be free to users and could generate revenue with advertising space. (Table #H8, HEC 101)

Autonomous Chasing Robot

A fast car model that follows another car on its own. Works using a camera and various sensors. Could be used by police officers in a chase situation. (Table #H10, HEC 101)

EKG Reader

Monitoring and recording vital signs is critical. This device records and stores multiple patients' data accurately and immediately. Monitor heart rate and other data in real time on touch screen display. Users can take notes/ draw on the graph. (Table #H11, HEC 101)

Encryption of Data from Planes to Ground Control: Mode-S Receiver and ADS-B Decoder

Planes have transponders that send signals to ground controllers. But the data is not encrypted and poses a risk. This device will interface to a smartphone for purpose of display. The benefit to be demonstrated is an encryption of the information to protect the location data of aircraft from being used by criminals or terrorists or enemy combatants. (They will simulate the broadcasts since actual broadcasts are forbidden). Sponsored by Boeing. (Table #H12, HEC 101)

eGuitar: All-Encompassing Guitar Assistant

Pick a song, and the eGuitar system will light up the proper chords and timing. User can adjust tempo and pause it. The experienced guitarist can actively record the notes played; and can create new songs/sounds. Control units are attached to the guitar. This project offers a solution to players who already own a guitar and want a learning device that is attachable (without having to buy a training guitar with lights).

(Table #H13, HEC 101)

Cool Roomate

This system uses multiple sensors throughout a home to actively monitor temperature conditions room-by-room; and the system's automated response to those conditions (opening/closing cooling vents; turning on/off ceiling fan, etc) will be based on user input. User can designate which room the cooling system should focus on. Ceiling fans use far less energy than central air units; Each room will have its own configurable climate control. Window shades automatically close when room temp reaches 80 degrees F. (Table #H14, HEC 101)

Maze Twinbots

Low-cost, energy efficient robot that navigates through a maze autonomously. After each run, the robot will use the implemented algorithm to increase the efficiency of its path until shortest path is found.

(Table #H15, HEC 101)

ANTI: Automatic Note Taker for the Impaired

A small robotic system that will follow a presenter using image recognition. System has speech-to-text software that will make notes for the user via a USB connection on a portable Windows device. This project aims to improve current note taker systems, which rely on the skills of another person who might make errors. Captures the full lecture or presentation, and provides not only the transcribed notes, but audio and video with subtitles. (Table #H16, HEC 101)

Solar-Charged WiFi Seeker

Robot seeks the strongest WiFi signal in a room. Capable of obstacle avoidance. Solar powered. While roaming, robot will stream video back to user's android device. Once it finds the strongest WiFi signal, it will stop and alert the user. (Table #H17, HEC 101)

Electrically Conductive Ink: Universal Circuit Fabricator (UCF)

Use this energized ink to print circuits onto paper. Can be used as a teaching tool (to teach electrical engineering, for example). Functions as an ordinary desktop printer. But ink conducts electricity. Use it to illustrate circuits, create artistic circuits, or even wearable electronics. (Table #H9, HEC 101)

Memrowave

Microwave automatically prepares food according to package instructions by scanning the barcode.

(Table #H18, HEC 101)

Hybrid Synthesizer

Uses analog circuitry and a software environment that can simulate various instruments. Synthesizer is small, light, portable. Keyboard can be connected to a phone via USB, allowing user to play real time. Provides an affordable alternative to multi-thousand dollar synthesizers. (Table #H19, HEC 101)

Electronic LEGO Sorter

Sorts through large quantities of LEGOs autonomously. If you buy a bulk quantity of used LEGOs, the sorter can piece together expensive sets (some themed sets sell for hundreds, sometimes thousands of dollars). Machine sorts by color/ type (brick/ plate/ tile/ figurines, etc). Mixed LEGOs are dumped in a bucket, and that bucket puts the pieces on a conveyer belt. The machine takes a webcam image, then the image is processed. LEGOs will be routed into the appropriate chute. Machine deposits into 9 bins. (Table #H20, HEC 101)

Helium1 – A Music Playing Device

A music playing device capable of detecting the presence of a person in a room; ensuring music is always playing (for people who are uncomfortable in complete silence). Will use intelligent tools to create smart playlists catered to its users. (Table #H21, HEC Atrium)

Gesture-Controlled Automated Residency Via Intelligent Systems (GARVIS)

Control your home with the palm of your hand. Intelligent home system that goes beyond timers, it can adapt and learn a person's habits and needs. Focuses on energy efficiency. Custom glove will allow user to use intuitive gestures to change settings, turn items on and off, and gain status information about their home. Interface with the system via the glove or a secure computer application accessible with any internet-enabled device. (Table #H22, HEC Atrium)

Visually Entertaining Smart Prism (VESP)

Bringing the lava lamp to the 21st century, device is entertaining to see and is useful. Four LCD screens make up the sides. Will have a charging station dock and an audio speaker. WiFi and Bluetooth enabled to keep track of calendar events, social media updates, news, weather, etc. Communicates with user's smartphone for music streaming. VESP's unique shape and composition makes it the first of its kind. (Table #H23, HEC Atrium)

Smart Water Heater

Device designed to retrofit existing water heater units and make them "smart" so that it can be easily controlled and ultimately learn the home usage pattern. Device will ascertain usage schedule and automate the water heater on/off schedule accordingly. (Table #H24, HEC Atrium)

Active Network Agricultural Monitor

Solar powered, uses a water sensor to report on soil moisture to keep watering minimal. Uses humidity, temperature and UV sensors. (Table #59, Outside ENG II)

Unmanned Ground Land Mine Detector

Around the world, it is estimated there are 110,000,000 active landmines that kill 15,000 to 20,000 people every year. This device autonomously scours lands, detects and marks the locations of possible land mines and Improvised Explosive Devices (IEDs) for safe removal or detonation. Detector detects metal landmines and LIDAR system provides local area vision. Device will autonomously scan a pre-determined path for safety. This system goes beyond current landmine detection systems with the use of ultrasonic sensors, LIDAR detection, metal detection, more. (Table #60, Outside ENG II)

Solar Powered Golf Cart

Batteries can be charged either with solar or wall outlet; can go at least 15 mph; 3 modes of operation; touch screen displays for users; provides information such as charge remaining, current speed, etc. (Table #61, Outside ENG II)

Mechanical and Aerospace Engineering

Design, Build, Fly: Unmanned Aircraft

Annual competition by AIAA and Raytheon. The UCF remote-controlled aircraft features a half-tube channel in the wing (Custer Channel), a design first seen during World War II but was never slated for wide-scale manufacture. (Table #1, ENG II Atrium)

Design of Implant for Cervical Spinal Fusion

Used to secure neck vertebrae during a procedure called an anterior cervical discectomy and fusion (ACDF). The small implant immobilizes the adjacent vertebrae to promote bone growth between them. (Table #2, ENG II Atrium)

EmBrace: 3D-Printed Assistive Leg Braces for Small Child

Joshua, age 5, has a rare condition requiring his use of leg braces. This project improves on the design of his current braces, including water resistance and motors to assist in removal of braces. 3D printing allows for replacement leg braces to be made more quickly and less expensive than traditional orthosis. (Table #3, ENG II Atrium)

Safety VEST: Alert System to Prevent Children & Pets Being Left in Cars

Solar-powered sensor system has the ability to recognize extreme conditions and identify a person or animal, and signal an alert to the vehicle's driver. Runs multiple environmental and lifeform checks. (Table #4, ENG II Atrium)

Thermal Hysteresis Catalytic Reactor for Lower Energy Emissions

A thermal reactor that will, through a catalytic process, minimize the formation of pollutants. Cost-effective, heat-resistant window and actuated shutter system placed on the wall of combustion chamber that will allow heat loss through radiation. Precisely controls the amount of heat loss. (Table #5, ENG II Atrium)

The Perfect Mix: Heated Methane and Biodiesel Fuel Mixer for a Combustion Process

A fuel-mixing system that delivers a homogeneous mixture of liquid fuel and air to a combustion chamber. Design will be used in combustion research and could be used commercially to reduce pollution while making combustion process more energy efficient. (Table #6, ENG II Atrium)

Exhaust Sample Collection Device for Efficient Energy Systems

An exhaust collection device that provides high quality samples of gases. The device must collect samples with no contamination from external sources. The device is meant to aid combustion design engineers by providing accurate, reliable data. (Table #7, ENG II Atrium)

Post Combustion Heat Exchanger for Energy Applications

Heat exchanger will feature efficiency and have a long lifespan, and able to withstand constant at high air temperatures. Device will provide a healthy, safe, and cost effective method of cooling air at very high temperatures. (Table #8, ENG II Atrium)

Miniature Functional Wind Farm

Project will test and assess multiple configurations of wind turbine placement to determine optimal configuration for maximum power generation. Long term goal is to solve efficiency problems in wind farms operating presently. (Table #9, ENG II Atrium)

Octovision: Crop Disease Detecting Unmanned Aerial Vehicle Octocopter

UAV and ground robot systems will reduce the need for human involvement in the detection of disease in agriculture, potentially reducing the cost of human labor. (Table #10, ENG II Atrium)

Centrifugal Dust Experiment for Microgravity Environment

An experimental testing centrifuge device to be used in microgravity environment. The goal is for it to be used on the International Space Station to study dust dynamics and ultimately how comets and asteroids are created. One-of-a-kind device custom built for the UCF Center for Microgravity Research.

(Table #11, ENG II Atrium)

Bioreactor for Nanocellulose Production

Tabletop machine that produces nanocellulose. Considered having super mechanical property, nanocellulose is stiffer than Kevlar, has 8x the tensile strength of steel, and is made from a completely renewable resource, the most abundant polymer on earth, cellulose. Can be added to plastics, concrete, and more to give materials super strength. It is cheap and safe to produce. (Table #12, ENG II Atrium)

Compressor Blade Root and Disc Optimization and Material Testing

This experiment tests a blade root and disc attachment. Studying High Cycle Fatigue for Inconel 718, a nickel based super alloy, for contacting surfaces. (Table #13, ENG II Atrium)

YAG Laser Machining of Gas Turbine Cooling Holes

Goal of project is to optimize the process from a bottleneck machine to YAG Laser Machine to increase overall efficiency. (Table #14, ENG II Atrium)

Experimental Platform for Long-Term Creep Fatigue Testing with Energy Applications

In high temperature environments, components over time experience deformation called "creep." Most creep testing machines stretch or compress the specimen. This machine stretches and compresses in a single test, and changes the force that is felt by the specimen. Ultimately achieves more thorough data in testing environment. (Table #15, ENG II Atrium)

High Speed Spectroscopy for Mechanical Testing

Advanced nanocomposites experience varying mechanical properties at high strain rates. (Ballistic conditions, for example). When laser strikes a sample under strain, the sample emits photons at varying wavelengths as it excites and returns to original state. Photons are collected by a probe. Through a process of piezospectroscopy, this process fills a niche that no other equipment can do now. (Table #16, ENG II Atrium)

Combined Extreme Environments (CEE) for Mechanical Fatigue Testing

Testing fatigue of aircraft at hypersonic speeds. The CEE is a combination of acoustical, mechanical and thermal loads onto different materials common to current aircraft. Will allow engineers to more deeply explore structure-property-service relationships for critical components at significantly lower cost.

(Table #17, ENG II Atrium)

Thermal Management of Electromechanical Actuators for Flight Control Surfaces

When airplanes maneuver, hydraulically controlled flaps are used. Hydraulic systems are extremely heavy. Electric motors are much lighter but get very hot in use. This project is a fan designed to cool electric motors. Would make aircraft lighter and fly using substantially less fuel. (Table #18, ENG II Atrium)

Formula SAE Powertrain Package

More efficient intake and exhaust design to allow the most air in and out of the motor as possible. To be used in upcoming Formula SAE (Society of Automotive Engineers) competition in May. A variety of components will be designed and manufactured. (Table #19, ENG II Atrium)

Formula SAE Suspension Package

Improved suspension design with the goal to make the car as controllable, light and nimble as possible for competition. This design will help car go around corners faster. (Table #20, ENG II Atrium)

Hybrid Lithium-Ion Battery with Convection Cooling

New design for lithium ion battery – the most highly used battery, powering most mobile electronics and electric cars. This project offers enhanced cooling capability (through convection) that reduces the excess heat and leads to more efficient battery and longer life. Excess heat in a battery creates unfavorable conditions in batteries. The hybrid design will improve the charge/discharge rates. This means the battery will be more efficient in dissipating the heat generated by unwanted electrochemical reactions. It will also ensure that no resource is wasted. (Table #21, ENG II Atrium)

Multi-Pod Crawler Platform

Small, lightweight vehicle that could be used for SWAT and bomb investigation, and for search and rescue in disaster areas. Has a tank style steering system and easily navigates over and around obstacles. Easy to operate and maintain. Mounting platform allows multiple uses for specific applications.

(Table #22, ENG II Atrium)

Advanced Spray Dryer for Producing Highly Monodisperse Micro/Nano Particles

Micro/nano particles are the basic building blocks for many energy conversion and storage devices. This project furthers UCF droplet technology research and the use of nano-particles in manufacturing products. The unit is designed to take a fluid solution and evaporate the solvent from the solution to produce a solid particle. (Example: take milk and turn it into powdered milk). This method can be used to advance the manufacturing of small solar cells, small lithium ion batteries, and pharmaceuticals. (Table #23, ENG II Atrium)

Vibration/Perturbation Stabilization Platform

Suspension systems on vehicles ensure smooth riding for passengers, but drinks and other unsecured items are not stabilized. The solution: a stable platform where a drink could be placed without spilling when the vehicle drives over rough terrain. This idea can be expanded to larger applications, such as stabilizing weapons in military vehicles to help with weapon accuracy. (Table #24, ENG II Atrium)

Hybrid Rocket by “Team Maximum Thrust”

NASA sponsored rocket competition with the goal to achieve the highest altitude. Rocket will be made with 3D printed materials and from parts suppliers. Goal for project is to make a propellant bolstered with energetic additives to achieve the most thrust allowed by competition rules. Nozzle will be machined to achieve maximum efficiency in the altitude range that team expects to burn their fuel through. Nose cone will be 3D printed. Rocket will be 3 feet in height. (Table #25, ENG II Atrium)

ASHRAE Design Team

National competition by the American Society of Heating, Refrigeration and Air-Conditioning Engineers. ASHRAE gives the team a blue print of a building and its location. Project will display a computer 3D model of the building and a virtual walk-through of it. Project will be designed according to all required specifications and provide for maximum efficiency. (Table #26, ENG II Atrium)

ASHRAE International Design Competition

This UCF team has been tasked to design and analyze three energy-efficient HVAC systems using a life cycle cost process for a given building in Doha, Qatar. Goal is to find alternative or new-to-market systems that are environmentally friendly and cost effective to own. (Table #27, ENG II Atrium)

ASHRAE Sanford Public Historic Museums

This UCF team has been tasked with solving air conditioning problems in the Sanford museum building. Goal is to design an HVAC system to achieve the highest indoor air quality possible and prevent moisture damages. (Table #28, ENG II Atrium)

Cup Cryostat: Test Apparatus for Thermal Performance Testing of Materials

The testing apparatus has the ability to extract comparative thermal conductivity data from a wide range of materials. This apparatus is priced well below commercial instruments and has more capabilities than what is available on the market. (Table #29, ENG II Atrium)

Advanced Manufacturing (Twin Screw Extruder)

A device that mixes shape memory polymer (a special type of plastic) with carbon nanoparticles, and extrudes the mixture into a thin plastic material (filament) that can be used for 3D printing. This extruder is 10" wide, 24" long and 6" high. Other extruders on the market are 100 feet long and cost nearly \$1 million. This could be made for under \$10,000. There is no other desktop plastic filament extruding solution, so this product could cater to home-based/ small-business based 3D printing manufacturers who want to make their own filament for 3D printing. (Table #30, ENG II Atrium)

Water Wash Fixture

Uses pressure vessel technology to render the airfoil clean of any debris or remnants from the manufacturing process. Currently there is no methodology used to clean the internal cavity of a turbine airfoil.

(Table #31, ENG II Atrium)

Noise-Pollution Reduction System

Scalable system is designed to reduce perceived noise by a minimum of 25 percent (from 80 dB(A) – the human pain threshold – to below 60 dB(A) – casual conversation levels. Scalability allows for a range of applications. Can be used to reduce noise from pool pumps, emergency generators, and much more.

(Table #32, ENG II Atrium)

Manufacturing Performance Improvements at Nephron Pharmaceuticals

The company makes inhalation medicine that comes in plastic vials with a twist-off top. When the vial cards come down the production line, they must be reoriented from vertical to horizontal on a conveyor belt while keeping pace with production. The existing turning unit has a high failure rate and too many moving parts. This team has created a new turning unit that is efficient and will save the company thousands in labor costs and will increase production. (Table #33, ENG II Atrium)

Radius X: General Wheel Rotation Power Motor

This new motor design features the rotation of the entire outer rim (versus just the drive shaft) to create a massive amount of torque. This project increases the length of the "moment arm." (Table #34, ENG II Atrium)

Crop Disease Detecting Autonomous Ground Robot

The robot aids farmers in locating and detecting disease in agricultural crops. In this case, for strawberry fields. (Table #35, ENG II Atrium)

Nano Deposition System

Scalable project will print carbon nanotubes using an evaporative technique. Useful for flexible electronics, composite material and electrical networks. This new system uses refrigerant to suspend the nanotubes and evaporates the refrigerant after deposition. System allows for refrigerant to be reused, does not require filter paper and uses lower temperatures to reduce rates of clogging in the nozzle. (Table #36, ENG II Atrium)

Micro Aerial Vehicle Distributed Actuation System

May be used by any researchers or hobbyists that have difficulty in achieving a fast climb with their micro aerial vehicle. Small actuators are placed at critical points along the MAV. When the airflow along the wing begins to separate at high angles, the actuators will disrupt for flow with turbulence, and ultimately encourage air to "stick back" to the wing. (Table #37, ENG II Atrium)

Ergonomic Drum Pedal

A bass drum pedal that improves upon current design. Current bass drums used in music have a pedal that can be adjusted by 10 degrees but the foot is never in a fully flat resting position, which can lead to shin splints and other injuries for the bass drum player. This pedal allows for a flat foot resting position while maintaining current musical capabilities. (Table #38, ENG II Atrium)

SCRAM: Supply and Command rover for an Autonomous Multicopter

This project is an unmanned hexicopter that lands on a mobile charging station (a ground rover) that is solar powered. The entire copter-and-rover system is unmanned. Copter lands on rover precisely enough to engage its plug-in charging mechanism. The electric-motorized rover will communicate flight paths to the multicopter while it is docked. Current unmanned aerial vehicles are limited by battery technology that reduces flight time. (Table #62, Outside ENG II)

Ocean Rescue Response Trailer

A triple purpose trailer that carries a personal water craft on the street, beach (soft sand) and can transform into a rolling stretcher. Currently, in every ocean rescue department nationwide, two different types of trailers are used: a street trailer that is licensed and tagged to transport the water craft to beach locations and servicing; and a beach trailer that moves the personal water craft on the sand with balloon tires. This project solves the problem of having two different trailers. Also, this project addresses transporting the patient quickly off the beach to an ambulance, enabling the continuation of CPR during transport. (Table #63, Outside ENG II)

Solar Drone: Low-Speed, Solar-Powered Aircraft with Extended Fly Time

Current drones have limited fly time (about one hour) due to limited battery capacity. This project concept is based on an inflated blimp. Bottom half is highly reflective and form a solar reflector/concentrator. Top half of balloon is transparent to allow sunlight to reach the concentrator. Solar Drone will be able to stay in the air for 8 hours. This drone carries a live streaming camera and is capable of carrying a payload. Can be used recreationally, for meteorological measuring, and in outer space. (Table #64, Outside ENG II)

Human Assisted Electric Vehicle

Inexpensive, single-rider vehicle designed to act as a replacement for cars and motorcycles for commuting. Powered by rechargeable batteries and a 5kW motor. Human pedaling can supplement the power. This can travel 40 to 50 miles on a single charge and has a cruising speed of 35 to 45 MPH, making this a useful, environmentally-friendly commuter vehicle. (Table #65, Outside ENG II)

Solar Refrigerator: Thermal Absorption Cooling System

A fridge that uses solar energy to lessen the electric need during peak electric grid hours (daytime). Creating a solar collector to concentrate the sun's energy into a section rather than using solar panels will be used. Final product will be cheap, energy efficient and environmentally friendly. (Table #66, Outside ENG II)

Human-Powered Vehicle

Features the latest improvements for competition, improving on last year's first-place design in the American Society of Mechanical Engineers Human Powered Vehicle competition. New this year: full suspension system and cooling system for the cabin. This team is also performing cost and engineering analysis to explore the balance between performance, cost, reliability and safety to create a human powered vehicle that can be produced in mass quantities. (Table #67, Outside ENG II)

UCF Baja Drivetrain – Technical Application for Torque Allocation

Designed for the 2015 Baja SAE car. It will endure several tests including acceleration, braking, hill climb, suspension and tracking, an endurance race and more. Gearbox and gears and shifts will be displayed. (Table #68, Outside ENG II)

Computer Science

Pi Makers

Today's consumer 3D printers use a microcontroller to manage the various motors, heaters and sensors on the printer. This is a device for 3D printers will replace the standard microcontroller with a Raspberry Pi, a small computer that also has general purpose Input/Output pins (GPIO) to interface with the other electronics of the printer. (Table #H25, HEC Atrium)

Community Driven Peer-to-Peer Network

Every user of this mobile application will, with very little effort, be able to instantly connect with team members and share any vital information they need: messages, images, datasheets, logs, etc. No Internet connection, no main hub or Wifi signal is needed. Creates an always-available local data network. This project could be best used by first responders in disaster relief areas. (Table #H26, HEC Atrium)

Simbad: Siemens Big Data Analysis

A framework for constructing scalable systems with the capability of processing human text and storing it in a database for sorting, indexing, categorization and automated response. Example: An inspector reports "the engine has a bad O-ring" and the system fills out an order for the new part, archives the information. (Table #H27, HEC Atrium)

Automatic Grading System for Computer Programming Assignments

System allows computer science students to receive nearly instant feedback on their assignments, as opposed to the current system of human graders, which can take a week or longer for feedback. This would save instructors time, creating a win-win scenario for students and faculty. (Table #H28, HEC Atrium)

Project Tesseract: Parallel Tessellation Using Compute Shaders

Tessellation is a process that takes simple geometry and through some calculations, creates additional detail. For example, a rough looking circle could use tessellation to appear smooth. This project will perform tessellation calculation on software (as opposed to hardware, which is what is currently done). The goal is to create a way to perform tessellation faster than tessellation hardware. (Table #H29, HEC Atrium)

Project Rickshaw (Table #H30, HEC Atrium)

AMD Novel Compression Algorithms (Table #H31, HEC Atrium)

Civil, Environmental and Construction Engineering

Environmental Engineering Reverse Osmosis Water Treatment Plant Design

(Table #39, ENG I Atrium)

Industrial Engineering and Management Systems

Development of an Effective Storage System for Advanced Drainage Systems

ADS, a company specializing subsurface drainage, enlisted this IEMS team to organize the company's yard that stores 7 million pounds of inventory. This team designed a product storage system that accounts for product sizes, storing conditions, yard traffic and more. (Table #49, ENG I Atrium)

Design of a Safer Child Car Seat (Nemours)

This project intends to design a car seat that will reduce the number of children and infants accidentally left in vehicles. IEMS and College of Business students have worked together with Nemours Children's Hospital to design the concept and passive safety devices/controls, and write the business case for the product. A future electrical engineering team will develop and implement active safety devices/controls. (Table #50, ENG I Atrium)

Vehicle Integration Facility, Personnel Movement Assessment and Cost Optimization for United Launch Alliance – Launch Ops

The goal of the project is to optimize the work area layout on various levels of the VIF by making the work areas self-contained with adequate tools and material. Team will help identify all sources of waste and all sources of variation that if eliminated will improve task time. (Table #51, ENG I Atrium)

Vehicle Integration Facility, Personnel Movement Assessment and Cost Optimization for United Launch Alliance

This project collected and analyzed data associated with ULA airborne and ground commodities sampling to identify differences between the product lines (Atlas and Delta) and eliminate waste associated with current process. (Table #52, ENG I Atrium)

Cardiovascular Surgery Pre-Admission Testing Improvement for Florida Hospital

This team's goal was to increase the percentage of patients who are completely Pre-Admission Tested prior to the day of the procedure, which will decrease the overall time needed to prepare CV patients for their procedure. (Table #53, ENG I Atrium)

Improving Florida Hospital for Children Emergency Department Processes

Project includes analysis of current processes, conduct thorough root cause analysis, identify waste in current processes and train staff in improvement methodologies. (Table #54, ENG I Atrium)

Warehouse Optimization for Boston Whaler

In order to accommodate the increasing consumer demands, Boston Whaler has expanded its facilities to include a larger stockroom to house the components used during product construction. This project set out to optimize the inventory level, material location and material flow from receiving to line side delivery.

(Table #55, ENG I Atrium)

Interactive Facility Design & Layout for General Electric Intelligent Transportation Solutions

Currently there is no facility floor space management system at the GE ITS Melbourne, Florida location. The company also intends to use the facility layout design at a second location. This project set out to design and develop an interactive facility layout system/tool and provide an efficient layout for the Cab Electronics product line. Goal is to have automated, interactive system to manage lab space.

(Table #56, ENG I Atrium)

Engineering Design Review Analysis and New Process Design for General Electric Intelligent Transportation Solutions

Improvement to the design review process of signaling products in the rail market. This team will design new processes for each product type. (Table #57, ENG I Atrium)

Registration/Scheduling Throughput for Parrish Medical Center

An optimized workflow relieves the staff of non-productive repetitive tasks and helps cultivate an environment which staff seeks to improve efficiency, strengthen customer relationships and re-engineer processes to be more productive, reduce backlogs and improve throughput. This project set out to simplify the work process by reducing bottlenecks, develop a smooth flow of patients, materials, reducing wait times, reducing fatiguing motions and more. (Table #58, ENG I Atrium)

Spring 2015 Senior Design Showcase and 7th Annual Symposium on Renewable & Sustainable Energy

Program

Friday, April 24

8 a.m. – 2 p.m. **College-wide Showcase of Student Exhibits**
(including Renewable & Sustainable Energy Symposium projects)
Inside/Outside Harris Engineering Center, and Engineering I and II Buildings

9 – 11 a.m. **7th Annual Symposium on Renewable & Sustainable Energy**
Speaker Presentations
Engineering II, Room 102

9 a.m. **Welcome**
Dr. Michael Georgiopoulos, Dean
UCF College of Engineering and Computer Science

9:20 a.m. **Keynote Presentation**
Grace Bochenek, Ph.D. (UCF, IE, '98)
Director, National Energy Technology Laboratory

9:50 a.m. Selected Renewable & Sustainable Energy Project Student Presentations

Hybrid Lithium-Ion Battery with Convection Cooling
See this project on display in the Engineering II Atrium.

Gesture-Controlled Automated Residency Via Intelligent Systems
See this project on display in the Harris Engineering Center Atrium.

Human-Assisted Electric Vehicle
See this project on display outside the Engineering II building.

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