

2012 ORU Engineering, Computer Science, Physics, and Mathematics Graduates and Faculty

Ten senior engineers graduated this year with B.S.E. degrees and two students with B.S. degrees. Six computer science students, five mathematics students, and two mathematics education students graduated, all with B.S. degrees. ORU Engineering major Chad Carroll has been selected for the 2012 Oklahoma Society of Professional Engineers (OSPE) Outstanding Engineering Student Award. He also won first place in the undergraduate poster session at the annual student professional development conference of the American Society of Mechanical Engineers in Baton Rouge on Friday, March 30, 2012. Engineering and mathematics majors Daryl A. Charron and Alejandro A. Hernandez competed in the South Central Consortium for Computing Sciences in Colleges (CCSC) student poster competition on Friday, April 20, 2012 in Canyon, TX at West Texas A & M. They won first place of 11 posters that were submitted to the conference. ■



2012 ORU Engineering, Computer Science, Physics, & Mathematics Graduates and Faculty

The Intelligent Swing

Chad Carroll, Aaron Settles, and Joshua Weed

In the realm of professional ranching, it is commonplace to have multiple acres of land divided by a system of fencing. While these dividing systems are likely to vary from ranch to ranch, gates are the standard in cordoning off the different areas of the ranch. With these gates the need for a method

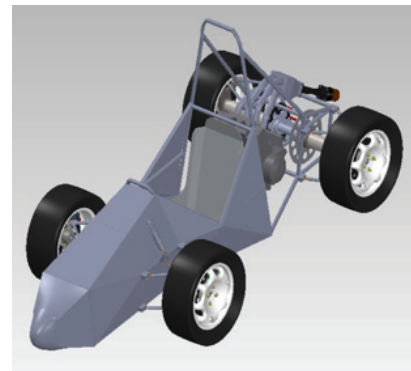
to open and close them with ease arises. The most widely used and conventional method employed is for the rancher to exit his vehicle, manually open the gate, reenter his vehicle, drive through the gate, again exit his vehicle, shut the gate, and return to his vehicle. This process may not seem overly time consuming on an



ORU FORMULA SAE RACECAR BODY

Zachary Proud, Vince Tizzzone, and Mathew Travis

The purpose of this project was to create the body and impact attenuator for ORU's first formula SAE racecar. The team had to strictly adhere to all of the rules and requirements for an



FSAE competition. Before the body could be created both classical equations and virtual modeling with FEA flow simulations were performed to optimize the design of the body. After the virtual work was completed and the design was finished, the physical construction could begin. After researching different

prospective materials, Lexan polycarbonate was chosen as the material for the body because of its cost efficiency, durability and light-weight. The preparation and construction were completed with only a few small challenges. The completed project currently meets all of the rules and regulations. ■

individual basis; however, there are typically a large amount of gates present on any given ranch. This can be a severe drain on available time. This project has been put forth in order to solve this problem without the use of any electrical power.

While there are electrical as well as solar powered gate-opening systems in existence, they normally come at a high price as well as bear either a difficult installation or a high frequency of needed maintenance. The goal of this project was to design a system that functioned purely from mechanical input. The most natural input that could be utilized efficiently was the weight of the vehicle. As such, a hydraulic trigger system was

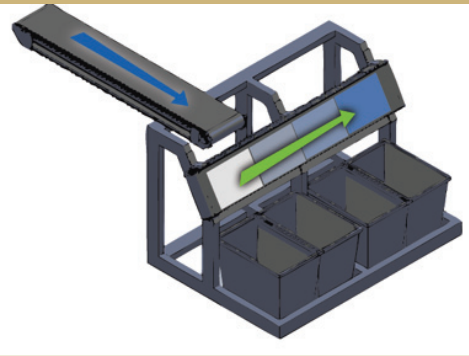
designed that would transfer the weight of the car into a linkage system that would pull the gate open away from the vehicle. This design was centered on the desire for the gate to be able to open in a bidirectional manner away from the oncoming vehicle. Additionally, the trigger system must not be able to be activated by cattle or other livestock.

Currently, designs have been created and executed that encompass the entire system. Preliminary testing of these fabricated components has proved the system to be successful and feasible for manufacturing with a few minimal design changes necessary to place the product on the market. ■

DESIGN OF A VERTICALLY-INTEGRATED RECYCLING SYSTEM

Christopher Barker and Aron Romasanta

This project involves a modern system for removing recyclable materials from a source of mixed household waste. Many methods of varying levels of technology are currently being employed to complete this task, but no viable method currently in use includes any technology to begin the recycling process in the production stage of the recyclable objects – which is one unique goal of this design project. This vertically-integrated



method to sorting recyclable household waste creates the possibility for a universally-acceptable system originating in the material production stage and finishing when an object is successfully

removed from a refuse source and processed for recycling.

Essentially, this process aims to work as a large scale encoding and decoding system. Each specific product material, e.g., high-density polyethylene soft drink bottle, cardboard box, or block of polystyrene packing foam, is coded in its production process with a designed amount of magnetic material in order to facilitate its removal in the final mixed refuse stream. When exposed to a magnetic field during the extraction process, coded elements are able to be removed from the rest of the stream and sorted separately. In order to divide coded elements by type, varying magnetic fields are applied along a conveyor system to extract objects of different magnetic percent weight.

Benefits of a successful final design of this vertically-integrated system include a high level of universal acceptability allowing for large scale implementation of the system in major production facilities, a positive or nonexistent effect on consumer safety, and a high retrieval efficiency rate. ■

the inconsistency in the nodes of the cluster. The rating is limited by the smallest memory size in the cluster. The project was successful in the creation of a working cluster of forty-seven computers and a multi-processor server.



The system size is limited by power constraints and temperature limits of the computers. The project is set up to be continued and maintained,

and could be expanded if a new location could be determined with more power and cooling available. ■

MODELING THE KINEMATICS OF THE UPPER ARM TO ASSIST IN REDUCING PITCHING RELATED INJURIES

Walter Davis, Darren Howard, and Feba Paul

In this project, we are modeling the kinematics of the shoulder and arm of a pitcher using the modeling software LifeMOD™. The raw pitching data was collected by our beneficiary, Applied Technology Holdings, Inc., using their patented wireless motion tracking system, and our job was to process the pitching data so it can be used with the program to model a pitch. By using a computer generated model of a pitch, data can be collected to better understand the mechanics behind a pitch. This will allow for a better understanding of how pitchers could injure themselves by showing how the muscles and joints are stressed during a pitch.

This project is to be completed as an amendment to a previous project completed a year ago. The previous project included the same aspects as the current project. However, it was discovered in the previous project there was no ability to decipher body position. That is, one was unable to find from the data whether the pitcher's body was advancing or remaining stationary while the arm was moving. Obviously this was a great deterrent to a quality analysis.

Originally, only three sensors were placed on the arm for the pitch analysis: one on the upper arm, one just below the elbow, and one just above the wrist. Therefore, a fourth sensor will be placed on the pitcher's torso in order to measure this body motion. The analysis and calculations to determine space, time, velocity, and acceleration of each sensor as it relates to the body will need to be reanalyzed with this fourth dimension of the torso sensor. After completing the sensor analysis and inputting the data into LifeMOD™ for analysis, the kinematics of the entire arm during a pitch will be modeled. This model will allow for scalable analysis to reduce injury. ■

DESIGN OF A HIGH PERFORMANCE COMPUTER

Daryl Charron and Alejandro Hernandez

This group is designing and assembling the hardware layout of a cluster computer using discarded equipment no longer needed by Oral Roberts University. The purpose of this project is to alleviate the long processing time for complex simulations and to help produce results for research projects requiring these simulations. This cluster will be tested utilizing the high performance Linpack benchmark to obtain a FLOPS rating. The cluster is rated at 9.06 GFLOPS using the Linpack software; however, this is not the peak rating attainable due to

2012 AWARDS & SUMMER INTERNSHIPS

Kathryn Crosby, Major: Mathematics
Congressional Award Gold Medal
Awarded in Washington, D.C. on June 20, 2012



The Congressional Award is a program established by the U.S. Congress challenging young Americans to improve themselves and recognizing young people who set and achieve goals in four program areas: volunteer public service, personal development, physical fitness, and expedition activities.

In serving 500 hours of public service, Katie focused on three separate areas including working at the local food pantry, assisting persons with disabilities through a therapeutic horse riding program, and a conservation project at a local park.

For her personal development goals, Katie set two goals. She earned several Red Cross Lifeguard, Wilderness First Aid and CPR certifications. Additionally, Katie spent over 1,200 hours improving her piano skills from the intermediate to pre-conservatory level.

Katie spent over 450 hours on her physical fitness goals of improving her basketball game and developing a habit of working out to improve her strength and flexibility along with her cardio program.

IEEE ROBOTICS COMPETITION

Paul Achemapong, David Kaligamba, and Obiye Kolokolo

The object of this project is to design and build an autonomous robot. This autonomous vehicle has to be able to overcome different obstacles, such as walls, to harvest energy from two different sources out of three that are provided. These sources are light delivered from a standard MR16-50W halogen bulb that will be mounted 6" outside of the course, and electric source of 5V with a 24 Ohm resistance, and a wind source created using a hair dryer. The robot is to use this energy to power a small motor that will subsequently raise a flag. The robot has to be able to accomplish this task as fast as possible. ■

For her expedition activities, Katie spent over 21 days in challenging outdoor wilderness areas backpacking and learning wilderness survival skills which culminated in teaching a two-week advanced leadership course at Philmont Scout Ranch in the mountains of New Mexico.

The Congressional Award program challenged Katie to set several goals and achieve them simultaneously.

For her summer internship, Katie is working at Calpine Corporation in their Houston location. She is working with the Data Quality Project, a recently developed project with the task of making sure the data from the various used tags are reliable.

This involves several tasks. It includes looking at the data in the tags coming from the gas and steam turbines at various plants to ensure that the data is good. This task is completed by comparing the tags against other tags and comparing them to the standard operation guides used for the turbines. Mostly, this is done using PI and a little bit of tag map and excel, though the company is slowly moving to eDNA. If the data appears bad, then several actions are taken. First, it is determined from the data the most likely cause of the bad data and a ticket is submitted to the appropriate group to have the issue resolved. Also, the tag is noted as faulty and the information is put in an online data site used for helping monitor the top tier tags used in the business side. Once these two things have been accomplished, the tag is followed until it is fixed and is noted as fixed in the online data site.

Additionally, since the project is new, tasks to help organize the data and find easier ways of managing it are required. The online data site is new as it is an offspring of the Data Quality Project and thus is still in its beta stages. Different ways of putting information about the tags onto the site are being improved as new and better ways of helping to manage the data are being discovered. Also, as new tags are classified as tier 1 (top tier) tags they are added to the data site and the necessary information about the tags are added in.

These are the main tasks, though other tasks are completed such as checking volume confirmation report data against the tags. Katie is well compensated for her work and currently works a 40-hour workweek, taking the metro bus into downtown Houston which has been an experience. Overall, Katie has learned a lot about how data quality is maintained in an energy business and what it is like to work a 40-hour week.

MORGEN BEAMS, MAJOR: ENGINEERING (MECHANICAL CONCENTRATION)

This summer I began an internship at Exterran in Broken Arrow, Oklahoma. Exterran is a global leader in full-service natural gas compression and a premier provider of services and equipment for oil & gas production, processing, treating, transportation and storage. The Broken Arrow branch is a manufacturing plant that designs and assembles several different kinds of plants including Amine System, Refrigeration System, Cryogenic System, Stabilization/Fractionation, and several others. My internship involves mapping the current state of the assembly process with a Shingo-Style format value stream map, identifying process

steps, operations and touch time, collecting data and identifying opportunities for improvement and developing and implementing solutions to reduce or eliminate waste in the process. While promoting a lean culture, I am working on two specific projects that involve developing an improved process for assembly to receive parts and valves from the warehouse and also constructing a spool installation order for the several different plants being built. Through this internship I have learned a lot about the manufacturing process and how engineering ties in. I enjoy the ability to work in the office and shop environments, observing how the process is developed on paper and how it is implemented on the floor. It is a great feeling to see ideas come to life to better the flow and process of a product that you have been working on and with.

DANIEL HOLMAN, MAJOR: ENGINEERING (MECHANICAL CONCENTRATION)

Over the summer I have the opportunity to work as a Terminals Tech Intern in the Transportation section of Phillips 66. I have 5 different projects assigned to me to fulfill during my short 6 weeks in Houston, Texas. This internship is a remarkable experience in what it looks like to actually work in the industry of engineering. Much of what I am doing is preparing and researching the installation of secondary emergency shutoff switches for truck racks across North America. One of my projects is to create a Scope of Work document for the installation of Scully Optical Sensors in the Vapor line coming off of the Tanker trucks. Another project I am doing is researching equipment to put in a new educational lab with the purpose of training new technicians on programming and operating the instruments used in the field at each of the terminals. Phillips 66 is a great company and truly cares about teaching their interns rather than just using them to do grunt work. I am truly blessed to have this internship.

MICHAEL O'BRIEN, MAJOR: ENGINEERING (ELECTRICAL CONCENTRATION)

This summer, I have been working at Logic Product Development in Minneapolis, Minnesota as a software engineering intern. Logic PD provides manufacturing, industrial design, and product development services to their customers. Logic also has some products of their own that are used in development. I work in the services group, writing software for customer projects. So far, I've mainly been involved in integrating wireless connectivity in embedded systems. It's been a wonderful opportunity to learn and to get some hands-on experience. Logic's atmosphere is very collaborative and I've been able to work with some very experienced engineers who have taught me much not only about engineering, but about the product development cycle and the business aspects of the industry. <http://www.logicpd.com/>

TIMOTHY RINK, MAJOR: ENGINEERING (MECHANICAL CONCENTRATION)

This summer has personally been quite an adventure for me because I never would have dreamed to be able to start this early with my future career as an engineer. I am currently working at Bizjet International in Tulsa, Oklahoma for the remainder of the

summer as a Mechanical Engineering intern. Bizjet works with the completion of small airplanes and business jets in order for them to be shipped out safely. At the beginning of the summer, it was a pretty tough transition from school to working after learning of the Iowa airplane accident of my fellow ORU community. I actually stayed on the same floor my freshman year at ORU with two of the guys who passed away as a result from the accident. The Monday after I heard of this terrible news, I went to an orientation where they showed a safety video with several images and videos of planes that have crashed. I realize now that I have a great opportunity to work with various aircraft to help prevent tragic accidents like the one that took the lives of my friends.

Here at Bizjet, I primarily build working Solidworks parts, assemblies, and eventually drawings from said parts and assemblies. I can still remember learning of the many functions that Solidworks has from taking Engineering Graphics with Dr. Leland my freshman year. When I have mentioned to the engineers here at Bizjet that I have worked with Solidworks going on three years now, they all seem almost baffled that I could already have that much experience. The parts I have helped design vary from brackets, locks, hinges and numerous others; some of which I found out are very important in the overall completion of the aircraft. Once I finish making the Solidworks drawings, they get sent to my boss for approval, and then get passed on to different Mechanical, Electrical, and Systems engineers for further approval. I'm looking forward to what the rest of my summer entails for me here at Bizjet; and I know that God has great things for everyone who seeks after Him according to Jeremiah 29:11. It has been a good learning experience thus far, and I am looking forward to what God has in store for my future career after I graduate from ORU.

MATTHEW BURTON, MAJOR: ENGINEERING (MECHANICAL CONCENTRATION)

Phrases like "revolutionizing the industry," "changing the game," and "a new chapter in aviation" were commonplace in conversation and paraphernalia at Pratt and Whitney this summer. About a week after ORU classes ended, I left my home town of Atlanta, Georgia for Hartford, Connecticut, to begin my second internship rotation with the legendary aviation icon, Pratt and Whitney. The company has been designing and building jet engines since 1925. Recently, the company has patented a revolutionary technology that increases jet engine efficiency and reduces vibration on scales that have landed the company on the cover of Aviation Week Magazine on multiple occasions in the past few months. My internship allowed me to see the true excitement of an engineering career and gain technical and professional experience that otherwise would be a thing of conjecture. Working in a jet engine overhaul facility last year and working in the Technical Services department this summer has allowed me to see how both technical engineering analysis and business management work with the design process to create technology that people use every day.

The internship process is different for every company and the experience that any engineering student may have varies largely with the department and immediate management that the intern works with. Thankfully, both of the internships that I had allowed me to work with truly remarkable professionals, many

of which have been in industry longer than I have been alive. I believe that much of this great experience can be credited to my involvement in the INROADS program, which is a national internship and professional development program for minority students. The experiences and contacts that I have gained through my involvement in INROADS have been outstanding, and I am sure that I will benefit from the organization for much of my professional career.

I would encourage any student (engineering or not) to pursue an internship and make an effort to stand out in the corporate world. Frankly, the job market is very favorable to interns, and it gives students a chance to "jump-start" their professional development. Getting an internship takes a bit of persistence, but I have learned that being a professional does too. It is worth the effort of trying, and I have seen that in most cases trying is rewarded with opportunity. Most importantly, when God opens a door for us, nothing can get in the way.

So I implore any college student to personally take the initiative to obtain an internship or co-op. One will undoubtedly benefit from the decision, and obtain a new meaning and depth for his or her undergraduate career. ■

ALUMNI NEWS

AARON BEAVERS, GRADUATED 2011: ENGINEERING MAJOR WITH MECHANICAL CONCENTRATION

I am employed as an applications engineer for AAON Inc. in Tulsa, OK. AAON is a manufacturer of semi-customizable heating, ventilation, and air-conditioning equipment. We have created a unique niche in the HVAC market by offering a semi-customizable product for an economical price. This has been accomplished through unit design and an innovative assembly line process that allows for flexibility in producing units with similar construction while having a multitude of options. This makes AAON very

competitive in both the standard and custom HVAC industries. Our equipment is also recognized as industry leader in quality. Because every unit we produce is created uniquely for a specific application, every component is selected to meet the customer's needs. We have a patented cabinet construction that utilizes foam-injected panels, resulting in a very rigid cabinet with a thermal resistance nearly double the industry average. Many of our standard features are considered premium options to many of our competitors, such as stainless steel drain pans. AAON has been recognized numerous times for its contributions to the industry. Forbes magazine listed AAON on its annual "Best



Small Companies" for seven out of the last ten years. In 2009, the National Society of Professional Engineers awarded AAON with the best new product of the year for the RQ packaged rooftop series. This prestigious designation is given to the product recognized for not only its pioneering design, but also for its positive societal impact. AAON has also received other various awards for design innovation.

As an applications engineer, I work with the dozens of representative firms around the nation that sell our equipment. Although our standard packaged rooftop unit has a 42-option feature string, there are many applications that require a special design or unique components. I utilize my expertise in psychometrics, fluid mechanics, and thermal systems to develop cost effective and energy efficient solutions to various abnormal applications. My focus is in packaged rooftop units, air-handlers, and natatorium units, but I also design custom coils and split systems. As a secondary position, I handle many of the responsibilities of one of our largest national accounts, which includes unit design, order entry, shipment coordination, and general technical support.

VINCENT TIZZONE, GRADUATED 2012: ENGINEERING MAJOR WITH MECHANICAL CONCENTRATION

I have just recently started working for Halliburton which is one of the biggest oil service companies in the world. I am working in the Production Enhancement product service line. In this service line I am training to become a professional hydraulic fracturing engineer. For those that don't know, fracturing is the process of



pumping water and proppant, which is usually sand, at extremely high pressures down a wellbore into perforations to create fractures in the rock. These fractures release the hydrocarbons that are trapped in the rock and make the well profitable. I am currently going through Halliburton's world class training which is over a period of around twelve months. The training consists of many computer based training programs and tests, multiple instructor taught classes and exams, and most importantly following and learning from my mentor, which is a professional, out at the well sites. The process to becoming an expert fracturing engineer is long and difficult but I am very excited for the opportunities and challenges that the future will bring. I feel that Oral Roberts University's Engineering program has prepared me well for the challenges ahead and for that I am very grateful. ■

2012 MISSIONS TRIPS

DANIEL DICKIE, MAJOR: ENGINEERING (MECHANICAL CONCENTRATION)

God definitely had a special plan for Team Burkina Faso this summer! As we left ORU's campus we had no idea how God was going to use us to minister to His people but He certainly opened doors for our trip and provided us with two very unique ministry opportunities.

The first was the opportunity to minister to the Tuareg people group. The Tuareg are what the local missionaries call an unreached and "unreachable" people group. They remain unreached because of their nomadic lifestyle in the Sahara desert and "unreachable" because of their strong Islamic ties



TUAREG CHILDREN WITH BREAD AFTER OUR TEAM PASSED IT OUT.

and violent nature to those bearing the gospel message of Jesus Christ. Three months prior to our team arriving in Burkina, most of the Tuareg were kicked out of Mali and sent to Burkina as refugees. With

God's favor we were able to visit their refugee camp and work with our contacts to not only meet the physical needs of those in the camp by giving out bread and shoes but by also praying over the camp, singing worship songs, and by shining the light of Christ. Our contacts were even able to speak to the chief of the camp about showing the Jesus Film after our departure.

The second opportunity was to work with Operation Christmas Child (OCC) by presenting the gospel message and passing out



AN OCC OUTREACH. I AM TEACHING A BOY HOW TO USE A YO-YO!

gifts to children from 2-14 years old. It was very rewarding to be able to give out the gifts and to play with the children. They smiled from ear to ear but we were able to give them an eternal gift. For most of the

children who attended these events, this was the first time that they had heard the gospel message of Jesus Christ. God had prepared the way

and many kids came to know Jesus as their Lord and Savior through these outreaches.

Thank you for your continued prayer and support of ORU missions! God used this summer to expand His kingdom and show His love to those in faraway places - even in Burkina Faso!

DANIEL HOLMAN, MAJOR: ENGINEERING (MECHANICAL CONCENTRATION)

A group of students from ORU had the amazing opportunity to take a trip to Tamale, Ghana this summer through the Missions Department. The focus of the trip was using the knowledge of what we have learned in school out on the field in order to both physically and spiritually support the people of Ghana. This was the first ever engineering specific trip through the missions department with a total of 5 engineering students and one other science major. During our stay in Tamale we were able to live in a lodge run by Christians. The lodge was a conference and



convention center used for hosting large groups of people. While we were there they hosted a forum for the presidential candidates of the PPE party running in this year's upcoming

election. The goal of the lodge is to create revenue in order to fund ministry outreach around the area of Tamale.

They are in the process of creating a new building which will be used as a vocational school for women. Our missions team was able to provide and fully fund solar powered lighting throughout most of the building. Using 32 DC powered bulbs we were able to light a little over 11,500 square feet. This was a huge blessing to them and to see how God used us to finish this project which was 4 times larger than we initially expected to. Our team also had the honor of teaching in a local school to children ages 3-12, and visiting orphanages to provide encouragement to the workers along with helping feed and wash the young kids. Our team also had the opportunity to travel into rural villages to show the Jesus Film in their local language of Dagbani and share the gospel. On Thursdays our team went to the largest hospital in Northern Ghana to encourage and pray for the patients. Over all this trip was absolutely amazing and it was incredible to me to be a tool that God used to harvest His Kingdom. ■

