ORU
Engineering Department
NEWSLETTER

ORU ENGINEERING, COMPUTER SCIENCE, PHYSICS, AND MATHEMATICS GRADUATES OF 2011

Ten engineering students graduated this year, one student with summa cum laude and two with magna cum laude. Three computer science students graduated together with two mathematics education majors and three mathematics major students. Aaron Beavers was selected as Outstanding Engineering Student, Outstanding Department Student, and for Outstanding Engineering Research/Design Project together with David Adams and Cyrus Hanson. Mattie Sue Judd was selected as Outstanding Mathematics Student and JoAnna Brannberg was selected as Outstanding Mathematics Education Student. ■

2011 ORU Engineering, Computer Science, Physics, & Mathematics Graduates and Faculty

MODELING THE KINEMATICS OF THE UPPER ARM INVOLVED IN A BASEBALL PITCH

Regina Gallo, Benjin Joshua, Melissa Slinkard

Currently, there are a limited numbers of ways to track the movement of the arm during a baseball pitch. All of these ways require the test subject to be in an isolated environment versus on the field where they normally perform. There are new wireless motion sensors that track velocity and acceleration in relation to time. Using the data gathered from these readings, it is possible to derive the position of the arm during motion, and model such data with the modeling software, LifeMOD. The foundation to the beginning stages of this modeling has been established with a rough model of the upper arm motion during a baseball pitch. This topic requires a lot of research and time to develop, but continuing this research could lead to a whole new level of modeling and tracking motion. ■

2010–2011 SENIOR PROJECTS AT ORU ENGINEERING

ORU Formula SAE Racecar

David Adams, Aaron Beavers, and Cyrus Hanson:

The Oral Roberts University Formula SAE team sought to design and construct an intake system that would meet SAE restrictions while minimizing pressure losses, thereby maximizing power output.

The team decided on a Venturi-style restrictor section, a conical plenum, and bent runners.

The team primarily used Solidworks™ Flow Simulation to test various designs. It was found that the conical plenum delivered the most evenly distributed airflow between cylinders. The plenum was made from flat sheet-metal sections for ease of manufacturing.

Rapid prototyping was used to build the Venturi restrictor because of its complex geometry and the need for very low manufacturing tolerances. A plenum insert that helps direct airflow to the runners was also manufactured using this method.

The intake manifold was mounted on the race car's engine, a Suzuki GXS-R 600, and tested with a dynamometer. Power curves for the engine with the final design of the restrictor and for a generic plate restrictor were generated using the dynamometer. They were then compared to the published power curve for the stock engine. The team discovered that the final design of the restrictor increased the horsepower by 40% with respect to the engine mounted with a plate restrictor. The team was also able to recover 75% of the stock engine's horsepower with this restrictor. ■

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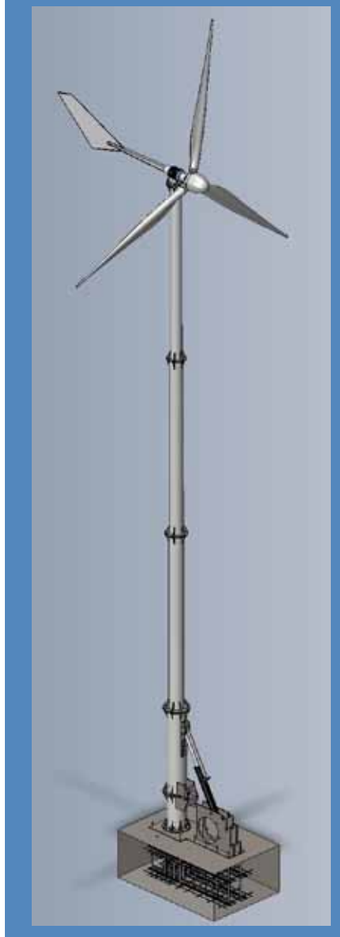
NEWSLETTER

THE DESIGN AND IMPLEMENTATION OF A SELF-ERECTING WIND TURBINE

Joseph Chebaibai, Adam Kauffman, Aaron Wilbur



Wind energy is an excellent and proven solution for generating electricity; however the initial cost (i.e. assembly, maintenance, disassembly, etc.) for such systems tend to be very high, as a crane rental is normally necessary for these functions. These costs minimize the return on investment for the system, which tends to drive away investors and customers. Therefore, the students' aim is to design and implement a self-erecting tower structure for a wind turbine system, in order to curb the aforementioned costs. The turbine system chosen for this project is proven and tested to be efficient by the manufacturer. It will be tied into the grid of a small farm in Fulton, Illinois, but before this can done the foundation designed by the team will have to be laid and cured before this can be done. Once completed, the tested structure will be installed and the generator along with all of its components will be attached to the structure in order for testing to be performed. ■

ACCIDENT PREVENTION SYSTEM

Dennis Nickelson, David Vandenhouten

This project was a continuation of the NACDS project developed by Timothy Bright and Idowu Pelumi. This system is a collision deterrence system that uses a GPS unit, a Ultra-Proximity Sensor, a Fusion Brain Microcontroller, and a Wireless Ad Hoc network. The system, although functional, was in need of a lot of improvements in order to be ready to be implemented in real life situations. The goal of this project was to make those improvements. The main improvements we felt needed to be made were to allow for real time communication between the server and client, to improve the user interface of the system, and create an alert system to warn the driver of a car stopped on the side of the road up ahead. In this paper, we discuss how we went about accomplishing these goals as well as the results of the testing of the improvements made to the system. ■

2011 SUMMER INTERNSHIPS AND SUMMER JOBS

Name: Chad Carroll, Classification: Senior, Major: Engineering (Mechanical Concentration)

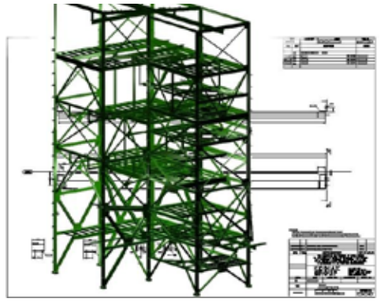
I am currently almost finished with my Mechanical Engineering Major and Business Minor. This summer I interned for John Zink, a company who builds custom burners, flares, and thermal oxidisers for clients all over the world. In my internship, I had the privilege of working at the John Zink Test Center. At the test center, desired burners will be designed and tested to assure it meets the operating conditions of the contract. I never dreamed of being a combustion engineer, but it is really cool. I never thought I would find myself getting payed to basically play with fire. If math or mechanical things interest you, or you like taking apart mechanisms or watching "How Its Made" on the Discovery Channel, engineering is probably for you. It's a lot of work in school compared to some other majors, but it is definitely the most rewarding once you get out! ■

NAME: ANDREW WALTER, CLASSIFICATION: JUNIOR, MAJOR: ENGINEERING (MECHANICAL CONCENTRATION)

This summer I had the opportunity to be a part of the Langley Aerospace Research Summer Scholars (LARSS) program at the NASA Langley Aerospace Research Center (LaRC) in Hampton, Virginia. This 10 week program is set up to allow students to have one on one interaction with an assigned mentor while working of their summer project. This past summer I worked in the structural and thermal systems branch which is a part of the engineering directorate on center. My primary project involved modeling the distribution of excess mass to match certain mass properties in a boiler plate crew module test article which would be used to test a new launch abort system that NASA is working on. This involved using several computer programs including PATRAN and NASTRAN to both edit an existing finite element model and check stresses and buckling under specified load cases. While on base at NASA LaRC I was also able to see many of their facilities and talk to a lot of other NASA engineers. Overall my internship was a great experience that helped me to gain some insight into what work life after college will be like. . ■

NAME: CHARLES SHULL, CLASSIFICATION: JUNIOR, MAJOR: ENGINEERING (MECHANICAL CONCENTRATION)

http://www.kodiakgrp.com/



I interned with the Kodiak Group, an engineering company based out of Michigan. I worked as a structural steel detailer so the fabrication shop could build the beam and then the field workers could install it. I spent the entire summer working on a GM plant project. By my academic backgroung from ORU I was able to get this intersnship and because of this intership I have a vital understanding of what structural engineering really is. ■

NAME: AARON WILBUR, CLASSIFICATION: SENIOR, MAJOR: ENGINEERING (MECHANICAL CONCENTRATION)

I worked with the refinery section of the corn processing plant in Clinton, Iowa. My duties while I was there were to develop Annual and Semi-Annual Reports for the Refinery Section of the plant for Quality Control. Other responsibilities were: developing a more efficient way to process and file data reports for the company. Also worked on another report for recording man ways for all tanks and vessels for their safety report. The applications and lessons I learned from Archer Daniels Midland Company was the importance of safety policies and procedures with respect to myself, others around me, and even the customer. Safety policies in affect that didn't allow any type of electrical device allowed into the plant due to hazardous/flammable gases present and the possibility of glass components of the devices breaking and getting into the product possibly. All electrical devices in the plant are specially manufactured for companies like ADM even down to a single light bulb. ■

NAME: BETHANY DICKIE, CLASSIFICATION: JUNIOR, MAJOR: ENGINEERING (MECHANICAL CONCENTRATION)

http://www.sulzerchemtech.com/en/desktopdefault.aspx

For the summer of 2011 I served as an intern for Sulzer Chemtech Inc.'s Mixing and Reaction Technology (MRT) division. Sulzer is an international process engineering firm that deals specifically with mass transfer applications. I heard about the opportunity through ORU's student job resource called the Golden Hire Network. The Sulzer office in Tulsa is the corporate headquarters for North and South America. The Tulsa MRT division was looking to hire a summer intern to relieve the work load created when a full time project manager left the company. As the first intern of this nature my job consisted of learning the interworking of inside sales in addition to project management. I was responsible for standardizing product assemblies in SolidWorks™ according to industry standards as well as streamlining SolidWorks™ drawing files used by sales for quotes and engineering for manufacturing. Another part of my internship allowed me to follow the manufacturing process of one of MRT's static mixers. I was given the opportunity to produce a video outlining the three fabrication techniques used to transform sheets of metal into highly engineered Sulzer Static Mixing Elements. My internship gave me a unique perspective into the process a product takes from conception to fabrication then sales to distribution. Learning from and interacting with industry professionals and established engineers was an invaluable experience. ■

ORU Engineering Department NEWSLETTER

INTERNSHIP SYNOPSIS: DANIEL HOLMAN

This past summer I had the opportunity to work as an intern for Helmerich and Payne. H&P is an international drilling company and is the primary land based drilling company in the United States. During my internship I worked as a roughneck on one of the land based rigs near Wamsutter, Wyoming. I was assigned to a crew and worked right along side the other roughnecks on the rig. Much of the work was physically demanding as we worked a typical 12.5-hour a day schedule, with 14 days on and 14 days off. The work included maintaining the rig by means of; cleaning and replace fittings on pumps, greasing moving parts, replacing drill line, and carefully examining each machine daily to make sure it was in proper working condition. I also was involved with mixing chemicals for the drilling fluid, making connections of drill pipe, running casing, replacing the drill bit, recording mud gains and losses, running through well control drills, and making calculations to find what types of hydrostatic pressures needed to be overcome. It was extremely fascinating to learn all of the different processes that occur on a drilling rig. It can be very complex to do something as simple as drilling a hole in the ground in order to recover hydrocarbons. This was a great opportunity for me to gain understanding of real world engineering and to encourage me through my education. ■

ENGINEERING SUMMER CAMP AT ORU

ORU Engineering hosted an Engineering Summer Academy day on July 1, 2011 as part of the Tulsa Engineering Alliance summer camp. Forty students from different schools in the Tulsa area visited ORU during the morning and John Zink, Inc. during the afternoon. ■

ORU Engineering student Aaron Olsson is showing the Formula SAE Racecar for visiting students.