

THE SYNERGIZER

ENGINEERING AND COMPUTER
SCIENCE NEWSLETTER
OUR GRADUATES

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MISSION

STATEMENT

The Engineering and Computer Science Department aspires to be a place of choice for engineering and computer science education where dedicated students and faculty grow together to reach their God-given potential for service to society and the church.

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Congratulations Seniors!



Another year has come and gone, and our department has fourteen great new Alumni. This year we are issuing a special summer newsletter to highlight these students and some of the department activities that have happened, such as the Singapore Study Tour and the NSBE Convention in Nashville, Tennessee.

Here in the Engineering and Computer Science Department, our students are vital to the school. Every year our seniors design projects that

showcase the knowledge they have acquired in their time here at Andrews..

Congratulations seniors! A chapter in your lives is over and new opportunities are just around the corner as many of you pursue jobs and graduate programs. It has been an honor and privilege to have each and every one of you in our programs and you will be greatly missed. God bless you in all your endeavors.

ECS Chair, Faculty and Staff

ECS Making an Impact on Society

By Rachel Boothby, taken from the *Adventist Review*



Last summer Boon-Chai Ng, professor of engineering, took students to Singapore for a study tour where they volunteered their time and abilities to refurbish a walkway for a local church.

This is not the first such project on which professors and students have collaborated. For their senior project in 2012, engineering students Adam Shull and Spencer Groff worked with Hyun Kwon, assistant professor of engineering, on a portable water treatment system for missionaries. They chose this project because many service-oriented organizations, such as Maranatha, ADRA, the American Red Cross, and the World Health Organization, send employees and volunteers into countries that do not have adequate water supplies. Their water purifier system would provide enough clean water for 30 people for 30 days.

“Both we and our students are passionate about choosing projects and conducting research that make an impact on society,” says Kwon. “Engineering is about how to make life better for others. That is what I do, and that is what I teach.”

In Kwon’s lab the research team is working on biosensor development. This type of technology is helpful in diagnosing diseases on the spot, which could improve the speed of treatment. Team members are working on developing a system that is inexpensive and portable, so it can be made available for underdeveloped countries.

Because of its strong interest and involvement in service to underprivileged communities, the Department of Engineering and Computer Science has begun implementing a chapter of Engineers Without Borders (EWB). EWB is a nonprofit organization that works with community-driven development programs worldwide to create and complete sustainable engineering projects.

“Joining Engineers Without Borders will help us to continue fulfilling our mission of service and meeting people’s needs,” says Ng. “It will give us the framework to use our engineering skills in design, collaboration, and service to further Christ’s mission.”

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Andrews University's EWB project will bring basic resources such as water or electricity to an underdeveloped country.

"We have the example of the apostles emulating Christ, such as Paul with his tent-making profession," points out George Agoki, chair of the Department of Engineering and Computer Science. "Tent-making was an economic support, but the mission was not separate from the profession." Through student projects,

research, and programs such as EWB, there are ways to make this tangible by meeting people's needs for water, sanitation, electricity/energy, and technology.

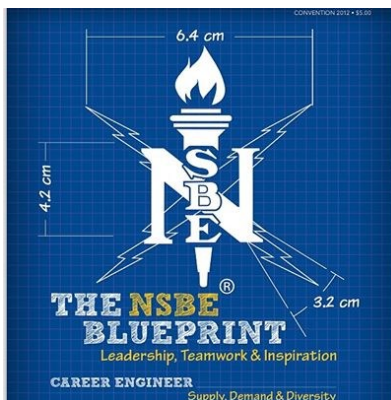
"When the apostle Peter talks about the chosen people, the royal priesthood, the holy nation, the people who belong to God, he is referring to all members of the body of Christ, those who have joined God's

church and follow Him as His disciples," says Kuhn. "Interestingly, the body is made up of different members, each one with skills and abilities that add to the proper functioning and life of the whole."



2014 NSBE Convention

By Andre Campbell



The National Society of Black Engineers (NSBE) is one of the largest student led organizations which has the mission to increase the number of culturally responsible Black Engineers

who excel academically, succeed professionally, and positively impact the community. Andrews University has a chapter which strives to push its members to achieve this mission.

One of the key events which we do as a chapter is attend the national convention. This year, the national convention was held in Nashville, TN. At this convention, it was a great opportunity for student members to network with various career professionals, get interviews for internships,

or jobs, and to learn more and become more aware of the latest achievements in engineering.

This convention was a success as most of the students who attended did end up landing various interviews with various companies around the country. Moreover, contacts of various industry professionals were attained thus allowing for greater opportunities in the future.

Profile of Thomas Zirkle

By author collaboration, edited by Shawn Schwarz

Over the past four years there have been several individuals around campus that one might observe going around on unicycles and in shorts despite the winter weather. One such campus character known for his tall stature, athletic abilities, and vibrant orange afro was Thomas Zirkle.

Zirkle, who hails from Arizona, started his journey at Andrews University in 2010. He has always had a love for math and medicine, however, he chose electrical and computer engineering because of its unique blend of creativity, application, science, math, and computer innovation, plus he came to the conclusion that he didn't have the stomach for blood and gore which would have been mandatory in the medical world.

As soon as he started his freshman year, Zirkle jumped at the chance to explore his field of study by getting involved in research with Dr. Hyun Kwon. "I am really enjoying actually doing something with my education and I hope to be involved with research for the remainder of my time here at Andrews." And he did



just that, continuing to be an exceptional student for the next three years.

In 2012 Zirkle was the recipient of a Mathematics award for excellence in his Differential Equations class and a research scholarship for participating in a joint Honors and Undergraduate Research Scholarship program in which he designed a device to detect DNA hybridization using a QCM-D in conjunction with a MOSFET.

He has worked in the department as a research assistant on various applied projects. His junior year Zirkle and a team worked on creating and designing a label-free molecular sensor. In addition, he also took on the task of working as a summer

undergrad researcher at the National Institute of Standards and Technology. His job was to "characterize a rotating magnetometer. This entailed the design and implementation of data acquisition programs/scripts and characterization experiments."

For his senior project Zirkle worked in collaboration with fellow graduate Jason Ruiz to create an automated grain moisture control system that would maximize efficiency and profits for farmers storing their product while at the same time bringing down their labor and grain quality costs. (see page 5)

Zirkle graduated summa cum laude and has been accepted into a masters program on full scholarship at

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“Not only is work involvement good for your resume, but will dramatically help you in your studies, thought process, and confidence.”

the University of Notre Dame where he intends to get his Ph.D., focusing on Electrical Engineering, with a specialization in nanotechnology. He would like to work on the design and fabrication of the next generation of transistor technology, whether at the nano- or quantum level.

He encourages upcoming engineering and computer science majors to pursue an internship or other form of work involvement. From personal experience Zirkle advises that, “not only is work involvement good for your resume, but will dramatically help in your studies, thought process, and confidence.”

Automated Grain Moisture Control System Project

By Thomas Zirkle

This past year I worked with Jason Ruiz on an Automated Grain Moisture Control System. In agriculture, farmers often need to store their grain at a specific moisture content level in order to ensure the grain does not spoil or lose quality.

While current systems already exist, they are often extremely expensive (\$6000 and up). Our client asked use to create a system for an order of magnitude less but of comparable quality. To approach this problem, Jason and I divided the solution into two parts, the control system in LabVIEW and the moisture sensor hardware.

After several months of design and fabrication, our final prototype used two metal parallel rods to capacitively sense the moisture content of the grain. This measurement was then sent to LabVIEW via USB. The LabVIEW

program then controlled the dehumidifying system accordingly. By the end of the semester our sensor was capable of $\pm 1\%$ moisture content, which was the exact specification given by the client.



Wind Tunnel Senior Project

By Andre Campbell

During the fall semester of 2013, Dr. Hyun Kwon informed us of a problem, which led to the wind tunnel project. The Department of Engineering and Computer Science did not have a visual way of demonstrating the laws of fluid dynamics. However, by having a functioning wind tunnel that problem would be solved.

The project included both a mechanical and electrical design. David Penny and I were responsible for the mechanical design which included the overall frame, fan selection, and force measurement system. These systems involved the use of two sensors, strain gauges for force readings and a differential pressure sensor for velocity readings. Charles was responsible for the electrical design which included a data acquisition system. A system that involved a circuit design capable of interfacing with the two sensors, a printed circuit board layout, and then

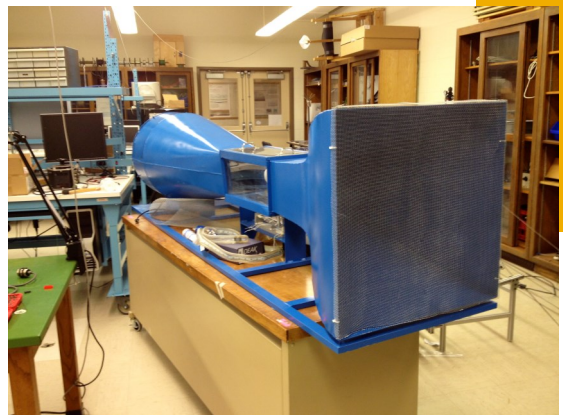


an assembly of the printed circuit board. The constraints of size, cost, and desired outcomes were taken into consideration for the design. Together we completed a tabletop wind tunnel capable of visually demonstrating the laws of fluid dynamics.

Charles, who graduated this May, plans on working full time and is currently looking for a job. David, who also graduated in May, plans on finding work specifically in the area of mechanical design related to computed aided 3D design. I myself plan on working full time and am also currently in the job search

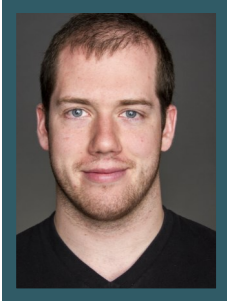
process. I plan to finish a few classes over the summer and then graduate in August.

One of the things we will miss about Andrews is the people and the atmosphere. The community at Andrews is definitely something which is hard to find elsewhere. The close knit class environment allows teachers to be able to interact individually with students, which is something that is not found in many other universities and will be missed as we move on to different steps in our lives.



Computing Capstone

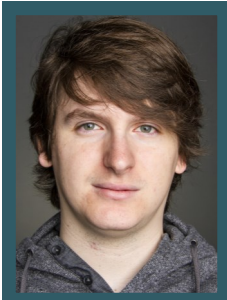
By Racheal Boothby



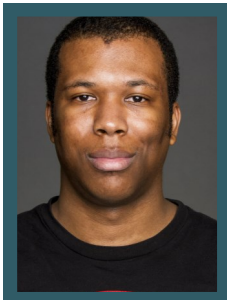
Adam Buchholz



Michael Hernandez



Lucas Kontes



Shemaiah
Telemaque

“...developing a system to improve efficiency and service satisfaction at the Gazebo...”

This semester, four seniors studying Computing collaborated together for their senior Capstone Project.

Adam Buchholz, Michael Hernandez, Luke Kontes, and Shemaiah Telemaque wanted to develop a system to improve efficiency and service satisfaction at the Gazebo (a quick-service restaurant on campus that is part of Dining Services).

In their capstone project, they worked to create a web ordering system for the Gazebo so customers would have the option to place their orders online, in addition to the current option of ordering in person. This new online ordering systems will be designed to save waiting time as students would choose the time to pick up their food order at leisure.

The computing students gained valuable experience in this project by working with different departments across campus, such as, Integrated Marketing & Communication, ITS, and Dining Services. They were able to work directly with the manager of Dining Services to customize the ordering system to tackle the problems they were facing in their daily operation.

Their website had to meet the standards of ITS and IMC, and to make sure their system would integrate seamlessly with the current system.

Shemiah shared some of the new skills that he and his classmates developed when they worked on this project. One area he mentioned was, “learning new programming languages and technologies” as well as communicating with Dining Services (the client for the project).

Michael pointed out that learning new programming languages through this Capstone Project “will definitely be useful in my future career.”

Lucas spoke about how this Capstone Project helped each of the students improve their problem solving skills. He said, “as with any project, problems will arise and this forces us to re-evaluate the process we were following, adjust the scope of the project so that the problem does not interfere, or find a permanent solution to the problem.”

The group chose this Capstone Project at the Gazebo because they wanted to have an impact on the University as a whole. Since these students and their friends have many interactions with the Gazebo, this project is one way to make that impact in a tangible way.

Automated Rod Cutter Senior Project

By Robert Jewett, Nina Lassionier, Brian Booth, and edited by Shawn Schwarz

One of the products that Physics Enterprises manufactures and sells is the Wave Motion Demonstrator (WMD). It is composed of rods attached by a wire with a square cross-section. In order to manufacture the WMD, steel rods must be cut to predefined lengths. Currently, the wave rods are being cut manually using a shear rod cutter. This is a very repetitive task that is not only

physically taxing but time consuming as well. The goal of Robert Jewett, Nina Lassionier, and Brian Booth for their Senior Design Project was to design an automated rod cutter that would convey, measure, and cut the rods to appropriate lengths.

Overall this project was a success for several reasons: the team was able to successfully handle, measure, and cut the rods. The



system could be further improved in the future with more robust programming, a rod straightener, and/or a sorting system. The department was very enthusiastic about the outcome of the project and has high hope for its designers as they pursue a career in engineering fields.

The Synergizer



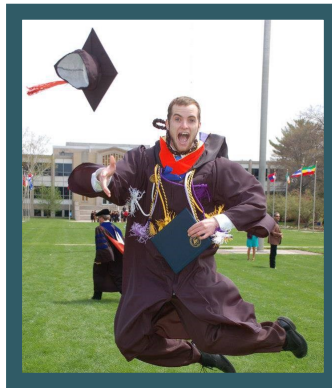
The name and Logo for the Engineering & Computer Science newsletter was designed by junior and senior ECS students.

EDITOR

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Profile of Andrew Roderick

By Andrew Roderick



I am headed to Zeeland, MI to work for Extol, Inc where I will be a Mechanical Design Engineer working with the InfraStake module. I will miss the great friendships with my

classmates and teachers as well as having a month off for Christmas.

I believe my greatest accomplishments were winning the Stratasys 3D Redesign contest with Brian Booth and my Senior Design project for Dane Systems with Larry Mendizabal. Together we created an efficient and aesthetic solution to a design of a structural electrical enclosure that would provide automation indus-

tries optimal space utilization.

My advice to any of the freshmen starting in this program would be to make sure you take time to have fun in the department and get to know your teachers. They are great people! I can't stress enough how important networking with other engineers is. Taking the initiative and applying for internships is the best way to be successful in school and in job hunting.