



ENGINEERING NEWS

New biomedical concentration in the Engineering Department

by Emily Howell '10 and Suzanne Smart '11

Biomedical Engineering began at Messiah College with a flourish in the spring of 2009 and has continued to grow throughout the 2009–2010 school year. Two adventurous students and a professor with a love for the impromptu have teamed up to form the nascent project group. Their work includes developing exciting projects, engineering new curriculum, and initiating relationships with the BME community through conferences and professional networking.

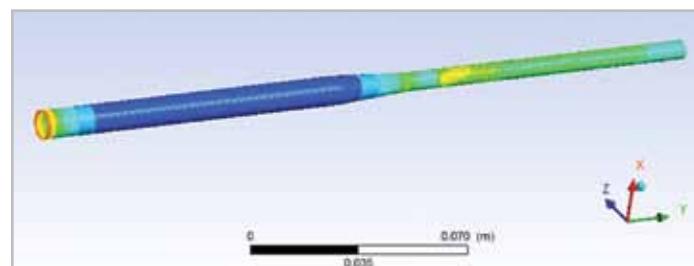
Suzanne Smart, Emily Howell, and Dr. Barbara Ressler have the pleasure of spearheading Messiah College's first foray into the realms of biomedical engineering. Suzanne is a junior and will be the first to graduate in this concentration, while Emily is a senior mechanical engineering student. Suzanne plans to pursue a medical degree and become a surgeon, but she is also considering getting a Master's degree in biomedical engineering. Emily has recently accepted an offer to attend Cornell University in the fall of 2010, as a member of their Biomedical Engineering Ph.D. program.

Although the current semester marks the official beginning of the Biomedical Project group, we began our work in the summer of 2009. In August, Dr. Ressler forged a relationship with Penn State Uni-



Suzanne Smart '11, left, and Emily Howell '10, right, learn to use equipment for minimally invasive surgery at Penn State Hershey Medical Center.

versity's biomedical engineering program, persuading Dr. Keefe Manning and Dr. Bill Weiss to partner with our BME students in a project involving the Penn State Pediatric Ventricular Assist Device, or PVAD. Our specific focus is the cannula or small tube that connects the PVAD to the aorta. Emily is studying the flow of blood through the cannula (see figure below) using computational fluid dynamics, and Suzanne is



Computational fluid dynamics allows researchers to quantify the shear stresses on the blood as it moves through the cannula. The red and yellow regions are the locations of highest stress, where the blood is most likely to be damaged.

researching and testing a range of cannula materials to evaluate how each affects the blood of the patient.

In addition to our work in the lab, we were able to attend the Biomedical Engineering Society's annual conference in Pittsburgh with Dr. Ressler. We spent the day meeting colleagues from Dr. Ressler's research in bioengineering, talking to various graduate schools, and listening to academic presentations. Some of the talks we attended were presented by Dr. Manning and his team concerning their analysis of the PVAD and associated devices. This was a valuable experience for us because the presentations enhanced our understanding of the technologies that we are studying within the BME project. In addition, hearing the updates of Dr. Manning's graduate

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students allowed us to embrace the overall purpose of the project.

Thanks to connections formed outside of the classroom, we also had the opportunity to visit Hershey Medical Center's Minimally Invasive Surgery Unit last semester. A resident at Hershey Med hosted us and showed us around her lab. We were able to try out some of the equipment that they have set up for medical students and residents to practice on, using tools commonly found in laparoscopic surgeries. One of them was a computer simulation that a doctor at the Hershey Medical Center helped to develop. We both found that

manipulating tools in a three-dimensional environment while viewing the movement of the tools on a two-dimensional screen is much harder than it seems. Our host then took us on a short tour of lecture rooms, libraries, and mock operating rooms, where full surgeries can be practiced on computer-automated mannequins. Our visit to the Surgery Unit was especially exciting to Suzanne, who aspires to focus her medical studies on surgery after finishing at Messiah College.

After such an exciting start, we are continually experiencing new growth, interest, and involvement in this project. We

look forward to the Student Scholars' Expo Day on April 30, when the community will have the opportunity to hear BME students present the results of this year's work with Penn State and the PVAD analysis. Additionally, the support of the Engineering Department, Penn State University, and Hershey Medical Center has been invaluable in making these opportunities available to students at Messiah College who have a passion for biomedical engineering. Questions or comments can be directed to Dr. Barbara Ressler at BRessler@messiah.edu.

Summer internship in Germany by Steve Heindel '10

I spent last summer working as a research intern at the Chair for Display Technology at the University of Stuttgart, Germany. The institution is essentially a graduate laboratory for research into all sorts of display technologies—Organic LED (OLED), Liquid Crystal Display (LCD) and e-ink media, to name a few. I worked under a Ph.D. candidate who is developing new processes for Thin Film Transistor (TFT) OLED display production. This is the same kind of technology which likely powers your laptop monitor or your flat panel TV. My task was to program a piece

of hardware using VHDL to show various patterns, images, and animations on a prototype display to test the quality of the display's pixels and integrated electronics. After successfully completing this task, I spent about four weeks in the on-site clean room producing a batch of prototype displays.

The program was coordinated and funded by the German Academic Exchange Service, and targets English-speaking students in the field of science and engineering. Because many students there are fluent in English, I was not expected to

understand any German, although the few semesters of it I took beforehand certainly helped me get around and talk with my native roommates.

The internship provided me a lot of exciting opportunities: I worked with students doing cutting-edge research in a field we all interact with almost every day, and I used multi-million dollar equipment found at only a few locations in the world. The results I helped produce will appear in scientific journals and patent applications.

MESSIAH COLLEGE ENGINEERING ALUMNI UPDATES

Curt Eyster '95

I'm currently living in West Chester, Ohio, with my wife, Karla, and our three children (Alyssa—11, Jeremiah—3 and Caleb—1). Since graduating from Messiah with an engineering degree in 1995, God has blessed me in many ways, not the least of which is my family. I've also been blessed to have spent my entire career thus far with Johnson and Johnson in the development of medical devices which benefit millions of patients. During this time, my supportive wife has been a key to allowing me to go back to school twice for degrees in Bioengineering and in Management. Working in research and development, I've had the opportunity to develop glucose sensors for diabetics, software algorithms for blood measurements, and capital equipment for safe delivery of drugs for patient sedation. Along the way, I've been able to play the roles of electrical engineer and systems engineer and to experience all aspects of product development from concept to manufactur-

ing. I am now serving as the manager of an R&D team in Cincinnati working on a sedation delivery system recently accepted for approval in Canada and in Europe. Since much of my time in product development has enabled me to work overseas, I also have had the opportunity to work with Hope International to bring microfinance to the extremely poor rural areas of India. I am currently working on an idea to connect student and alumni engineers with potential design opportunities that might be used for clients of Hope International in India. I have been blessed to spend my career developing devices to help people, and I am excited about the possibility of extending that beyond the medical field and into the entrepreneurial realm of helping the poor of India start businesses of their own. I would love to hear from any students or fellow alumni who might share similar interests or who would like to share what God is doing in their lives now.

Leroy Sverduk '04

As a civilian electrical engineer at the Naval Surface Warfare Center Carderock Division, I work on the reduction of U.S. electromagnetic ship signatures as well as the detection of threat vessels through the use of magnetic and electric field sensors.

One of the projects I recently led involved the measurement and

mathematical modeling of Corrosion Related Magnetics, which are the magnetic fields produced

as a ship rusts. A portion of this project involved watching a 1/40th scale model ship rust. Although from this example you may not believe it, the research is quite interesting and my work has given me the op-

portunity to travel around Europe working with international Navies. I recently started a one-year detail position at the Office of Naval Research as the program officer sponsoring electromagnetic sensor research and development. I'm excited to share the news that I passed the Maryland P.E. Exam in October. My wife, Kelly (Mills), and I currently live in Potomac, Maryland.

Andy Vogel '03

After living in three different states since graduation, I have finally settled down for what I hope is the long haul here in Gettysburg, Pennsylvania. Following graduation, I moved to North Carolina where I worked for Infineon Technologies, a semiconductor manufacturing company, as a burn-in test engineer for DRAM devices. After a year there, I decided that I would like to get back involved with wrestling, having missed it more than I expected after finishing my career as a college athlete. Thankfully, I was able to find a position with the Wheaton College wrestling team as an assistant

coach. While living in Illinois, I gained the experience I would one day need to become a head wrestling coach at the college level. That opportunity came in 2007, when the position at Gettysburg opened up. After several interviews, I was offered the job while I was working at the Messiah Wrestling camp that summer. In the fall of 2007, I moved back to Pennsylvania, and I have been coaching the Gettysburg team ever since. I did not take the most direct route to this career, but I am glad things worked out the way that they have.

Marten Beels '06

I graduated from Messiah in the spring of 2006 with an engineering degree (electrical concentration) and got a job nearby with Tyco Electronics doing RF Propagation modeling for the new statewide 800MHz public safety radio system. After doing that for about a year, I decided to look for something a bit more challenging and got a job with Mauell Corporation next door in Dillsburg. They design and build control panels for various transit authorities (mostly New York and New Jersey) as well as nuclear power control station simulators. The simulators must match the real thing exactly, so I spent a lot of time going over detailed drawings, checking for accuracy (even spelling mistakes in the real thing must be duplicated in the simulators), doing some engineering design, and helping to procure, build, or modify the necessary equipment. They often included a wide range of old controllers, meters, switches, as well as very modern Nuclear Instrumentation Modules (NIM) devices.

During that time, my wife and I got married. We had a fantastic honeymoon in Turkey and went to Europe to visit some of

my family and friends.

While engineering work was fun, I decided that I really wanted to go back to school and switch back to physics. I started applying to grad schools, taking the tests, and looking at some of the physics programs. I ended up choosing to come to Lehigh University because it was a good location close to Becca's family, and they had a good program with a wide range of active research. I wasn't sure exactly what type of physics I wanted to study, but after taking some classes and spending a summer working for a professor, I decided to join his non-linear optics group. I'm currently studying the non-linear properties of various organic molecules in solution using high power picosecond long laser pulses. We work with an organic chemistry group in Germany that is really good at synthesizing molecules. **We're trying to better understand what determines their non-linear properties and look for highly non-linear molecules that can be vapor deposited into waveguides.**

Something like this could be developed into an "optical transistor." Imagine being able to control the bandwidth contained in fiber-optic cables without having to use the slow silicon-based electronic circuitry of today's routers. Physicists develop the groundwork for a basic understanding and demonstrate a physical effect, and the engineers can make it into a working device someday.

I'm enjoying grad-school life, and I have the ability to set my own schedule. Besides studying, I've been doing a lot of cycling and running. Becca and I are also planning on visiting my parents in Nepal at the end of this year. They are working with United Mission to Nepal in Tansen, near Kathmandu. My dad is working as a doctor, and my mother will be working with some nursing students.

I'm not exactly sure what I want to do after graduating. I've enjoyed my teaching experiences so far, so I would definitely consider finding a teaching position, but I think as long as I'm enjoying my research, I'd be happy working in industry also.



DEPARTMENT OF ENGINEERING

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ENGINEERING NEWS • SPRING 2010 OUR MISSION

The mission of Messiah College is to educate men and women toward maturity of intellect, character, and Christian faith in preparation for lives of service, leadership, and reconciliation in church and society. Graduates of the engineering program will therefore be technically competent and broadly educated, prepared for interdisciplinary work in the global workplace. The character and conduct of Messiah engineering graduates will be consistent with Christian faith commitments. We accomplish this mission through engineering instruction and experiences, an education in the liberal arts tradition, and mentoring relationships with students.

New storage building behind Frey Hall houses larger projects

by Harold Underwood



Construction of steel pole storage building behind Frey Hall.

Construction of a new steel pole building behind Frey Hall is nearly completed. This new storage facility will house larger projects such as the Light Sport Aircraft (LSA) and accommodate larger testing stations such as one for the Village Water Ozonation System (VWOS). Funding for this structure came through the Collaboratory from external sources, to compensate the College for space being used by the Biodiesel project. Since construction began in September 2009, the structure and electrical work has been completed. However, a biodiesel heating system is yet to be installed, and site work remains 80 percent complete until surrounding ground can be leveled later this spring. This new storage building frees up laboratory classroom space for the Department of Engineering while providing convenient access to project work from the laboratories.

Editor's note



I would like to express my appreciation to each of the engineering alumni and current students who contributed an article for this issue. It is great to get an update on the current work you all are doing, as well as your personal news, making the newsletter a more interesting read for all of us! If you would like to contribute an alumni update or a project/internship report, please feel free to send it to me at HUnderw@messiah.edu to be considered for the next issue. Thanks!

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