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FROM THE EDITOR

Hi IOE,

Hope this semester is treating you well so far. Only two more weeks until Spring Break! This issue is packed with ideas for your summer. I have included articles on study abroad

programs and their benefits, as well as quite a few internship experiences. You can also learn about some of the other activities your fellow IOEs have been up to. Hope you enjoy!

-Alex

TOPICS IN TODAY'S HEALTHCARE SYSTEM

BY MAXWELL BOYKIN

Healthcare has been a huge topic in today's society. In 2014, global health care spending as a percentage of Gross Domestic Product will rise to 10.5% with an expected increase of 5.3% annually over the next five years. When you turn on CNN you are bound to hear some politician go on a rant on why the United States should increase or decrease spending on this sector.

There are a lot of reasons as to why healthcare is such a big topic today. Firstly, the current growth rate of the older population is at a high of 1.9% compared to the total population growth of 1.2%. Since there is a large population over the age of 50, there have been an increase in chronic diseases in the worlds' population. As a matter of fact, chronic diseases are the leading cause of mortality in the world- representing 63% of all deaths. Another main issue in healthcare is the cost and quality. The United States spends on average, \$8500 per person. This is by far the highest spending rate when compared with any other country, with Norway spending the second most (\$5500).

The quality of American healthcare has also been a focus in recent years. Many patients have actually developed infections while physically being in U.S. hospitals. Even with all of these unfavorable statistics, there is one area of healthcare that is only headed up: technology. Recent advances in health technologies and data analytics are helping facilitate new treatment options. Electronic medical records (EMR's) have made transferring information much easier as well as the usage of electronic medical prescriptions. So now after learning a little bit of these trends, I encourage all of you to research more about healthcare! Here's a question for you all. If you had political power, what changes would you make to the American healthcare system?

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STUDY ABROAD IN TROYES, FRANCE

BY: ERIK KNAPP

This past summer, I was fortunate enough to spend time studying in Troyes, France at the Université de Technologie de Troyes (UTT). On this five-week program, I earned six credits; three 400-level CEE credits and three 200-level ANTHRCUL credits which count for the comparative perspectives course in the International Minor. In addition to taking classes, you are immersed in French culture and participate in multiple weekend excursions to Paris, the French Alps, and the Champagne region. Finally, at the end of the program, you are given a “free” week in which you are able to travel on your own throughout Europe.

The program began right away. On the first weekend, you are able to attend the annual UTT Gala, which is a gathering of all the students at the University to de-stress from classes and have a good time. Then clas-

ses begin. Classes begin at 9:00 am and generally go until 4:00 or 5:00 pm. This may seem long, and it is. But the professors understand and give breaks throughout the classes. You also get about two hours for lunch each day as well.

Each weekend, you participate in an excursion to someplace in France. One weekend will be spent in Paris seeing the Eiffel Tower, the Arc de Triomphe, exploring the Louvre, and visiting the Notre Dame Cathedral. Another weekend is spent white-water rafting, paragliding, and zip-lining in the French Alps, near Geneva, Switzerland. A third weekend is spent touring the Champagne region, where Troyes is located. Overall, these weekends will be a fun time spent with amazing people with whom you will develop life-long friendships. Studying abroad in France was one of the best experiences of my life and will help to shape the decisions I make about my future in the coming years.



Paragliding in the French Alps



The Palace of Versailles

ABROAD EXPERIENCES FOR ENGINEERS

BY: ELIZABETH OLIN

The University of Michigan offers an amazing setting to cultivate and promote students in their pursuit of knowledge and growth, but it is my opinion and experience that going abroad offers a unique perspective that cannot be achieved in any other way. Unfortunately as engineering students, there is a common idea that an international experience is just not a practical option, whether it is due to the worry that going abroad will result in not being able to graduate on time, that the Engineering School won't accept the transfer credits, or that international experience just does not relate to the engineering curriculum. I think this idea is not only wrong, but detrimental to the success of engineers.

Last winter semester I had the incredible opportunity to partake in a study abroad program, and as a current Junior pursuing an IOE major and an International minor with only 12 credits per semester left, I am an obvious example that an abroad experience is absolutely possible for engineers. Additionally, I have found that not only did my time abroad stimulate my growth while away, but upon my return, the knowledge and experiences I gained have been relevant and beneficial to my life and academic pursuits (and not just because of my international minor). As the global market grows, the engineering field is becoming more and more international, and understanding the differences and knowing the similarities between cultures and countries can only benefit an engineer.

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Of course, there are challenges when contemplating spending time internationally, especially with regard to classes and progressing towards a major. However, there are a few approaches to the going abroad process that can help make the experience more attainable. Michigan Engineering offers many programs through the University where the transfer process and credit approval is more direct and already established. However, there are still simple solutions to the credit dilemma for non-UM programs. With a different host university,

even if IOE specific classes are not necessarily an option during the experience (as was the case for me), the breadth courses and even non-engineering technical electives are IOE requirements that offer a much more flexible way to make study abroad classes advantageous. Additionally, I made the decision to take the Winter Semester of my Sophomore year abroad as opposed to the common convention of going as a Junior. By going earlier in my college career I had more options for class transfer credits and more time to finish the specific UM Engineering classes upon my return -- and really who can complain about missing a cold Michigan winter?

On the whole, I would highly recommend and encourage any engineering student to think about going abroad whether to study, work, or volunteer. By planning ahead and utilizing the flexibility in the IOE curriculum, students can work to make an abroad experience work for them to improve their academic learning and also broaden their knowledge of the world.

SUMMER INTERNSHIP AT IMPROVEMENT PATH SYSTEMS

BY: ALEX KOROLEFF

This past summer I worked as a Healthcare/Data Analytics Intern at Improvement Path Systems (IPS). IPS is a small healthcare analytics company that offers innovative consulting solutions to their clients, often hospitals, through the use of data analytics, modeling, and custom software. They are located in Bingham Farms, Michigan, which is about a 45 minute drive northeast of Ann Arbor.

IPS is involved in a variety of very interesting healthcare process improvement/optimization projects. Past projects have ranged from creating optimal nurse staffing models to a simulation of pharmacy output to operating room resource allocation. For those interested in a career in healthcare, there are a wide variety of projects you can get involved with that suit both your interests and skillset.

I personally worked on two different projects last summer. The first dealt with a custom software package we designed specifically for a client called the Patient Management Aid package. Our client was transitioning from paper records to all electronic records. This particular hospital dealt with a lot of intensive surgeries, such as amputations, as well as the physical and occupational therapy following such surgeries. As a result, there were many phases of care that had to be recorded as the patient advanced through various stages of recovery. Our PMA software package integrated all phases of care into one location, allowing all physicians easy access to patient information. When I got involved with the project, it was already at the deployment stage, so my tasks dealt mainly with user-interface testing and debugging of the actual software, as well as working directly with the client to make sure all of their needs were expressed in our product's features.

The second project was just beginning and was thus much more research and data intensive. Using tools such as SQL, Access, VBA, and Excel, I did a lot of data mining and analytics. This project revolved around the integration of a pneumatic tube system (think tube at the drive through of a bank) from the existing hospital building to the new lab

building they were building. The pneumatic tube system of a hospital is crucial in sending lab work, medical supplies, etc. between the labs, operating rooms, and emergency rooms. Since it could be potentially carrying life-saving material to the ER for example, this system needs to run efficiently and be dependable in crucial times. We tried to find bottlenecks in the system to reduce wait times and increase overall system performance. This was an interesting project because I had so much to learn about the system, the technology, the layout of the hospital campus, etc. before I could even begin to work with and understand the data.

The best part about this company is that it is small (about 30 people), so you really get to know everyone and more importantly, you have the opportunity to work with everyone throughout the summer. Everyone is accessible and willing to help and answer questions. There is no sense of hierarchy there; everyone is considered an equal contributor to a project. I worked with the founder and CEO of the company (an IOE alumnus!) almost every day. That is a rare opportunity for an intern, and as a result, I learned so much this past summer.

For anyone interested in healthcare or working for a growing small business, this is a great company for you. IPS also continues to grow with the addition of more and more contracts, so there are both internship and full time opportunities available for students. They have a great reputation within the budding healthcare consulting industry, and as word of their quality work continues to spread, the company will continue to grow. To be successful here you need to ask questions, be willing to learn every day, and be able to function well in a team, and I encourage you to check them out!

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STRATEGIC FINANCIAL SERVICES INTERNSHIP

BY: ARJUN MOTTA

This past summer, I worked as a Summer Analyst at Strategic Financial Services, a small wealth management firm in Upstate New York. I had never worked in the financial services sector before, so I was not entirely sure what to expect. I ended up having a very cool learning experience.

Being that Strategic Financial Services is a very small firm (only about 30 employees total), the interns were given many random jobs within a bunch of Strategic's various capabilities. These could range from operations to estate planning. Meanwhile, we would attend weekly investment meetings, where Strategic's investment team would meet and discuss how their investments were performing and what the next steps to be taken were.

Along with all of my small jobs here and there, I had an overarching summer project for the Investment Team. Strategic hadn't invested in the Property-Casualty Insurance industry for any of its portfolio in several years;

that being the case, I was tasked with performing research as to whether or not it would be a good industry to invest in again. To do so, I read a lot of research from banks like Bank of America, Merrill Lynch, Goldman Sachs, and Morgan Stanley. Then, after having a firm understanding of the industry, I looked at historical Price/Book ratios to independently value companies like The Travelers Companies (TRV). After realizing the banks were overvaluing TRV, my mentor and I came up with the recommendation to delay investing, which I presented as a Powerpoint to the investment team.

Working in financial services was a good experience for me. It introduced me to a completely different kind of research that I'd never been exposed to before. However, I do not think wealth management specifically is what I would like to pursue in the long term; despite its cool parts, it felt like the deals were to some degree menial because of their low impact.

STOLT-NIELSEN INTERNSHIP

BY: ESMOND LOKE

During the 2013 summer break, I worked at a company dealing with bulk-liquid transportation, distribution, and production services called Stolt-Nielsen as a summer intern. The division that I was placed under was the Stolt Bitumen Services, which was in charge of shipping, manufacturing and trading of a commodity known as bitumen, or asphalt. Bitumen is a sticky, black and highly viscous liquid or semi-solid form of petroleum used primarily in road construction.

As an intern, my role was to forecast demand and supply of bitumen within the Southeast Region through monitoring of ships trading bitumen, as well as performing sensitivity analysis to determine the worst, base, and best case scenarios depending on the various factors affecting said demand and supply. By tracking the various ships, using some assumptions based on prior knowledge of the industry, as well as the number of ports stopped by each ship to unload and load cargo, we can determine the amounts of bitumen traded within the region by looking at the cargo sizes of each ship.

Furthermore, by looking at the relative ages and conditions of each ship, and the health and solubility of each trading company, we can determine different strategies the firm can undertake, in terms of purchasing or leasing ships, containers and amount manufactured or purchased. Doing market research can also inform the firm where there may be a potential increase or decrease in demand for bitumen based on the number of upcoming or cancelled projects, plus the amount of bitumen manufacturing or processing plants around the particular region.

This sort of internship is highly recommended for IOE majors, especially for IOE sophomores that have completed IOE 201 and 202, where we learn a variety of techniques to perform sensitivity analysis as well as demand forecasting. Furthermore, it gives IOE students a chance to put to use such knowledge and apply it to a real-world scenario and see how IOE skills can translate in the workplace. Finally, interns can get a hands-on working experience which cannot be learned in the classroom.

IIE SIX SIGMA GREENBELT CERTIFICATION CLASS

BY: MICHAEL LEAHY

This winter was the first time the student chapter of the Institute of Industrial Engineers (IIE) hosted a Six Sigma Greenbelt Certification class here at the university. The institute sent a trainer from their headquarters in Norcross, Virginia to instruct about 60 students here. The class started on Friday afternoon and ended the following Sunday afternoon. It was an intensive time commitment over the weekend, but at the end of the course you took the exam and were certified if you passed.

The content of the course seems very useful for IOE's, but a lot of the topics were covered in other coursework students have had in the department. Also, the pace of the class could have been sped up dramatically. The process a Six Sigma Greenbelt learns is fairly simplistic and can be taught to Michigan students much faster than it was. I would argue the biggest value the certification provides is a combination

of several different topics covered in other classes into an easily understood and usable system for measuring and improving system performance. You'll also be able to talk the talk of Six Sigma with other certificate holders.

The course cost 500 dollars and that price included all materials needed. I'm still trying to determine the value this certification adds to your abilities and your marketability to employers. Several IE's that I know who work in manufacturing suggested the Greenbelt certification. It has international recognition and a wide range of applications. As far as a resume booster, I found the certification interested several employers I talked with at the winter career fair. Among all the different classes a student can take, HR managers can easily recognize this certification when they gaze across your resume. I think at least one interview I have scheduled this year is a direct result of my certification. Only time will tell if the Greenbelt certification will be a good return on investment, but so far I'm optimistic.

AN IOE MAJOR IN A WORLD OF CODING

BY: ANNA MUNACO

Last semester I took EECS 280 here at Michigan. It was definitely an interesting experience. On the first day of class I walked in and found a seat. A couple people nearby turned and introduced themselves. When they asked my major and I responded IOE the common response was "What?! Why are you taking this class?" I told them it met a cross-over requirement, which is does. They still couldn't understand why I would elect to take a class they were required to take but clearly weren't eagerly anticipating.

I decided to take the course during a moment of inspiration last winter when signing up for classes. At the time I was really enjoying ENGR 101 and my GSI convinced me that programming might be my true passion. I figured I would give EECS 280 a chance and if I liked it, maybe I would switch my major to pursue programming further.

Perhaps the reaction I received from fellow 280 students should have been a sign to me to "get out now" but I kept with it for the first week, and the second, and then past the add/drop deadline. I had made

it through the first two projects with little stress and almost no time in office hours. Then came Project 3. I'm sure there are quite a few people who can credit Project 3 of EECS 280 as to the reason they aren't majoring in CS or CSE, people like me. The project challenged my coding knowledge so thoroughly. Pointers and pointer to pointers and segfaults and memory leaks haunted my dreams for what seemed like the longest month ever.

Next up was the big midterm. I studied more than any other university exam before it and when it came it did not go so well. I didn't get to finish two problems because of the time limit. I was devastated and worried about how I would even pass the class.

I made it through the last two projects fairly easily. Then came the final. I studied even more than I did for the midterm. I did and redid all the practice exams. I made flashcards. I scoured piazza for practice exam answers (because the practice exams don't come with an answer key). I drove my roommate crazy talking to her in C++. The day of the final arrived and I left extra early to make it to Stamps on time. I walked into the auditorium and two hours later I left with an A- and freedom.

UM SUPERMILEAGE TEAM

BY: AGNEY DESHPANDE

The University of Michigan Supermileage team is an engineering design team with the goal of building a vehicle that achieves 3,300 miles per gallon using a gas powered lawn mower engine. The team is four years old, with about 40 members. We compete in Shell Eco-Marathon, which takes place in Houston, TX, and SAE Supermileage, which takes place in nearby Marshall, MI.

The team has five subteams: Race Strategy, Engine, Body, Driver Interface and Integration, and Project Management. Each subteam focuses on producing the most efficient components possible while maintaining safety and usability. Engine team works to convert a stock Briggs & Stratton lawnmower engine to a powertrain that we can use in competition. Major alterations include changing the carburetor to an electronic fuel injections system, tightening the cylinder sleeve, and converting the flathead system to an overhead system. Through these methods, we maintain better control of our fuel input while decreasing the amount of fuel needed to run the engine.

Body team designs and creates the carbon fiber body. Each year, we design a new body using CAD and Finite Element Analysis. This design is physically produced using CNC routing of dense tooling board, which we then sand and finish to create a male mold. Then, we create a female mold using fiberglass. Finally, our actual body is made with carbon fiber. This process ensures a light yet strong shell. Our vehicle body doubles as our chassis, in that we have no

other interior structure. All other parts of the vehicle are mounted directly into the body.

These other parts of the vehicle are designed by the DII team. This subteam is responsible for the systems that the driver will interact with, particularly the steering and safety systems. Currently, we are designing a rear brake system and new steering. While in previous years our driver would steer left to turn right, the new design will feature an actual steering wheel and natural steering.

Project Management is concerned with our external and internal relations. Project Management includes Sponsorship, Public Relations, Finance, and Internal Affairs. We create relationships with companies, media and university contacts. Project Management also maintains the team website and social media.

Of particular interest to IOEs is the Race Strategy subteam. Race Strategy tests and optimizes our vehicle performance through operations and systems engineering. We have developed an Excel Solver model to determine our optimum driving style. Our team utilizes a "Pulse and Glide" style, meaning that we bring the vehicle up to a top speed of 30 MPH, then shut the engine off and glide for as long as possible while maintaining a minimum speed. Our computer model integrates race conditions such as elevation changes and air drag to return the best locations to accelerate or coast. Most recently, the Race Strategy tested a model of our vehicle in the UM Wind Tunnel to determine our unique drag coefficient. Now, we are able to put this constant into our model. By decreasing our assumptions, we obtain more accurate results. Race Strategy is next working to test the rolling resistance of our vehicle.