

Industrial Blueprint

■ The IOE Student Newsletter ■



■ October 2016



From the Editor

Hi IOE,

Welcome back to school! I hope you had a great summer and a great start to your semester. For those of you who have never picked up an Industrial Blueprint before, this is a student newsletter written by IOE students for IOE students. Inside, you will find articles written by your peers describing what IOE means to them, the student organizations they are involved in, and their IOE-related summer experiences (internship, research or study abroad).

Happy reading!

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Walk-in Hours:

Mondays: 10:30 am – 12:30 pm

Tuesdays: 11:00 am – 5:00 pm

Wednesdays: 10:30 am – 12:30 pm

Thursdays: 10:30 am – 3:30 pm



Consulting Internship

By Kenny Vi

This summer, I interned at a consulting firm in Palo Alto, California called End to End Analytics. Utilizing my experience in computer science and industrial operations engineering, I worked on a project with a major bread company based in Canada that needed intelligent promotional planning capabilities to raise prices. My work was a mix of interfacing with our client, over conference calls and on-site, and analyzing data using a combination of VBA, Python, and Anaplan.

One of the unique elements of this internship was the size of the firm; End to End was a smaller company of about 50 people, of which about 25 lived in California, the rest spread out across the East Coast and South America. Because of the smaller size, I became familiar with many of the associates, consultants, and even partners, which created a close, transparent environment that was a joy to work in.

Another consequence of the small company size was that I belonged to a small project team: myself, a senior consultant, and the project manager. The small team size gave me a surprising amount of responsibility for my limited skillset; I was a key participant in many client meetings, oftentimes including important executives invested in the project. Delivery work is absolutely valuable experience, but what I found infinitely more valuable was the presentation and on-the-spot problem solving experience from on-site trips.

Another unique element of my experience came as a consequence of working in consulting; having prepared myself for the quintessential nine-to-five job, the flexible hours and traveling came as a pleasant surprise. The culture at End to End was hands-off; no one cared when you came in or when you left, which provided a great amount of freedom. The freedom worked for two reasons: the pay structure was set up as a variable pay model, and self-motivation drove just about everyone I met in the company.

Traveling also came as a surprise. I flew back and forth to Toronto every other week, which was quite flashy and exhilarating, especially because I had previously never been to Canada, let alone Toronto. Also, part of each trip was social, and as a networking opportunity each trip came with fully expensed dinners with our client at some incredible restaurants downtown.

All in all, I highly recommend trying out consulting or a small company if anything in my experience sounds appealing. I certainly know, with this internship under my belt, that consulting is a terrific fit for me.

Internship at AbbVie

By Julián Fiallo

This past summer I was able to truly put what I have learned to the test during my internship with AbbVie Biotechnology. I worked in the Business Excellence Department and my main project for the summer was to perform an Overall Equipment Efficiency (OEE) Analysis on an Automatic Visual Inspection machine (AVI) for the Humira Adalimumab vaccine. The AVI machine is the last process of quality inspection for the vaccine before it is sent to another plant for packaging and then distribution to patients. The machine essentially searches for syringe defects as well as particle impurities in the vaccine by taking thousands of pictures of the vaccines using cameras.

The AVI machine was relatively new and AbbVie did not have a good idea of how efficient and effective the machine was being in the context of their production goals. To start my analysis, I retrieved historical data from past runs. From there I continued on to use the data mining skills and the linear modeling and hypothesis testing techniques I acquired from IOE 373 and 366, respectively. I was able to find trends within the data, such as how many syringes were ejected from the machine with defects and determined the ratio of how many actually had defects compared to those that did not and the machine's actual syringe inspection rate. This information, in addition to other information such as total production time and actual runtime, I was able to base my analysis on three factors: Performance, Quality, and Availability. In the end, the machine was running well and up to par with AbbVie's production plans.

My project did not end there though, as I saw the opportunity to improve this analysis process; it could be simplified significantly if all the data taken from the machine immediately generated the analysis results. To do this I used my VBA knowledge to develop an automatic OEE Analysis Excel spreadsheet that took the data the machine's operators entered into the system and generated OEE results, as well as a waterfall graph that would provide executives with a visual tool to evaluate, on a grand scale, how well the machine was doing in comparison to what was expected. This tool is still being used by the company. Overall, this was an amazing experience where I was able to apply many of the tools and skills from my courses.

Studying Abroad in France

By Blake Bormes

This summer I had the opportunity to study abroad in Grenoble, France. Not knowing what to expect, I packed my bags in hopes of exciting, new experiences. At first I was a little apprehensive about living with a host family. My “family” was a mother, about 52, with two children who were studying elsewhere in France. I was scared that I would not be able to communicate well with her, and even if she could understand me, what would we talk about? Throughout those six weeks, I learned how to be confident in myself while speaking with others, whether complete strangers or good friends. The first few weeks of the program were difficult.

After sitting in a classroom for hours learning French and then exploring the city, I was exhausted; holding an hour-long conversation at dinner with my host mom was a difficult feat. As the weeks quickly passed, however, I learned how to speak more fluidly and how to better comprehend locals. One weekend, my friends and I travelled to Marseille, a beautiful port city in the South of France. We were wandering in and out of local shops when we found ourselves in a soap store (one of many in the city, for Marseille is known for its production of soaps). The storeowner, dressed in a blue and white striped shirt and donning a set of round spectacles, was quick to greet us with a grand, “Bonjour! Comment allez vous?” Soon, my friends and I were in a deep conversation with the friendly stranger.

We described our study abroad program, and he explained how he had travelled to 52 different countries throughout his lifetime and what he liked best about his trips. After purchasing some soaps to take home to the states and ending our conversation with the nice man, my friends and I all realized that we just held an extensive conversation in French with a stranger and none of us had trouble understanding each other. I learned that it only took trusting myself and a little knowledge to be able communicate with a France native, and I realized all I could do by being confident in myself and my knowledge.



Studying Abroad in TECNUN, The University of Navarra, Spain

By Victoria Glunt

Let me start off first by saying, I had only ever been out of the country two times before this summer and both times I had gone with my parents and we had only gone for a week each trip, so for me to travel alone to Europe for 6 weeks was a huge leap of faith. I had known for some time that I wanted to study abroad sometime during my four years of college, and being a student-athlete, I knew it would be nearly impossible for me to take a full semester abroad, so I decided to go this past summer. Going abroad was the best decision I have ever made.

It had always been a dream of mine to visit Spain, and this summer I was able to live there and be immersed in their culture for six weeks. With our small group of 15 UM students, we went out and navigated our way through an unknown country with limited knowledge of the local language. It was difficult at times to understand and communicate, but with a bit of persistence, we were able to figure it out. With the help of our program leaders, we got to see many aspects of Spain, in different cities across the country. Unlike the cities in the United States, each city had a blend of Spanish culture as well as the local culture of each region.

Because we were located in the Navarra region of Spain, an industry rich area, our program included a few company visits where we were able to get an inside look at the manufacturing process. From an Industrial and Operations Engineering point of view, it was really interesting to see how these companies operated and how they created a product that would ultimately be used by the consumer. We were even given the opportunity to see the LEAN manufacturing model firsthand at one of the companies.

Studying abroad taught me a lot about myself and others from around the world. I was given the opportunity to get to know not only the 15 UM students but also a few local students and students from seven other countries. By interacting with them, I was able to build lasting friendships with people I never would have met otherwise. Being thrown into a completely unknown situation with people that I had only met once before was definitely a bit scary, but after a few days together, everything seemed to fall right into place.

If you have not already studied abroad and still have time, I highly recommend that you go even if it is only for a few weeks. It was definitely the best experience of my life and I hope that everyone gets to study abroad sometime during their college career.



Internship at Navistar

By Sarah Park

This summer I had an Engineering Design and Development internship at Navistar in Lisle, IL. I worked in Body SMT Components group. The objective of this team was to help validate Navistar's new products efficiently and on time. The department's goals were to design components for the trucks such as mirrors, windshield wipers, and lights. Over the summer I worked on three categories of projects which were requirements, validation, and compliance. In regards to requirements, I helped to acquire information to help populate a new database system for design requirements for each component. I also conducted research on the glass used in the rearview mirrors as well as for the testing procedures used to measure the endurance of the glass. The goal of this research project was to gather information to help determine a requirement standard for the durability of glass used in Navistar's mirrors. My projects that involved validation consisted of observing and facilitating tests that were done at the nearby testing facility. The final project I worked on was compiling compliance documentation for the other engineers in my group. This involved learning all of the government regulations for each component and making sure that they were all being met by the new design.

Even though this is not a career I hope to pursue I learned a lot from this experience such as how important it is to anticipate questions an audience might ask when giving a presentation and how beneficial it is to make sure goals are clearly defined before beginning a project. This internship was a great experience and am very grateful I got to have it.

Applying IOE Knowledge

By Jenna Locricchio

I decided to pursue a career in Industrial and Operations Engineering long before I began my education at the University of Michigan. My decision arose from my passion to study both engineering and business, which are innately coupled in IOE. Similarly, I applied to MECC Consulting Group for the invaluable hands on experience in both fields that it provides.

Upon admittance into MECC Consulting Group last fall, I worked as a consultant for a local bookstore. I evaluated and made recommendations on the internal infrastructure, employee scheduling, and returns process. While working to increase efficiency and reduce costs, I employed knowledge gained from my IOE classes as well as the problem solving skills acquired over my time in the College of Engineering. Applying these principles to successfully solve a business operations related issue instilled confidence in my decision to pursue the two fields simultaneously.



Internship at USPS

By Jessica Sirias

Last summer I interned at the United States Postal Service as an Operations Industrial Engineering Intern in San Diego, California. I worked in the In-Plant Support department with 9 total industrial engineering interns. The first few weeks, we were trained on how the plant operated. It was interesting to see the behind the scenes on how mail and packages were scanned, sorted and sent off to different locations. At the internship, we were all assigned a team and a project. I actually worked with someone who just graduated from University of Michigan and our project was to reduce the number of late PM trips coming from the post offices to the plant. It was really nice to work on projects that would make a real impact on the plant and organization. Other people had projects like reducing load time or increasing scanning scores so it really felt like there was a lot of opportunity for industrial engineers at USPS.

It wasn't all just work, we participated in a running man challenge with interns in different locations. We ended up winning the competition and won customized USPS selfie sticks. Overall, being there for 10 weeks, you become really good friends with your fellow interns. I was living with 4 other interns so we got to know each other really well and still keep in touch. After work, we would try to explore the city, some days we would go hiking or to the zoo and one weekend we visited LA. We were all from different parts of the country, but it was really fun being able to hang out with people from different backgrounds and be able to explore San Diego together. The internship was overall a great experience and would highly recommend to anyone in IOE.

Why IOE?

By Maddie Price

I chose Industrial and Operations Engineering because of the wide career paths graduates can take once they finish their education. There are so many different directions this major can go, even within the course path you choose at school. I still am not sure what career path I want to take, but being in Industrial and Operations Engineering, I am not worried about being successful in whatever path I may end up on. This semester I hope to gain a more in depth look into this major and develop my skills regarding my class topics. I am now taking higher-level IOE classes in which deeper knowledge is required to succeed. I can't wait to see where this course of learning takes me in the future.

Choosing IOE

By Tianke Wang

In fall of 2014, I entered the University as a freshman, with high hopes, big dreams, and no idea of what I wanted to pursue. Just like many of my peers, I had to do some soul-searching, introspection, and exploration before I finally settled on a major. I started in LSA, where I took a variety of different classes my first semester, including biology and organic chemistry, aspiring to make it into medical school and further study for an medical degree.

I quickly realized that this was not the path for me, despite doing well in my pre-med classes during my freshman year. I discovered that that isn't the career path for me. However, I did enjoy taking calc 3 and differential equations during my freshman year. I was amazed at how calculus could be applied in so many different ways toward engineering problems. From my experience in those two classes, I made the choice to transfer to engineering. Starting my second year as a civil engineering major, I was excited to finally be learning what I thought was my ideal major. Eventually one of my friends told me about IOE; I became interested in the endless number of applications of IOE concepts out in the world. During my second semester of sophomore year, I changed my major to IOE.

Since then, I've taken some of the most interesting classes ever. My favorite classes were IOE 202 (Operations Modeling) and 333 (Ergonomics). Unlike some of my previous classes, I felt genuinely interested in the topics taught in IOE classes. I felt a new motivation to come to class and to learn the material genuinely because I wanted to and enjoyed it.

Now as a junior, I am taking higher level IOE courses, expanding my knowledge. I especially hope to gain further skills in linear programming from IOE 310, as well as knowledge of databases from IOE 373. I've firmly established IOE as my major, with no plans to ever change.

Looking back, I realize that switching majors to IOE was one of the best decisions I ever made. I look forward to future IOE classes, as well as wherever in industry I may end up at post-graduation.

Majoring in IOE

By Meng Yuan Zhang

After my acceptance to the college of engineering, I had initially wanted to become a chemical engineer and had even taken two semesters of chemical engineering courses until I realized it really wasn't a good fit for me in particular. Though many peers appeared to enjoy the process of solving a complicated thermodynamics problem, I found myself thinking more about where all the resources came from and what uses they would be put into.

Finally, I decided to talk to a few advisors and eventually I changed my major to IOE because I am interested in operations as well as the big picture view of processes; the many opportunities and career paths IOE offers also attracted me to this field of studies. Since this is my first semester in this major and I do intend to complete graduate school at U of M in IOE, I hope to explore different areas of IOE through meeting and talking to the many professors in our department, becoming involved with research as well. At the same time, of course, I'm looking forward to meeting many peers in my classes as well as IOE related student orgs.

Research Experience

By Carrianna Voellm

This past summer I did research with a professor at Rensselaer Polytechnic Institute in Troy, New York. I decided to do research at RPI versus staying in Ann Arbor for the summer because RPI is 10 minutes from my home back in New York. Therefore, I could live at home for the summer. This would be a great idea for any freshmen or sophomores to consider if they are interested in doing research, but also going home for the summer. I was connected with the professor at RPI through contacting any friends I had that attended RPI. They asked me what I was interested in and then referred me. I really enjoyed working at a different university because it showed me how my Michigan education is similar to, but also different from, that of an Industrial and Operations Engineer at RPI.

In a sense, it allowed me to have a different perspective of the material I was learning every day in class. My research was specifically in Data Envelopment Analysis, or DEA for short. This really sparked my interest in big data, thus helping me decide which internships to apply to. It also sparked my interest in continuing my education in the future, such as working for a little while then getting a Masters degree. Overall, it was a great experience and I am thankful that I was able to have one like this.



Theta Tau

By Erin Guder

I am currently a part of Theta Tau, a professional engineering fraternity. We aim to help each other professionally while bonding through various events. Theta Tau has been an amazing experience for me, professionally and socially.

My big, as well as many other brothers, is an IOE major. She has helped me prepare for career fairs, interviews, and networking sessions. Her past experiences have helped prepare me for my future experiences. Without her, I would not be able to get as far as I am so quickly. Beyond helping me with my future, she and other IOE brothers help me understand IOE topics for homework or exams.

I am also studying computer science. Since the brothers in our fraternity come from a variety of majors and backgrounds, I am able to discuss anything with any brother beyond my major that may interest me.

Beyond the professional benefits, the brothers are all very interesting people. Through the interviews and frequent social events, you get to become very close with this large group. Even though the backgrounds and majors differ, all of our values align because we all joined Theta Tau. People, including myself, have found their best friends in this fraternity.

Theta Tau has been a very supportive and inviting community for me. The benefits are endless, and will be for anybody that would like to join.

Picking IOE

By Christopher Cardoso

Picking IOE was an interesting decision for me. At first, I chose Engineering because I thought it was the only school that had computer science. But once I came to U of M I realized I was wrong, and also realized that I didn't like computer science. Deciding that I didn't want to transfer to LS&A, I took time to learn more about all of the majors. When I realized that process engineering was more for me than any of the other building related majors, I realized IOE was the perfect fit for me since I've always been focused on maximizing efficiency and loved making things better. This semester, I'm taking IOE 440, Operations Analysis and Management. This class has really solidified why I'm interested in IOE, since it has taught me a lot about how we can manage operations and all the tricks to keep maximizing efficiency in supply chains. I hope to continue to learn more about things like this throughout the semester as well as throughout my time as an IOE.



Internship at P&G

By Julia Clark

This past summer, I interned at Procter & Gamble in the Information Technology department. I was located in Cincinnati, Ohio at Procter & Gamble's headquarters. For my 12-week internship, I was placed on a data warehouse management team. I had two projects that I worked on for the duration of my internship.

My first project was focused on organizing a large set of data and creating a tool that would allow distributed management of the data and increase data accuracy. To organize the data and create an Entity-Relationship Diagram, I used the normalization concepts that are taught in IOE 373: Data Processing. Then, to create the tool, I used a database software called Quickbase to put the data into tables and apply security settings that allowed distributed management. Once I created the tool, I wrote a user manual and held multiple user training sessions. It was a gratifying experience to see this project from its beginning stages up through the deployment.

My second project involved creating a monitoring tool with reports of several different server health metrics such as CPU and space usage. In order to create the reports, I had to pull real-time data from several servers. To do this, I also utilized skills from IOE 373: Data Processing. I created SQL queries that retrieved the data and calculated the necessary metrics. Then, I designed the reports and used the data to display the relevant trends. It was really interesting to see such direct applications of IOE concepts in my Information Technology internship – I think that most of the skills we learn in IOE are very applicable to any industry!

Studying Abroad in Shanghai, China

By Jessica Hirsh

Over the summer, I had the opportunity to study abroad at Shanghai Jiao Tong University (SJTU) in Shanghai, China. Many study abroad experiences last for 6 weeks, but I was able to spend a full 13 weeks studying, traveling, eating, and absorbing everything China has to offer.

This program is organized by the International Programs in Engineering office. The University of Michigan has a Joint Institute Program with SJTU, where sophomore students at SJTU can apply to spend their last two years of undergraduate studies at the University of Michigan. With the Joint Institute program, students get two undergraduate degrees in just four years. Although the program is incredibly rigorous, it is a very popular option for students at SJTU, with over 150 students applying to study at Michigan each year.

There were approximately 50 students from Michigan studying abroad at SJTU. The majority of the Michigan students were studying either Mechanical or Computer Science Engineering, but there were a few majoring in IOE as well. One of the main draws of studying abroad at SJTU is that, since the program is a full semester long, you can take a full course load (up to 12 credits). I took two Chinese language classes, a Chinese culture class, and Linear Algebra. The courses are challenging; they are modeled off their counterpart course at U of M, so students can be ensured that they are getting a very similar quantity and quality of education. Other popular courses students took while abroad included Thermodynamics, Calc 3, Physics 140, and EECS 280.

After studying abroad in China, I would definitely be open to interning abroad or possibly working internationally in the future. I've learned that I really enjoy seeing different aspects of other cultures, and I think it would be very interesting to experience an international workplace. Overall, I had an incredible experience in China. I would definitely recommend it for anyone interested in having an incredibly meaningful and memorable summer.

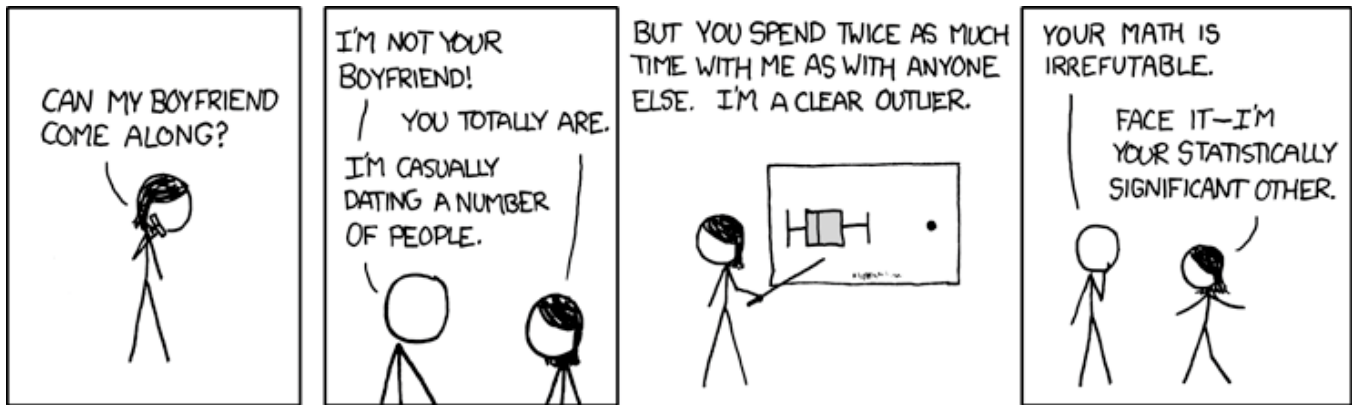
Internship at Seegrid

By Sam Duerr

This past summer, I had the opportunity to work as an Application Engineer for a robotics company, Seegrid, that makes vision-guided vehicles. In short, they make industrial equipment (forklifts and tuggers) that navigate without human interaction by using cameras. In my role, I completed pre-sales consulting work for many of Seegrid's customers, such as GM, BMW, Whirlpool, and Jaguar Land Rover.

I loved the experience for a variety of reasons. One of the things I enjoyed the most was being able to witness the manufacturing lines of some of the world's top products, and gain an understanding of the processes that produce some of the biggest product names in the world today. I feel that I gained a different perspective by completing this work, as opposed to simply working for one of these companies for a summer. I was able to compare and contrast the different assembly plants and distribution centers I traveled to, which adds another dimension of analysis when completing consulting work. For example, seeing a solution to a problem at one automotive site can often help solve an issue at another automotive plant. Also, many companies suffer from the same issues. For example, getting parts to line on time and in an orderly fashion is one the biggest struggles for many automotive companies. They lose tens of thousands of dollars for every minute the line is shut down. A solution we provide to one company can often solve a similar problem at another, so it pays to see a number of different facilities. Seegrid is also a relatively new, and small company, having been around for only 13 years with 100 or so employees. The company has recently come under new leadership, and the culture was that of a start-up, which also contributed to an exciting and fun summer.

I would definitely recommend to future students to look into not just the work that they will be completing at a job, but also to gain an understanding of who they will be working with. It's definitely a plus to enjoy the team you are working on, and to get along with them both at the office and away from it.



Thanks for Reading!