

Engineering in London 2022 Student Blog Posts

Lauren Dial

One of my favorite excursions that we did while in London was the Science Museum. The museum was so diverse showing both Victorian-age steam engines which related to our in-class topics, but also showcased the evolution of medical practices. The medical equipment particularly interested me because I am a Biomedical Engineering major and want to continue the vast development of the medical industry. My favorite aspect of the exhibit was the evolution of prosthetics. The exhibit began with wooden models of limbs that could only be described as a placeholder and didn't have any other function. The timeline ended with a 3D printed arm prosthetic that was completely functional. This prosthetic shows a more cost effective option and it would also be easier for the patient to adapt to. During this visit, we were also able to see a state of the art lab that was used to refurbish and maintain the technology found throughout the museum. Overall, I really enjoyed the excursions that were included in EIL. They allowed me to see the engineering principles that I learned in class in person and make key observations to enhance my understanding.

Sarah Miller

The Engineering in London Program has been a truly amazing experience. I'd have to say that my favorite trip was to Bletchley Park. Here, we got to see the National Museum of Computing and learn about the effort to code break the German Enigma machine during World War II. Within the museum were several of the earliest computers such as Colossus, the Witch, and Alan Turing's BOMBE machine, which was instrumental in breaking German codes to help the Allies defeat the Axis powers. This experience was especially enlightening because it gave us the opportunity to take the relatively basic concepts that we have learned about in our circuits course and see how they interact and join together to create much more complex and advanced devices. This experience also demonstrated how our efforts as engineers can have such incredible impacts on the world.

Zoe Campbell

My time in London has allowed me to gain a broader understanding of engineering. One experience that was particularly impactful was our visit to the London Museum of Water and Steam. I'm so grateful that we were given the chance to see the impressive machines in action! Seeing them move really helped me understand thermodynamics better. I was able to better visualize the processes we talked about in class, and I could begin to apply them in the real world. It also made me think of the people who invented these machines and how amazing they were. Our modern world was shaped by the innovators of the past and it makes me reflect on how I might improve the world someday. Another excursion that I found interesting was our visit to the Old Operating Theater Museum. This museum housed a collection of Victorian medical devices and diagrams. It was so fascinating! Their science wasn't perfect, but the strides they made in medical practices still manage to confound me! It makes me appreciate how much we can do with medicine today. The trip allowed me to reflect on my passions and what I truly want to do with my degree. I've always been interested in the medical field. I am considering the path I want to take in life and Engineering in London has been very helpful in allowing me to better shape my future.

Terry Nguyen

My name is Terry Nguyen, and I am studying aerospace engineering. During our Engineering in London program, we were able to visit vast amounts of museums and historical engineering sites that contributed to my understanding of engineering. Though all were excellent trips, the one that stood out to me was the Kew Bridge Steam Museum. We were given a wonderful tour of the original area of the steam engine factories where the city of London was once reliant on for pumping large amounts of clean water to the public. They allowed us to see the beautiful 300-year-old workshops that helped create the components for the engines and other possible projects. One piece I was fascinated by was the belt system created to run from one engine. The engine was connected to multiple shafts and belts that brought work to each station, so wherever you did your job, the one engine provided the machines work. After the workshop, the steam engines were introduced and was the most exciting part because of the correlation between thermodynamics and the process of how they ran. We got to see many of the groundbreaking inventions including the Newcomen engine built around 1712, the Watt and Boulton engine which was the Newcomen engine but with a condenser to capture the excess water made in the 1770s, and the Davey Triple Expansion Engine made in the early 1900s, two different time periods but all building off one another.

These engines helped my understanding of the cycles learned in the class of Thermodynamics. Being able to see the processes in person gave another perspective on the engineering that went into it and where our cycles taught today came from. Also seeing how old the engines were in



the museum and them still working today provided inspiration for myself in the engineering path I am on. The way they were able to scale and design such effective engines without computers or 3-D printing is mind blowing and gives me hope that I can one day provide support for future engineering projects. Thank you for providing us a scholarship to learn the roots of engineering.

Meghan Smitherman

I have thoroughly enjoyed being able to experience this program and learn more in-depth about thermodynamics and electrical circuits in a unique way, along with being able to see the scientific and engineering innovations throughout Victorian England that changed the modern world in our various program excursions. One of my favorite places that we visited was the Science Museum in South Kensington. The Energy Hall exhibition was exciting as I was able to see the progression of the steam engine from the first Newcomen atmospheric engine, to Boulton and Watt innovations using a separate condenser, to other steam powered innovations such as a steam turbine and a triple compression piston engine. It was especially cool to see an actual demonstration of the 1903 Mill engine in the middle of the floor moving and producing steam using. It was easier to understand the uniqueness of double expansion power strokes that the pistons had in the engine as it was working. Seeing the actual parts of the various engines and videos of working models allowed me to better envision the different thermodynamic cycles working within the engines and comprehend what's happening during the compression, expansion, and power strokes. The Exploring Space exhibition, while not nearly as comprehensive as the Smithsonian in Washington, D.C, was still interesting to see as it was a new perspective on how rockets evolved from the first use of rocket missiles in the 1800s to the V-2 rocket during WWII to the Apollo moon landing and beyond. It was interesting to see Britain's contributions to aviation and space flight as well with their Black Arrow rocket and engine and designs for reusable rockets. The Making of the Modern World exhibition was fascinating to see just how far humanity has evolved technologically and scientifically since the Industrial Revolution. It inspires me as an engineer to continue adding on and improving to the countless technologies and inventions we have today in order to improve society for the future. I was also very intrigued to learn about the BepiColumbo mission that launched in 2018 in a collaboration between ESA and JAXA. The mission consists of two different satellites that will study the magnetic field and surface/interior of Mercury to provide vital information about the planet.

My favorite exhibition, however, was the Flight Gallery, as it delved into the history of aviation and flight, from the first monoplanes and biplanes created in the 1900s powered by small gas engines to the jumbo jets we have today powered by gigantic Rolls Royce turbofans and jet engines. The progression of various gas and jet engines alone was fascinating to be able to physically see the engineering innovations made to make flight safer, cheaper, and more efficient. I was also amazed to be able to see an actual Spitfire-MK1 that was the Royal Air Force's best weapon during WWII and helped win the Battle of Britain and countless other air battles. WWII is such a fascinating topic for me, especially the naval and air battles and the engineering innovations used throughout those battles, so I loved that I was able to see an actual plane that was in use for training programs during the war. I am grateful that I was able to go on this study abroad trip because of the life skills I've learned in addition to the invaluable information I have learned about Victorian engineers and engineering innovations that has validated my desire to become an aerospace engineer and design new technologies that will further our knowledge and exploration of the universe as well as making flight faster, more affordable, and more efficient for the general public.

Stephen Qiu

My name is Stephen Qiu, and I am currently majoring in mechanical engineering and minoring in computer science. During the EIL program, we had the luxury to visit Bletchley Park and the National Museum of Computing.

In the morning, we took a train to Bletchley Park and first visited the national museum of computing, which houses many different computers and machines, but most famously the bomb machine, which helped crack the enigma code and the colossus computer, which helped crack the Lorenz cipher. Both these machines helped the Allies win the war and being able to see the machines run in real life, clicking to life in front of me, was really exciting. The machines had thousands of wires going all around, all organized and



several thousand transistors in the machines that were the size of rooms. Also, our guide Robert Dowell, gave a very in depth explanation of the logistics and mathematics behind the machines, as well as the history and the evolution of computers, which was eye opening to me as a mechanical engineer and also as a computer science minor. The machine was a combination of the engineering building the machine and the theory of the mathematical computations and it was truly a wonder to visit and be able to see. Bletchley park more so focuses on the lives of the people who worked there when they were trying to break the code. We got to see Alan Turing's room inside hut eight, as well as other artifacts that belonged to him such as his notes and watch, as well as his teddy



bear. It was interesting to see the other side of Alan Turing and the code breakers that are not really portrayed. In general, this trip to Bletchley was really interesting and an eye opener to the history and the work of the machines that helped win the war.

Joey Syracuse

My experience in London has been one that I'll never forget. While taking thermodynamics and circuits here, many of our class outings have significantly contributed to my understanding of the concepts we have been learning in class. One of my favorite trips we took as a group was to the London Museum of Water and Steam, as it housed many early steam engines that were still in working order. It was incredible to me to see how well preserved these machines were, and it was fascinating to see them work after talking about how and why they work in our thermodynamics class. Being able to understand the physics and math behind these engines and their cycles and then seeing the magnitude of these machines in person really gave me an appreciation of the work that the engineers who designed them put in, especially so long ago before modern computing.



Brock Blansett

As a mechanical engineering major, seeing early steam engines in action at the Museum of Water and Steam was very interesting and informative. These engines were used in the 1800's, and many are still able to run in the museum. We were able to see the cycles the engines made with steam, which correlates to what we learned in thermodynamics during this program. Something that surprised me about these engines is how massive they actually are, with some spanning 3 all floors of the museum. Alongside the early steam engines, we also saw how water can be used by turbines to generate electricity, and were given a short train ride around the building where we were told a brief history of the use of trains.



In addition to the many educational excursions we took on this trip, the central location of London provided the opportunity to travel around Europe. During my time at the program I visited both Amsterdam, Netherlands, and Geneva, Switzerland. Learning about different cultures by actually experiencing them was an amazing experience that I would not have gotten without studying abroad. All in all, the Engineering in London program was an informative and inspiring experience that I am proud to have been a part of!

Jacob Howard

My favorite experience of the 2022 EIL study abroad trip was our group visit to the Thames Barrier, a massive structure that spans the entire length of the river Thames, which is around 520 meters across at this part of the river. This structure essentially prevents a large portion of Central London from flooding during times of natural disasters or other abnormal circumstances that can affect the flow of the river Thames. Seeing the model of this barrier while visiting this landmark was an incredible experience and played a very important part in my understanding of how the main gates of this barrier functioned individually. The process of the gates raising into a flood-preventing, or closed, position involved a very large crank shaft hydraulic system that is operated using multiple large electric generators. The barrier begins in a flat position where it is even with the bed of the river, allowing boats and water to pass through normally. As the large crank shaft hydraulic system rotates to raise the gates into a closed position, increasing amounts of water are prevented from passing into the next portion of the river and moving downstream. Once the potential for a flood has been minimized or stopped entirely, the barrier can be moved up slightly more into the “underspill” position. The “underspill” position of the barrier allows a controlled amount of flow underneath the barrier to slowly rebalance the water level between the sides of the barrier and acts to relieve some of the pressure on the upstream side of the barrier walls.

The operational model of this barrier demonstrates how the entire barrier functions from the beginning of a rising tide or storm surge to the controlled “underspill” to rebalance the level of flow. Through this process, fluid flow principles are used to ensure that there is not a very large pressure differential between the sides of the barrier and that there isn't too much water being trapped upstream to create this pressure differential. Additionally, the principles of thermodynamics that we learned while in London can be exemplified to create a mass-energy balance of the entire barrier system or individual gates, allowing for a better understanding of how much power is needed to move the gates as well as how much energy is required to produce that power output. In combination, thermodynamic and fluid flow principles also give construction engineers a better guideline for what materials would be necessary to withstand large amounts of pressure building up on the gates. Seeing the barrier and model in person helped me better understand how all these principles are inter-related and how all of them are necessary to ensure the successful creation and implementation of the Thames Barrier and other complex projects that can be considered marvels of engineering concepts.

Bella Macher

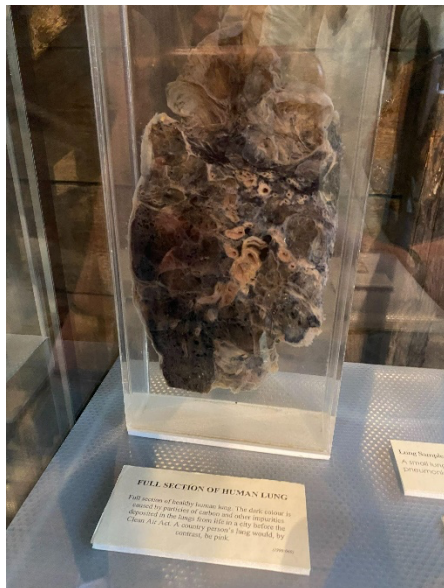
Being a biomedical engineering student in this program that primarily focuses on mechanical and electrical principles of engineering can be intimidating and challenging; however, it was refreshing to be able to visit a famous, historic site in London that related to my particular interests. The Old Operating Theatre was used in the 19th century by physicians to perform surgeries in front of an audience, allowing students and other physicians to learn about human anatomy by directly analyzing a patient's bones, muscles, and organs. It was interesting to learn about the early methods of anesthesia, which consisted of a patient consuming alcohol, as well as other herbs and medicines used during that time.

This experience encouraged me to appreciate the advances we have made in medical procedures and devices. Seeing and understanding the actions of past physicians motivates me to do research and familiarize myself with ways in which the environment around us will impact our long-term health.



Upper Image: The interior of the operating theater

Lower Image: A section of a human lung that shows the impact of the pollution found in cities during this time.



Mara Schutt

The place that was my favorite of our London tours was the Old Operating Museum. I am a biomedical engineer who wants to go into making and building prosthetics and orthotics. The Old Operating Museum really helped me realize this was the field for me. The museum allowed me to see and understand how medicine developed throughout the years. I was able to see the beginnings of tools we still use today as well as how we have refined and improved surgeries. The Old Operating Museum was an important part in helping develop the beginnings of medical devices and seeing the progression over the years made me realize even more that I want to help develop the next generation of medical devices. Evolution has to start somewhere, and the museum was one of these places. I will not forget how intrigued I was by everything and was just thinking I cannot wait to start building the next generation of these devices.



Micah Fletcher

As a biomedical engineering student, one particular experience that interests me was the Victorian Operating Theatre. I found this museum to be a step back in time to medicine in the Victorian era—one of great growth in all fields of science, engineering, art, and math. This also piqued my interest since someone who will be heavily involved in the future of medicine to see how far the field has come in two hundred years. For example, the use of anesthesia during that time period did not exist. Presently, this practice is used heavily. Additionally, they had a section to replicate a pharmacy and listed what ingredients were used for different medications. These ingredients were very natural, a far comparison from the medicines we are engineering today. Lastly, the part I found the most interesting was in that time period, the thought to get rid of an infection was to drain the patient's blood. Overall, this experience helped me experience biomedical engineering in the Victorian era and was able to show how far medicine has come since then. This also makes me excited for my future in the field as I cannot wait to be a part of the next advancements to make medicine safer and more accessible.

Corbin Edmonds

Living in the 21st century, there is a lack of appreciation for our everyday cars and computers. People nowadays take for granted the ability to get into an automobile and travel across country or video chat with someone thousands of miles away. Having the opportunity to come to London and see the beginning of modern engineering has opened my eyes to wonders of the machines and devices I use every day.

The Water and Steam Museum at Kew was incredible. The engineers and mechanics that volunteer their time there are able to keep these Victorian era machines running as smooth as if they were built yesterday. One of my favorite engines there was the three-cylinder triple expansion engine uses to power the textile mills of the early 20th century. Early engineers were able to design a system that recycled their steam in two other pistons after the primary high-pressure



cylinder. Because each successive cylinder and piston was bigger than the last, the steam at lower pressures could still produce the same amount of work on the piston. This expansion system marked a revolutionary step in efficiency because it allowed for more energy/work to be extracted from the steam. Another revolutionary leap in design was the addition of a separate condenser to the engine cycle. Boulton and Watt added this to their early engines as an improvement to the first Newcomen engines in order to help fully evacuate the used steam and improve efficiency by lower the temperature of the post-expanded steam. These engines redefined work in the world by moving away from the hard labor of man to the efficient and repetitive work of machines. Without these foundational engines, the cars, trains, and even computers we know today would be nonexistent. As an engineer, sometimes the best way to find solutions for the future is by drawing inspiration from the past.

Isabel Boyd

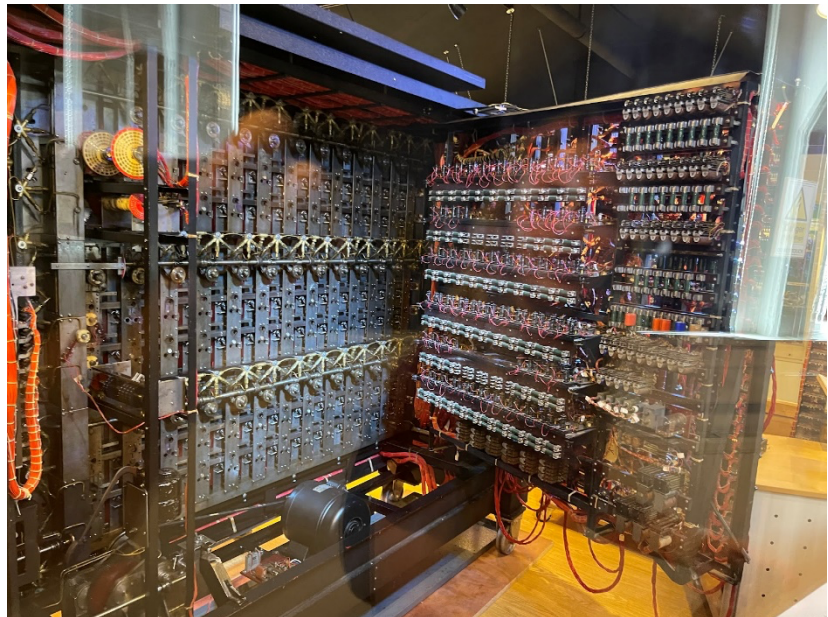
Our Being at the Prime Meridian was an incredible experience. After climbing up a hill near the beautiful University of Greenwich, we were able to look down at the city and see amazing sights of the River Thames. After taking some creative pictures on the meridian, we were able to tour the Royal Observatory, which was an integral part in assisting with timekeeping in the ocean. This observatory is also most notably the home of Greenwich Mean Time.

While in Greenwich, we were also able to tour the Cutty Sark clipper ship, one of the fastest of its time. It was used primarily in the tea trade with China and later wool trade with Australia. It was neat to see the history of the ship and observe what living on the ship for months may have been like.

Overall, being in Greenwich was an educational and rewarding experience and I hope future EIL students are also able to visit and learn from being in this area rich with history.

Even Hals

Hi there, my name is Even Hals, and I am junior in Aerospace Engineering. Engineering in London was one of the best experiences of my life. Being so immersed in the engineering world has been so beneficial for my knowledge in the field. From having classes in circuits and thermodynamics every day to seeing the real-world examples at places such as the water and steam museum and the science museum my experiences here have been life changing.



One of my favorite experiences in London definitely has to be seeing the old computers at Bletchley Park where Alan Turing developed the Bombe. It's hard to believe that so many important battles were won because of the efforts of these genius mathematicians. This was just one of the many experiences that made my EIL trip so memorable.

Kate Ward

Hello! My name is Kate Ward, and I am a junior majoring in biomedical engineering. Going on the EIL program has been such a wonderful experience for me. I will forever cherish the memories I have made and the amazing experiences I have gone on. One of my favorite days in London was going to stand on the Prime Meridian Line, exploring the royal observatory, and then getting to see the Thames Barrier. We received a presentation on the engineering behind the Thames Barrier, which I found to be so cool and loved being able to learn the history behind it. Further, being able to learn new material in class and then go and see it in real life has been such a unique learning experience. Seeing things like the Crick and Watson DNA model and working steam engines has truly enhanced my understanding of science and engineering topics.



I am so grateful to have experienced the stunning city of London and all of its enriching history and diverse culture. My truly favorite part of this program has been the beautiful new friendships I have made. From hanging out and eating Sainsburys to working on homework, I am so thankful to have met everyone on this trip. Overall, this program and the people have not only helped me grow as an engineer but also gain a broader perspective on life.