

Hammermen Scholarship 2016

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This summer I was fortunate to be afforded the invaluable opportunity to intern with GraftWorx, an early stage health-tech start-up who are working to address the unmet clinical need for preventative medicine. None of this would have been possible without The Incorporation of Hammermen of Edinburgh and The Saltire Foundation. The latter, a registered Scottish charity, operates a scholarship programme open to undergraduates studying at universities across Scotland. Their aim is to find, fuel and spark the next generation of business leaders by realising Scotland's human potential. The Saltire Foundation is entirely unique in the respect that the scholar programme goes beyond facilitating and organising a quality placement, providing a network of support by building a community of likeminded individuals for the future. Undergraduates can experience new cultures across the globe through working for the world's industry leaders, highly recognizable brands or an innovative start-up.



My journey as a Saltire Scholar initially began in November 2015 with a written application form serving as the first stage of a highly competitive selection process. The full application process was a learning curve that spanned six months and encompassed two speed interviews conducted by representatives from Entrepreneurial Scotland, over a dozen tailored cover letters and the three consequent host company interviews. Receiving this prestigious award, in combination with funding from the Hammermen Scholarship, enabled me to travel to the heart of Silicon Valley to undertake a twelve-week internship with a successful seed stage start-up company.

GraftWorx

GraftWorx are developing cardiovascular implants with integrated sensors that can record and send real time data regarding blood flow, heart rate and the level of blockage. This crucial information can be sent to a smartphone app, which uploads it directly to the cloud and alerts a doctor or clinician when actionable data has been received that requires a clinical response. This innovative technology could revolutionise medicine and prevent catastrophic outcomes for the patient such as amputations, heart attacks and strokes.



Menlo Park Offices

Our main offices were located in Menlo Park, where I divided the majority of my time either engaged in the office or learning in the lab. Over forty other start-up companies, each with facilities tailored to their specialty, occupied our building. Working in this environment provided a great insight into the contrasting Californian lifestyles and working culture. While there was a casual office dress code reflecting the relaxed atmosphere of most start-ups, this did not detract from the seriousness of purpose, the dedication and commitment that was put into developing these advanced biotechnologies.

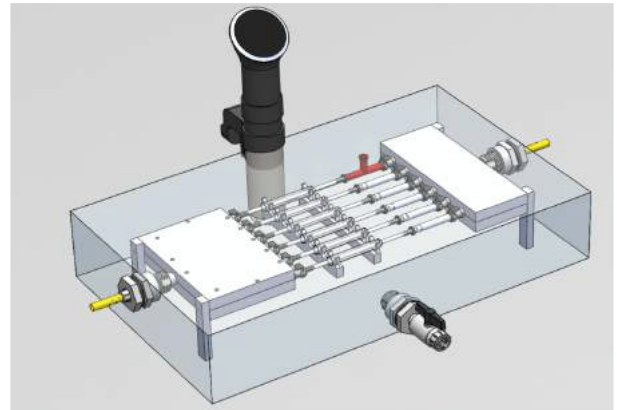
From my first day immersed in these unfamiliar surroundings I found myself immediately integrated into a close-knit team of ten accomplished engineers & doctors, having my opinion valued as I contributed to the development of their ground breaking novel technology. As an undergraduate Mechanical Engineer with a passion for medical science, I was provided with challenging opportunities to apply myself in numerous areas including design for manufacture, materials development, FMEA, validation testing, data analysis and component calibration, all whilst gaining a deeper appreciation of technology's role in modern medicine. Becoming an active team member of a Silicon Valley start-up also provided the chance to experience the capacity of applied science whilst expanding my knowledge of how start-up companies operate, from long term planning to gaining exposure and funding. It was fascinating to learn about venture capitalists, angel investors and accelerators from a founder's perspective and I found it thought provoking to contemplate the company's future. The team recognized the importance of how they defined a corporate culture as they grew in size and openly discussed how they should act now in order to accommodate for new members in a forthcoming diverse team. It was clear that the environment would greatly change in the future as it had done so in the past, adapting to the needs of a developing organisation.

In my time with GraftWorx I learned a substantial amount about applications of engineering that go beyond the scope of my degree. One of my main takeaways was having practiced the ability to adapt my own knowledge and skillset to provide solutions to obscure, complex problems and how to add value to any multidisciplinary team. I was lucky to find such a welcoming and respectful team that provided me with some incredible roles and responsibilities. My main achievements with GraftWorx include constructing and presenting a successful product demonstration to a potential partner, repairing a \$10,000 pulsatile pump, completing the chemical safety training at Stanford University's Nanofabrication Facility and adding value to a remarkably accomplished team.

I would never have imagined that as an intern my thoughts would be listened to each week in meetings with the chief executive and founders of the company. Now being able to say that the work I have done has contributed to the development of a device that will save lives in the future is a sheer privilege and has given real purpose to my degree. From Mechanical to Biomedical Engineering, it really is a testament to the incredible opportunities made available by the support of organisations such as The Incorporation of Hammermen.

California

I was fortunate to share an apartment with another Scottish intern who worked for a start-up in a different city – as luck would have it, we already knew of each other. We had little spare time to explore the surrounding area from Monday to Friday, in part due to the erratic hours of the start up world that require a little flexibility depending on the current operations. The majority of the time this gave way to reasonable hours, however on occasion I found myself in the lab until two in the morning to prepare for investor visits or product trials. Another factor through the week was the bay area traffic that took the US 101, an eight-lane freeway, to a complete standstill at rush hour. To balance out our long weeks, we decided to make the most out of every opportunity to travel at the weekends.



Testing Apparatus Designed with Solidworks, Machined and Implemented to Collect Data from "Smart" Grafts for Calibration



Pulsatile Pump Maintenance



Wearing a full cleanroom suit in Stanford University's Nanofabrication Facility

Our first weekends were spent exploring the vibrant city of San Francisco, a colourful metropolis full of festivals and celebration. We cycled across the golden gate bridge, drove down Lombard Street and met the locals.



Rental bikes on the famous Golden Gate Bridge



San Franciscans in Dolores Park

In the spirit of adventure, we made the most of the Californian countryside by travelling to Yosemite National Park. Through perseverance, we were granted rare permits to climb one of Yosemite's highest peaks, the Half Dome.



Conquering the Half Dome cables



A view from the edge of Glacier Point

Taking in all I could learn inside the workplace had sparked my passion to learn more about the progressive medical technologies being developed across Silicon Valley. Funding from the Hammermen not only went towards living costs and the commute to work, it also helped me to follow my passion by attending the annual Rosenman Institute Symposium – a conference designed to bring together a community of inventors, clinicians, and technology entrepreneurs who create solutions for unmet clinical needs. The five-hour event combined the most innovative biotech start-ups in the US showcasing their products and a Q&A with a panel of surgical experts, seasoned clinicians and start-up veterans all discussing topics exploring the intersection of medicine and technology. The talks were followed with a chance for networking and for me to ask a few questions of my own.



Interns from across California



Rosenman Symposium at UCSF

There was an emphasis put on networking in Silicon Valley and reaching out to others. After contacting GlobalScots and Heriot-Watt Alumni, I attended social events to take in a bit of American culture and find out the stories of those who had moved to build a career in the US. A few amazing opportunities arose from approaching others. Whilst camping in Sonoma Valley, I got the chance to meet a Heriot-Watt graduate who owned his own winery and gave us a tour. One Scottish expat who had become a renowned consultant offered us the chance to tour the GoPro headquarters and other contacts set up site visits of large tech companies such as Facebook, Instagram and Google.



BBQ with Interns & Scottish Expats



Learning about the first ever GoPro



Instagram HQ



The Facebook "Wall"

One of my fondest memories was made as a result of the VP of Engineering at GraftWorx taking note of my history in the Air Training Corps. I was unbelievably fortunate to be offered the opportunity to go for a short flight in a powered glider, owned by his friend and GraftWorx investor. I was granted an aerial tour of Stanford's campus and a unique view of the sprawling tech companies that surround the bay.



Palo Alto Airfield



Flying over Stanford Campus

Charity Fundraising

This summer, I have been afforded more than I could ever ask for. In return I wanted to show my gratitude by giving back and supporting those less fortunate. I decided that alongside my internship I would fundraise for two separate charities that hold a connection to Scotland, the first being The Saltire Foundation in recognition of the remarkable opportunities that they provide to undergraduate students, and the Scottish Association for Mental Health (SAMH) to support the meaningful issues they address. To raise awareness and funds I aimed high and set myself the challenge of swimming from the Alcatraz Island to San Francisco. With the hope that I could gain support from donations, I began training six weeks prior to the event. As I was not a particularly strong swimmer before summer it took a gruelling few weeks of training to perfect my technique and improve stamina. I happily sacrificed my lunch breaks at work so that I could cycle over to train in Facebook's outdoor swimming pool, teaching myself the correct form for long distance front crawl. Additionally swimming two nights a week, I had to make the decision two weeks before the event to start fundraising if I was capable of completing the swim. As open water swimming is a completely different challenge to churning out lengths in a pool, I travelled to San Francisco's Aquatic Park one evening after work, rented a swimmers wetsuit and attended an open water swimming session called Swim with Pedro. I paid Pedro the reasonable price of \$18 dollars to paddle beside me in his kayak as I tested the waters to see if I could swim a distance comparable to that of the Alcatraz prison. Having gained the confidence I signed up for the Escape from Alcatraz Aquathlon, which consists of a 1.5 mile swim to shore preceding a 7 mile run to the Golden Gate Bridge.



Open Water Swim Training



Post Alcatraz Swim

I would like to extend a special thank you to the Hammermen members who were able to support me and donated toward the two great causes. I'm immensely grateful for the support I received and appreciate every donation made. As a result I managed to surpass my initial target and raised \$1,241.47 to be split between evenly between the two charities, plus \$147.96 in Gift Aid.

Next Steps

Encountering the start-up culture and Californian lifestyle first hand has provided me with prodigious life experience, whilst interning at my host company taught me the invaluable lesson that you don't need to know everything. Studying an engineering degree with a wide scope can instil the idea that you need to be an expert in each field to make a notable impact in industry. In reality I have grown more as a young professional by tackling diverse challenges and learning to adapt in unfamiliar roles. Developing an awareness of GraftWorx values and culture enabled me to discover my position as an individual in the company, whilst receiving feedback from supervisors affirmed a confidence in my own capabilities that has motivated me to take a fresh approach to university. I have a newfound drive to be pro-active in my learning and stay cognisant with advancements in contemporary technology, as I have witnessed the wealth of remarkable opportunities that are available if you hold the right attitude and will to achieve.

I hope to stay engaged with the Incorporation of Hammermen of Edinburgh, the Entrepreneurial Scotland network and the GraftWorx team in the near future. Whilst finishing my degree I will continue to give back as a volunteer brand ambassador for the Saltire Foundation and look to encourage other ambitious undergraduates to reach out and seize every opportunity.