

**Cybersecurity Internship
CYSE 368
Fall 2023**



**Final Reflection Paper
Professor Duvall**

**Internship conducted at:
Brooks Crossing Innovation Lab
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Introduction

Throughout the period of September 14th, through to December 6th, I have had the opportunity and privilege to be an Intern at the Brook Crossing Innovation Lab. I had taken the Cyber Security Internship Course fully expecting to be given an opportunity for an internship out of the gate through the course, but I was sadly mistaken and had to apply for numerous different internships. I was fortunate enough to receive an email regarding an opportunity for internship through Old Dominion University and the course itself for the Brooks Crossing Innovation Lab and I gladly jumped at the chance. I am so greatly appreciative of the opportunity I was given and the people I worked with during these past three or so months.

Right before the internship was to start I was tasked with coming up with a few learning outcomes or objectives that I had hoped to achieve during my time, as well as a memorandum of agreement between me and my future employer. The first of the objectives and outcomes I came up with were learning the abundant cyber technology that was available to me. The second being the opportunity to gain teaching and working experience in a professional environment. The third objective was the opportunity to advance my personal cyber security skills and knowledge. Then finally was the opportunity to discover new opportunities for future employment through working with this organization, as they had close relations with other businesses relating to the cybersecurity field.

Throughout this paper I will be explaining the ins and outs of my time at Brooks Crossing Innovation Lab, including my experiences as a student and a mentor for K-12 students, the individuals I had the privilege of working with, and the different technologies I had the opportunity to work with and learn on while I was there.

Internship Introduction

Before I can delve into my internship experience, I must first describe the environment that I have been working in. According to the Brooks Crossing Innovation Lab website, they are described as “The Brooks Crossing Innovation and Opportunity Center (BCIOC) is a new facility in the Southeast Community of Newport News, open to all, offering training and job seeking opportunities...It is the first and only lab of its kind in Virginia. The Brooks Crossing Opportunity Center is a centralized hub for customized, flexible, comprehensive, and innovative approaches to career awareness, skills development, wealth building, support services, and case management” (Brooks Crossing). The building itself was around a small commute, of around 45 minutes from the Old Dominion University campus. As I worked here, I met with individuals who worked in conjunction with businesses near to the Innovation Lab, including the neighboring major business, the Newport News (or Huntington Ingalls) Shipyard.

When I first showed up to the Brooks Crossing Innovation Lab for the orientation, I had no concept of what I would be doing at the internship or how it would relate to my major as a student of Cybersecurity. Upon my orientation, myself and another intern were greeted by our supervisor, and we were given the first tour of the area that we would be working in for the next few months. My initial impression of the space was that it was a relatively new business, as it was a bit sparse in the decor and there were plenty of boxes scattering the area throughout. The main spaces that I was to find myself working in was the Maker Space, which was their technology corner. The Blue Room, which was lovingly labeled the “intern headquarters”. Then finally there was the Boykins Room, where the K-12 students would meet and conduct their field

trips when they would show up throughout the upcoming weeks. I had no real grand expectations when I first came to the internship of how it would look or what the environment would entail, but I found myself pleasantly taken aback by the sheer amount of new technology that I was surrounded by and introduced to during the tour. I realized that while I would be working with these technologies, the main focus of the internship was not to teach us what the equipment did, but to get us to learn and teach to others who would come into the building what they were and how they worked. Some of these technologies included items such as different styles of 3D printers, two laser engravers, a T-shirt printing machine, a UV printer, Raspberry PI's, Virtual reality headsets and softwares, and a multitude of others that will be discussed later on.

There were other areas of the building, however, that I was not personally familiar with during my time such as a conference room, a music recording studio, a space where individuals who came in could sit down and work at, and then finally there were actual offices for the higher ups who worked at the building.

My personal favorite to discover that I would have the chance to work with was a virtual reality welding machine. This machine was donated to the Innovation Lab by the Newport News Shipyard as a way to introduce younger students to welding and to spark or discover an affinity with the job and to see if that would be something they would be interested in as a future career, potentially with the Shipyard itself.

Throughout the tour, we were given the history of the business itself and what they stood for. As described by our supervisor, the company was started and set out to introduce new and exciting technology to the Newport News area in the form of outreach, and to give the individuals who lived nearby the opportunity to learn and work with technology to further their own education and job opportunities. They would also offer opportunities such as CyberCode Academy days, where students and parents would come into the Innovation Lab and be taught different cybersecurity skills and coding techniques by the interns and supervisors who work here, and huge day events such as the STEM Awareness Day. Along with this opportunity for outreach, they also had weekly STEM events where the main focus would be to teach the K-12 students different skills involving technology. While the company itself is a business, the Brooks Crossing Innovation Lab was by no means a profit driven company, most of, if not all of the focus was on the community and they did not sell any products. Anyone had the opportunity to schedule time slots to use the Innovation Lab during their operating hours. Anyone could come in and spend as much time as they signed up for to explore the vast arrangement of technology and equipment at their disposal.

Management Environment

The management environment was vastly different to previous jobs I have worked. Where I am used to being under the constant supervision of multiple individuals, I found myself being under the supervision of just one person the vast majority of my time at the Innovation Lab, this person being the Program Manager and the person who gave us our initial tour. Along with the Program Manager, the only other person who I knew of the management team was the owner of the business itself. As well as these individuals, I also had the pleasure to be working with graduate students who had applied to the internship program. I would consider them to be higher ups as well, due to the fact that they had far more experience with the differing technology, and had much to teach us when we asked for lessons or were confused about certain aspects of the job.

While we did work under the supervision of these individuals, the interns for a majority of the time were left to our own devices, and expected to work on our own tasks that were assigned to us through an online list. This document was split up into individual categories, such as daily tasks, weekly tasks, monthly tasks, and then the overall goals set by the program manager that were to be accomplished without a set in stone date in mind. With this form of self governing almost, the internship itself was very flexible with my schedule and we could choose just how often we worked. This was great as I had a busy schedule as is, and I was able to come in between my classes and work. We also had a weekly check-in meeting over zoom where we would join and talk about what tasks we had completed throughout the work week and what new projects we had started or ideas we had to share. This concept of supervision was foreign to me, and although it was nice to have a hands off experience with the supervisors, it was very easy to find myself distracted and fiddling with other technologies besides those assigned to me. The nice part of this arrangement was that while it was heavily initiative driven, the program manager would often come in throughout the day and check in on us interns to clear up any questions or concerns that we might have, which definitely helped to balance the new environment I found myself in, which pushed and helped to complete the tasks I had been assigned to with relative ease.

Major Work Duties

While working with the Brooks Crossing Innovation Lab and also being a cybersecurity student, I was tasked with responsibilities ranging from basic cleanup of the Lab and the different rooms and workshops, to working with technology and creating projects to help spread awareness and outreach of cybersecurity and related technologies. Along with these responsibilities, the other interns and I helped teach and work with the K-12 students who came on field trips to our building. Throughout the time at the internship, I feel as though most of our time was spent teaching these younger students the technology and skills, and less on working with the technologies myself. There were many field trips throughout the semester, and towards the end of my time at Brooks Crossroads, there were field trips almost every day of the week.

While it could be a bit frustrating working with these younger kids at times, due to the students being easily distracted and quite loud at times, I found myself enjoying teaching these younger students, as it opened their eyes to this brand new world of technology that they had not previously known about. As I had described above, these field trips were a major part of the outreach experience that was at the forefront of what the Brooks Crossroads Innovation Lab provided to the community. When there were no field trips scheduled, our days would remain relatively calm and revolve around the tasks we had been assigned and working on upcoming projects to help further this outreach program, and sometimes would provide a new lesson for the students and other members of the community who would come to the Innovation Lab.

One of my personal favorite projects that another intern and I had created was a Phishing Awareness Campaign. The goal of this project was to spread awareness of the threat of phishing emails, scams, texts, and phone calls that the students could experience in the real world and as they grow up with the technology around them. We did this in the form of a powerpoint, where we took real world examples of phishing attempts, such as an email I had received as an obvious attempt at phishing, and an example of what a real email would look like from a legitimate business and how they differ. We went over ways to discover what made the phishing emails

stand out, such as spelling mistakes, obviously fake email addresses, and links that looked suspicious.

Including this personal project, and the addition of others that the other interns and I had worked on throughout the semester, along with the field trips and daily tasks, I feel as though the culmination of our efforts positively impacted the business. Our projects helped to push the idea of cyber security and awareness, as well as teaching individuals new technologies, which aligned with what I feel as though the business had set out to accomplish in the first place.

Specific Skills

As a relatively newer student of Cyber Security, I had previously thought that the skills I had acquired through my classes were up to that of what was expected of a freshly recruited individual in this field. However, my time at the Brooks Crossing Innovation Lab turned that notion on its head. While I had a baseline of skills and knowledge to reference, I found myself challenged and learning new skills every day. While the skills I had gained throughout my courses were indeed useful, I felt as though I lacked behind my counterparts in specific job knowledge that was required for this internship. Prior to the internship, I had some basic programming knowledge with scripts such as Python and Linux. While this turned out to be useful for coding items such as the Raspberry Pi's, which are defined as "Raspberry Pis are small single-board computers that can be used for various purposes, such as learning programming, robotics, and electronics" (Raspberry Pi) using a program I had some previous experience with, such as linux. I had not before used programs such as scratch, which were taught to the K-12 students during my time. In my previous job experience, I did not have the opportunity to work with actual younger students before, so I felt somewhat unprepared for how vastly complex teaching in the real world is compared to the notions I had previously conceived on the topic. However, other skills I had gained in my classes such as how to properly work with computers had definitely contributed to my success at the internship. I found myself more often than not having to ask other interns how to do some tasks, and while I felt uncomfortable with how little I knew compared to what I thought I had, I am grateful for such an eye opening experience in an environment that I could safely do so without judgment or consequence.

Thanks to the internship experience, and to the class itself, I feel as though I have been challenged to learn more about cyber security through my own personal research outside of what is taught in class. The eye opening experience that I had was humbling but in a good way, as I will strive to better understand and have a newfound appreciation for the field I am working towards.

Curriculum Preparedness

As a student of Cyber Security at Old Dominion University, I have taken a multitude of courses that align with my degree so far. Some examples of these courses are classes such as Introduction to Python, Introduction to Linux, Windows Systems and Management, and others that have helped to further my basic understanding and knowledge of cybersecurity itself. While I had this basic understanding of my major, I felt somewhat unprepared for the internship in the form of teaching ability. Other than just that aspect, I feel as though the ODU curriculum that I have taken thus far helped me to succeed in my internship opportunity and with this internship course I have grasped a new understanding of what cybersecurity is and how it actually

correlates to the real world. As well as this new understanding, I have found myself wanting to take courses that better prepare me for the real world and what all I will find myself dealing with, such as threats, potential training opportunities, and the knowledge of how to use different softwares and technology that I have yet to learn or discover.

Learning Outcomes

For the multiple learning outcomes I had set for myself for the internship, I feel as though I had basically accomplished what I had expected to, and to my surprise I had accomplished even more than what I had originally anticipated.

The first of these outcomes were to learn the abundance of technology at my disposal at the Innovation Lab. I have accomplished this goal by having the ability to have worked with, played with, and learned about so many new and exciting technologies that I would never have seen before had I not come into this course.

The second goal I had set for myself was to gain teaching and working experience in a professional setting. I feel as though I have successfully accomplished this goal throughout the internship, as the abundance of teaching opportunities through the multitude of field trips has better equipped me to deal with teaching others in my professional field who may not know the in's and out's of cybersecurity like the K-12 students who came to learn.

The third of the outcomes that I had previously set was the opportunity to enhance and utilize my cybersecurity skills personally and professionally. I feel as though I had accomplished this goal to the best of my ability and much more than I had originally anticipated. Like previously stated, I had come into the internship with a basic understanding of what cybersecurity was and how it would relate to my major and my professional life. To my surprise, I came away from the internship with a whole new set of skills and understanding of how vast and ever changing the world of cybersecurity and technology is. The experiences and challenges that I had to overcome definitely set a precedent for how I go about learning and putting into practice the cybersecurity skills and knowledge that I will gain and have gained in the past.

The fourth and final outcome I had set for myself was to discover new possibilities with the technology I have never seen before. This outcome goes hand in hand with the first goal, as through the learning of new technologies through the initial training I went through, I had been thrown into a world full of new technologies and some technologies I had already been familiar with.

For example, with the field trips I had the pleasure of working with, I had learned how to create and print 3D models and items that had previously been unthought of to me (see Figure 1). I had the opportunity to learn how to print designs onto shirts using design software and a special T-Shirt printer (see Figure 2). I had learned how to set up and work with a Resin printer, in which I was the first intern of my team to accomplish. Lastly and one of my more favorites was the hands-on activities we had done with the children, such as building working models of windmills, rubber band racers, and coding VEX robots (see Figure 3). Without the help of the internship, I would never have had the opportunity to work with all of these different and amazing machines and technologies, and I even came out with a few souvenirs of my time, such as a custom T-Shirt and my own 3D printed name tag. Although the past few months have flown by, I can safely say that the goals I had set for myself and for my internship have been blown away.

Motivation

In the internship, I would have to say that the most motivational part that I had experienced was seeing how excited the kids who came through were, whether it be through field trips or the various STEM events that the Innovation Lab had throughout my time. As someone who personally gets excited about technology, computers, and cybersecurity itself, it was almost a breath of fresh air to see these individuals take time out of their day to want to learn more about what we offered at the Innovation Lab. Teaching these students and parents how to be safe online, how to code (while rudimentary), and to see them take a genuine interest in it motivated me to want to continue to learn and explore more about the teaching field and the opportunities that would be available in my professional future.

A second motivation would have to be the opportunity to work with the other interns and to be able to build off of one another, whether it be with new skills, or knowledge. While I was here I had learned more about technology and equipment than I would ever have on my own. This motivated me to continue learning more about the different equipment we had access to, and to go out of my comfort zone and explore the creative aspect of myself that I had never really looked at before now.

Combining these two motivations, and the warmth that the others that I had the pleasure of working with gave to me, fueled me to continue throughout the internship even though I had to commute through my busy schedule, and had other factors that weighed me down.

Discouragement

Although there were a plethora of great aspects of working as an Intern at the Brooks Crossing Innovation Lab, there were a few downsides that had definitely affected my experience. One of these discouragements would have to have been the long commute time. While it may not necessarily be the fault of the organization, having to cross the Hampton Roads Bridge Tunnel during rush hour was one of the most frustrating parts of my internship. Combining that with the amount of gas I had spent and the sad fact that the internship was unpaid definitely affected my motivation to want to come in as often as possible.

A second discouragement that I had, to no fault of the organization, was the laid back approach to teaching cybersecurity itself. Going into the internship, I had the expectation of learning from individuals who were in the field of cybersecurity. Although that was sadly not the case, I had fully expected to learn more professionally than what I did. As it was a cybersecurity, there was a level of expectation that I had to learn, but it quite frankly felt more of a teaching internship most of the time that I was there.

These discouragements were few and far between, and I feel as though the internship would have been enjoyable in the long run despite them. However, had the opportunity for a paid internship been available for the Brook Crossing Internship, I would have been way more eager to jump into it more so than I had, but I am definitely grateful to have been able to work here and expand my knowledge and gain the experience and skills that I have during my time.

Challenges

The challenge that I had the most trouble dealing with as both an intern at the Brooks Crossing Innovation lab and a full time student at Old Dominion University was balancing my

coursework with the schedule that I had to set to be able to reach the goal of 150 hours of required time for the internship itself. I had originally planned on having a part time job while having the internship and going to school, but as time progressed, I had come to the quick realization that it would not be an attainable goal for this semester. I found myself more often than not dealing with late assignments and a lack of overall motivation to want to work on school work at all considering that it was already past deadlines. Since I had started my internship a bit later than the rest of the interns, I found myself having to stay longer and coming in for less days than I originally had planned my schedule out for, partly because of gas management, but also due to one of the days I had set on working quickly became a work on make up assignments day. Had the time requirement been any shorter, or had my schedule changed ever so much to better accommodate this work load, I feel as though I would have had a much better experience, even though the experience I had was even better than I had hoped.

Recommendations

While my time at the Brooks Crossing Innovation Lab may have been shorter than I had hoped, I do have a few recommendations for any individual considering taking the class or working here in the future.

The main recommendation would have to be to learn how to balance their individual course load, as well as to set out a strict schedule for classwork and homework that can be managed along with the projects that are picked to complete for the internship itself. As a student I have never really had the need to create a work and assignment schedule before coming to this internship. I quickly realized that it was easy to fall behind, and while I had due dates for my assignments, I found myself not completing them on time. After a few weeks of rushing to complete these assignments, I had set myself a strict balance of work and project management which helped my life as an intern and student immensely.

A second recommendation that I have to better prepare future students for the internship class, I feel as though it should be made abundantly clear that they need to have an internship already established before coming into the semester. One of the major problems I had starting out, to which delayed me starting and getting my hours complete, was not knowing this to begin with. Had it not been for the opportunity to come to the Brooks Crossing Innovation Lab, I would have not been able to complete the Internship class, and would likely have had to drop the course entirely.

Conclusion

In the end, while my time at the Brooks Crossing Innovation Lab was short, I feel bittersweet about having to leave. While I did have a few frustrations and challenges about working the internship, it was vastly outweighed by the sheer amount of excitement and joy I had gotten out of it. Not only did the experience match what I had initially thought of it, it surpassed my expectations by far and the skills and knowledge I have gained throughout the internship will be carried on with me into my future professional career as a Cyber Security graduate. The ability to be able to work with the individuals I had, and to learn and grow with the young students in my skills has boosted my confidence for the future, and has renewed the spark of learning that I had previously felt had been buried under the amount of stress and assignments that I have had to complete as a student. I am thankful for the opportunity to have been able to

work where I did, for as long as I did, and would not change where I had picked if I had the opportunity to.

Appendix

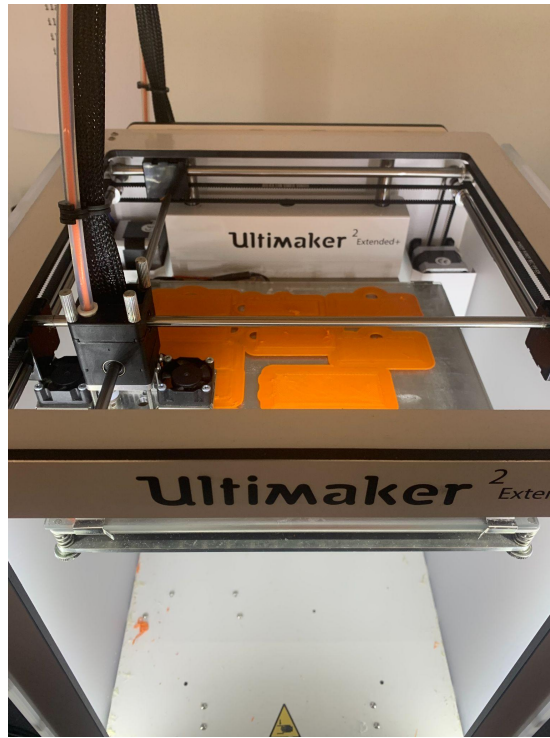


Figure 1



Figure 2



Figure 3

References

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