Internship Reflection Paper

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I. Summary

My role as an intern for Atlantic Engineering Services was to develop an update to their website that would help increase recruitment and recognition. My supervisor and I agreed that I will also take a business trip to visit the Pittsburgh office to discuss other potential products that can benefit the company, along with representing the Jacksonville office. Although I was hired to develop an update to the website, my other responsibilities were assisting staff and project engineers with site inspections, entering project drawings, data, and information into a database, and eventually being asked to investigate the internal network and physical security and make an overall security assessment of the business. The duration of the internship started 1 week before the start of the Summer 2023 Semester and ends at the end of the semester.

II. Specific Activities and Reflection

A. List of Specific Activities Performed

Sr. No.	Activity/Task	Course Objective	Team/Individual effort	Approximate time spent
1	Meetings with C-suite	1,2,3,5	Team	2 hours/week
2	Meetings with supervisor	2, 5, 6	Team	2 hours/week
3	Designing the final draft of designs and SRS for website update	1,6	Individual	1 week (total)
4	Implementation of the website update	1,3,4,6	Individual	2 ½ months (total)
5	Making Security Assessment	1,3,6	Individual	4 weeks (total)
6	Data Entry	1,3	Individual	4 hours/ week
7	Testing the VR platform on Revit	1,3	Team	1 week (total)
8	Business Trip to Pittsburgh Office	2,3,4,5,6	Team	1 ½ weeks (total)
9	Site Inspections	2,3,6	Team	3 hours/ week

B. Reflections on Specific Activities

1) Meetings with C-suite

Most of my meetings with the C-suite were staff meetings I shadowed. I learned the procedures of what structural engineers do to start projects, their development cycle, and the definitions and the business rules, I even got a few contacts for potential future internships by visitors in the meetings. The few times where I was in the spotlight, it related to me presenting the progress of the website update for validating whether it was they desired. I learned the dynamics of how meetings go for most engineering-related businesses where they go through the progress of each of their projects. I learned how to explain the progress of my project in terms that my coworkers and bosses can understand. I was also mentioned in other meetings where I had to explain the progress of the security assessment and any recent findings that they needed to know. I learned fast that I need to be just as careful with wording as I was when I was presenting my project.

2) Meetings with Supervisor

My meetings with my supervisor were mostly about discussing the progress of the website update. It was great to practice presenting my progress on the project as a way to rehearse my presentations to the C-suite. Although my supervisor had some background in programming, his knowledge was not above mine in front-end development, but he helped me practice how to word things during my presentation with the C-suite and staff meetings. In my meetings, I have to be sure to explain what my supervisor needs to know and ensure that he understands the information. If I do not, I can experience a shift in requirements later if he changes his mind. There were moments when he came up with ideas that would suit the project that I wouldn't have thought of my own because he is the one managing the product. These meetings were the first set of scheduled meetings I had in my career besides general staff meetings which could allow me to have an easier time to have a good dynamic with my superiors further in my career.

3) Designing the final draft of designs and SRS report for website update

Since the project started before the start of the internship, the discovery and requirement engineering process has been mostly finished. What was left to do was elicit any requirements left for features that were desired. I learned how to further help articulate what clients or the

person being interviewed meant when discussing features or requirements. The final process of reviewing the SRS and designs shows how easy it can be to be disingenuous about the document because the client will just approve without understanding the SRS report. The moment taught me to be careful with reviewing requirements and designs with apathetic clients. Without my stubbornness during the review, a lot of the requirements would still be unclear or need to be changed later.

4) Implementation of the website update

After finishing the SRS report and prototypes, I started to develop the webpages for the content, job board, and application. The first thing I needed to do was to research and learn HTML5, CSS, and JavaScript to understand how to do website development. Although the website was using SquareSpace, understanding web-development would assist me in using the advanced features and further understand how the web-stie operate. To speed up the process of learning, I used the freecodecamp website to get a quick crash course on all three. To my surprise, none of these languages were difficult. JavaScript felt familiar to C++ but without pointers, so it took the least amount of time to learn, CSS felt like I was making structure classes, and HTML is an has easily understandable syntax structure and formatting. Knowing CSS was useful in overcoming the limitations of SquareSpace's customization options through manual changes made through overwriting the SquareSpace CSS classes. When I had a good grasp on all three languages, that's when I started implementing the planned designs and requirements into the website while ensuring that no changes were made to the existing live website.

Despite the careful planning with the SRS report and prototypes, plenty of things did not go as planned and many designs and decisions had to be changed or redesigned because of the lack of thought when it came to the maintenance of the website and the limitations of Squarespace. This oversight had cost me a lot of time because I had to find solutions or fix designs to each issue that occurred with how SquareSpace worked. Squarespace is a user-friendly application that lets people who know nothing about coding make websites for their business. However, there are still plenty of limitations on what the user can implement into their website without using advanced settings and features. One of them surprisingly is to make a functional job board. This was amended by redesigning and developing a job board from scratch using the coding block advanced feature. Experiencing this made me realize the importance of finding these issues in the design as soon as possible because of the massive time lost. When I was in my Requirements Engineering and Analysis class, I heard that based on the time when issue or oversight occurs, the more expensive the cost to amend it. When I was managing the project, I didn't think about what it would cost me if I found an issue in the project, especially an issue early in the project like designs and requirements with maintenance. I don't know why I thought the job board would need to be edited at all. From an ethical standpoint, I could have done nothing and kept it so that I am the only one to maintain it which means I could possibly make money off maintaining the product, but it didn't feel right. I wasn't concerned about the money, I wanted to make the best product possible to make my clients happy, or in this case, to make my boss happy. I knew that if I was able to make the maintenance for the job board user friendly, then the product would be twice as good. Developing the job board was challenging because I had to learn how to use libraries and frameworks for web development like Vue3, Bootstrap, and learning how to use CDNs. I made user manuals for editing the content of the job board, I made heavy commenting and documentation inside the source code in case the product manager needed to edit that as well, I even made CDNs for the data, the style sheet, and each script variation so that product manager would have an easier time editing the job board. I removed any reference to the company and released it on GitHub to bolster my portfolio, I also intended for it to be seen by other SquareSpace users wishing to have a job board on their website as well.

5) Making the Security Assessment

When I first started the security assessment, the only purpose was to ensure that a recently terminated employee did not leave any applications that had malware or take any information that was not allowed to be shared. Then I uncovered unexpected weaknesses in the internal network of the business. I found that my work email has been receiving phishing emails under the name of my supervisor and the content inside the email oddly corresponded to emails we sent back and forth on teams. I was able to determine that there was malware on his laptop affecting the company's internal network. The whole situation was interesting because I learned a new method to attack a computer or network. The moment provided insight that knowing how to secure a computer or network can also provide knowledge on how to attack a computer or network.

I received complaints from my coworkers that the permissions and access control for modifying and deleting files did not exist in the internal network for the server. After a meeting with one of the C-suite members, I asked about the lack of internal security on the server. He mentioned that there were policies already in place to mitigate the risk of data loss and that backup servers update weekly. He also mentioned that their IT company, CMIT Solutions, monitors and mitigates any unusual actions that can be seen as internal threats such as mass deletion. When I read the case studies in my Computer Security class, I wondered how companies can seem inefficient with threats and problems or have poor access control, even if they are a tech company or have a department or team that focuses on their security. This experience has shown me that the reason is that there are numerous factors when it comes to security. Another reason could be poor internal management of responsibilities to the point that there is an oversight on a problem that can snowball.

After inspecting the internal security of their networks and computers, I focused on the physical security of the Jacksonville office. The focus of the assessment of physical security was the front door to the office because it is the only entrance. I ensured that no one would be able to

enter without employees in the office knowing through additional policies and installing a doorbell at the entrance. Throughout the assessment, I understood that securing a business is complicated. However, the best way to secure a business is to understand and know it. Knowing the business means knowing the industry, the expected behaviors of workers, the way the business is managed, knowing the services that the business pays for, etc. This insight helped me understand the reason for the SWOT diagram, the risk matrix, and how risks and threats are categorized. These parts of the assessment are understanding the business or product that is being assessed. When the report was finished, I sent copies to my supervisor and the members of the C-suite and they were happy that the findings were thorough and the recommendations easy to understand and perform.

6) Data Entry

Scanning CADD drawings and entering them into the company's server and database was a tedious task because finding and recording the information on the dated CADD drawings can be difficult due to the bad state of the paper. Some drawings didn't provide certain information, or it was provided in an improper spot which can be difficult to find. Putting each scan in the server meant knowing how to navigate folders and files. Those scans were also optimized manually for better visibility which took extra time to perform. Then the recorded information was then inputted into their database. Since I have been learning Revit, understanding CADD drawings has been easier since I have a good understanding of the template the drawings used. This experience can be good if I want to join companies like AutoCAD with the insight and understanding of why and how users use their products. I've also learned how the company's database works, gotten a better understanding of databases affect businesses, and understand ways a database can store and sort data.

7) Testing the VR platform on Revit

When I visited the Pittsburgh office, one of my coworkers gave me the idea to see the capabilities of using Twin Motions and virtual reality with Revit. Twin Motions is an application that can render 3D drawings into UnrealEngine5. What so Important about this is that UnrealEngine5 supports the Virtual Reality platform. To understand Twin Motion, I had to learn how to use Revit and how to make and edit designs using CADD. I then had to understand the Twin Motion application and how to bring the 3D architectural model into VR. Another coworker who was also interning to be a structural engineer and one of the senior draftsmen aided me using Revit by allowing me to use their projects and helped in the process of integrating the project into Twin Motions. The senior draftsmen assisting me explained that if I learned how to draft not only, I will be able to use Twin Motions more effectively, but I can also make money by being one of the drafters for the company. I then asked if it was possible to do this work on the side while I still focus on my career in software engineering. He explained that the work can be done from home and once I finished drafting for a project, I can choose to stop working and draft for another project later. This made me consider it strongly, especially if I graduate and I struggle to make ends meet.

8) Business Trip to Pittsburgh Office

The business trip to the Pittsburgh office was the most challenging assignment in the internship. To start, I had to navigate from Florida to Pennsylvania which is roughly a thirteen-hour drive, not accounting stops. Then I had to learn how to navigate the city safely and find places to eat or ship. To my surprise, Pittsburgh has a beautiful downtown district, and has a lot of potential jobs in the software industry, from big names such as Google to small companies like IT companies. The city is different from the ones in Florida given how the buildings are affected by the geographics. For starters, basements and rotating doors are common which are not in Jacksonville, Ft. Myers, or Florida. Knowing these pieces of information can help me decide on future job offers if they are in Pittsburgh because I understand how the area, the lifestyle, and the economy.

The other challenging parts were the assigned tasks that I was sent up there for. The main tasks were to do in-person meetings with my supervisor related to my current, future, and potential projects, elicit ideas from coworkers in the Pittsburgh office for features for the website update, and analyze their office and business to relay information that can help the Jacksonville branch improve recruitment, employee retention, and marketing. I had to do these tasks while still working on tasks for the website update.

The meetings with my supervisor went accordingly, we determined that by the end of the internship, my tasks for the project should be completed. My supervisor determined that the next project should be micro-sites for targeted clients and companies. His reasoning for this is to further initiate returning clients and companies that have stronger needs for the business's services and consultants. The potential ideas floating around were phone apps. When eliciting features or requirements from the coworkers at Pittsburgh, there was only one input that was worth taking note of and it wasn't about the website. It was about using VR in Revit which started the idea of it being a side project.

Analyzing their office was fun, but putting together how to improve the Jacksonville office based on the information found was challenging because of the huge differences in location and layout. However, the improvements that I puzzled together have improved the office's security and work environment. Understanding the difference between both branches in how they do business was interesting. Despite being the same company, there are huge differences in schedules, tasks, and projects being done. A great example is that the Jacksonville branch goes on-site visits more often than Pittsburgh. At the end of the week, I found ways of improving the Jacksonville branch's work environment by hiring more admin or secretary positions.

When talking to coworkers, another goal was to start conversations about getting to know or working with the Jacksonville branch. It started with the fact that Covid lockdowns made the business go through hard times internally and we needed more cohesion between the branches. During the business trip, I was a living reminder that they also work with people in Jacksonville. I was also a living reminder to the senior members of the business that my dad had once worked in the same building as them

before being moved to assist in starting the Jacksonville branch. This goal was an unspoken task given by my father who wants to ensure that the relationship between the branches stays strong. This business trip was a huge burden of responsibility and a challenge for me, but this was the best opportunity to learn more about being a businessman and to help the business grow internally.

9) Site Inspections

The job site and construction site inspections I was assigned to assist involved the following tasks: measuring dimensions on pieces of the building's structure, taking pictures in areas of concern, inspecting failures in the structure, drawing out dimensions, and high physical activities involving crawling through tight spaces, being under buildings, multi-tasking, and carrying heavy objects. What is interesting about these tasks was the idea that engineers still must do manual labor in some fields. Learning the exact consequences of an engineer being wrong can be disastrous to a business or firm and ensuring that the structure or products will work or exist as intended is a must to provide trust with the client. I connected similar processes of inspecting failures, dependencies, and potential problems in the future that are applied to coding and software engineering practices. Just as structural engineers must inspect each joist or beam on a given floor, so does a software engineer when it comes to given files, functions, classes, etc.

III. Brief explaination on the impact on Software Engineering knowledge, perspective, skillset, & future direction

This internship made me realize that the different fields of engineering have similar definitions, problems, procedures, goals, and industries. After all, engineering is seen as a scientific way of planning, designing, and developing. Just as a software engineer inspects and debugs code, a structural engineer inspects a building or construction site to see how structurally sound the structure is and fixes the things that are not up-to-code or that will be structurally unstable in the future. This internship also allowed me to learn front-end and website development. I've learned HTML5, CSS, and JavaScript to understand the basics of developing a website. Then I learned how to navigate and use Squarespace. This application is good if the user needs to be involved with the maintenance of the website and needs the ease to change things on the fly. The last thing I need to learn to complete the project was the bootstrap library, Vue3 framework, and a little bit of node.js and react.js. Due to some circumstances, I was also able to brush up on my cyber security and forensic skills and make a security assessment of the business I interned at. What was interesting is that I uncovered that there are phishing emails being sent to the company despite having an IT company in charge of their network and computer security. Based on the recipients and content of the phishing emails, I've also uncovered potential malware in the internal network because it seems that some emails are being intercepted. I am grateful for this internship, I have learned a lot about myself as a software engineer and that I can pursue freelance work, project management, and business analytics.

IV. Further Reflection

A. What Worked

What worked well during the internship was that I was organized with my assignments, tasks, and goals. I recorded and documented as much as I could, then I would organize them through backlogs, folders, notebooks, and GitHub. I even used the back wall of my office for the space of my backlog. It shows my coworkers and supervisor what I am doing. Thanks to being organized and thorough, I usually knew what my next step was, or I was prepared for an unexpected outcome.

B. What didn't Work

What did not work well during my internship was strangely my productivity in the early morning. I am not a morning person, yet I am still punctual when arriving at work at eight o'clock. That does not mean that I was productive at that time. I at least must have coffee to start the day, or I will just stare at the computer screen. Then before I know it, it's ten o'clock and I have to go to a meeting. I tried sleeping early, using sleep medication, working out in the morning, waking up even earlier, etc. This is important information for me to understand, especially in a professional environment where one wrong move can make a blemish on someone's career. Being aware of this now, I can schedule meetings or deadlines better in the future so I can be more productive.

C. If to do it all over again, what should change?

Looking back, only one thing comes to mind on what I wished that I had done differently which was being more stubborn when it comes to requirement elicitation and validation. When I started the project, my supervisor gave out the desired features but validated the designs later made with only a few comments. When we reviewed the progress at the start of the second sprint, he was unsatisfied with some features being under-designed that lacked the necessary elements he needed while others were overdesigned with elements that needed to be scrapped. Thankfully most of the fixes made were not time-consuming, but time was lost implementing and designing those features that were overdesigned. The sudden shift in requirements did involve redesigning a feature entirely which ended up taking a lot of time to research and develop. The mistakes that were made could have been prevented if I was more stubborn and thorough in the validation process but also more inventive with my elicitation. I found a method of wireframing or prototyping where instead of showing the whole product, I can show bits and pieces incrementally, then show how the whole prototype fits together.

D. If to do it all over again, what should stay the same?

If I had to repeat this internship, what should stay constant is the amount of documentation that I have made on everything I have done so far. Even if I don't plan on showing the documents to others, it's a record of my thoughts, notes, and ideas. I mainly documented any tasks with my physical backlog, I wrote journal entries if I made a huge milestone or anytime I felt necessary, and I documented the problems I faced when developing a new feature. The documents helped me stay on track with a clear

goal in mind by keeping records of issues, things done, and things left to be done. My documents also helped me write official documentation for reports and projects by providing key information or details through the research made. This saved time justifying or explaining information because it was readily available. My journals at first were good for debugging issues with software and code because it my issues into words which helped in finding the solution. Later, they became better at overcoming failures in my designs because they had dissenting opinions and notes about them. A lot of my journal entries or notes were just issues I could not solve and sources or research to possible solutions which were the ones that were the most revisited. Certainly, the project wouldn't be in the state that it's in without those documents.

E. Lessons Learned

The first lesson learned from interning at Atlantic Engineering Services was how to manage a project for a business on my own. Managing a project for a business has a few notable differences than managing an academic project. Firstly, deadlines for the business are not set in stone as much as they are in an academic project, but only if it is justified with evidence. A huge difference is that sometimes in a project related to a business, no one can help or check my work. This means that if I am stuck on a certain task, I have to find the answer on my own. Having no one to check my work means that I must ensure that the quality of my work meets the expectations of the business. In an academic project, most of the time it is heavily structured and has strict requirements, objectives, and formats. However, a project in a business not only can have a setting that is similar to an academic project but can require different methods or styles of formatting and structure depending on the scope or what is required by the business.

The second lesson learned is that sometimes to research and develop a project by a trial-by-error process. When researching self-imposed questions or topics that are unfamiliar, a lot more creativity and resourcefulness are required when searching for a source for the answer. Verifying the answer is especially strenuous when there is no one to correct the mistakes. On some occasions, verifying the answer or a debug solution can be its monster, especially when the person is alone in the process. I learned it is imperative to document methods and be organized to be able to verify or debug. The documents can help with the research or further debugs because it records the methods that worked and others that didn't for problems similar.

The last lesson learned was how to conduct myself in an office or professional setting. When it comes to conducting oneself in an office, it is important to be observant. Observing the dynamic of the office space is good for understanding how to know how the business is being run. Good questions to ask are "Who's in charge of sending the paychecks?", "who can make my life a living nightmare?", and "What does everyone think of the boss or person who hired me?" These questions are good to avoid making enemies in the office or to prevent them from sticking out badly. Being the "Grey-man" is a great trait to have because excelling can result in bigger expectations or have coworkers turn against you depending on the role or position in the company. Besides, a good surprise is used sparingly. Understanding the level of trust that the business has for my coworkers, and I can depend on the level of expertise and size of the company. Since the engineering firm is small and full of licensed engineers or experts with decades of experience, the business heavily trusts the employees to be ethical, such as not having a time clock, having weak internal security policies, and having flexible hours. However, the bigger branch office in Pittsburgh has more employees but with the same level of expertise has a stronger internal security policy to accommodate more people moving in and out of the office. Overall, these lessons are fundamental to thriving in any part of the software engineering industry or any engineering firm for that matter.

V. Approval

Supervisor Signature

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