**Engineering Experience: Example 1**

This is the first in what will be a series of posts, breaking down my own engineering experience record. In total, my record included my graduate studies (Master’s degree) and 4 different jobs. In this post, we’ll review my entry for my graduate degree. The entry is anonymized, but should still contain plenty of information to give an idea of how one might fill out their own experience record.

**Graduate Degree Experience**

The first section is self-explanatory. Describe when, where, who, and what.

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| **Start Date** | | *(a while ago)* |
| **End Date** | | *(a while ago + 2 years)* |
| **School** | | *(A Canadian University)* |
| **Department** | | Biomedical Engineering |
| **Degree** | | Master of Engineering Science |
| **Supervisor & P. Eng Reference** | | Dr. *(My Supervisor)* *(Mailing address)* License: 123456789 (PEO) |
| **Responsibilities** | I conducted scientific research on the use of *(imaging technology)* for *(medical application)*. The research consisted of two projects: (1) *(measurement 1)* and (2) *(measurement 2)*, and relied heavily upon implementing signal and image processing techniques through software (SW) development. I also worked as a teaching assistant for undergraduate (Programming for Engineers) and graduate-level (Introduction to Medical Imaging) engineering courses. | | |

**2.2.1 Application of Theory**

This section is fairly straight-forward. Typically whenever you design or develop something, you’ll work through the steps listed here. Remember to clearly state what *you* (and not team members or colleagues) did.

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| **Analysis** | I performed a technology assessment (scientific literature review) of existing methods to measure *(measurement 1)* (acoustic microscopy, histological analysis) and *(measurement 2)* (magnetic resonance imaging, small angle light scattering, polarized light) for *(human anatomy)* in order to gain a better understanding of how these measurements had previously been obtained. |
| **Design and Synthesis** | I designed and developed software in Matlab and LabView to (1) compute *(measurement 1)*, (2) interface with a digital oscilloscope and mechanical ultrasound probe mover to collect radio-frequency (RF) data, (3) calculate and plot RF spectra, fitting the results to a model for tissue anisotropy. |
| **Testing Methods** | I planned and executed a test to measure the speed of sound in a controlled saline-based solution in order quantify the error introduced by this measurement. I also used tissue of known anisotropy (e.g. muscle and liver) as a sanity test of the anisotropy measurement apparatus and software. |
| **Implementation Methods** | Using the software I developed and experimental tissue-holder apparatus that I co-designed, I imaged 13 *(description of specimens)* and used the software I developed to measure and map their *(tissue characteristic 1)*. Using software that I developed, I measured the RF back-scatter from 8 *(description of specimens)* to characterize their *tissue characteristic 2*. |

**2.2.2 Practical Experience**

This is where the vagueness starts, in my opinion, and for that reason where breaking out the response into separate table entries really helps. It ensures that you hit all of the points that the PEO is looking for.

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| **Function of components as part of the larger system** | To design SW interfacing with an ultrasound system through a digital oscilloscope, I achieved an in-depth understanding of how the ultrasound signal, originating from the transducer and echoing off the specimen, was travelling through the ultrasound system (analog and digital components) and digital oscilloscope to arrive at a point where the SW could read it. |
| **Limitations of practical engineering and related human systems in achieving desired goals** | Imaging the *(specimen description)* for *(measurement 1)* required the tissue to lay flat and remain stationary while in solution. I iteratively co-designed a jig designed to secure the tissue for imaging, while applying minimal compression and obscuring as little of the tissue surface as possible. This necessary jig, however, partially limited the surface area of the tissue that could be imaged. |
| **The significance of time in the engineering process** | After being excised from the *(organ description)*, the ex-vivo *(specimen description)* deteriorates in a matter of hours in a process that is accelerated by excessive handling. I developed and adhered to an efficient imaging protocol to ensure the integrity of the collected data. |
| **Knowledge and understanding of codes, standards, regulations and laws that govern applicable engineering activities** | All my laboratory work was completed in a WHMIS-compliant environment. I completed the appropriate WHMIS training being completed beforehand. |

**2.2.3 Management of Engineering**

You’ll notice there are a few N/A’s in this section and that’s fine. No one is going to get a lot of management experience fresh out of undergrad and especially during a Master’s degree. I put N/A’s in the categories that I did not accumulate experience, knowing that I covered these areas in subsequent jobs.

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| **Planning** | In order to fund the engineering research, grant and scholarship applications were written. I, along with my thesis supervisor, developed a high-level plan for the research to be completed. We documented our hypothesis, proposed methods, and justification for the project prior to the work commencing. |
| **Scheduling** | I performed all scheduling of the data collection, analysis, and reporting segments of the project. This scheduling accounted for the use of resources with limited availability (ultrasound and CT imaging systems), high priority resources with unpredictable and expiring availability (*(description of specimens)*), and predetermined milestones with required deliverables (conference presentations, journal submissions, thesis completion). |
| **Budgeting** | N/A |
| **Supervision** | During this research, I also worked as a teaching assistant for undergraduate engineering courses (Programming for Engineers and Introduction to Medical Imaging). I tutored both graduate and undergraduate engineering students on these subjects. Additionally, I co-supervised a group of summer students as they completed small-scale research projects in our lab. |
| **Project Control** | N/A |
| **Risk Assessment** | N/A |

**2.2.4 Communication Skills**

If there’s one thing you get exposed to quite a bit during graduate studies, it’s communication. Heck, I took a graduate level course on scientific communication. Whether it’s the endless writing (scholarship applications, abstracts, papers, and your thesis) or the presenting (as a scientist or a TA), grad school is not as insular as some may think. In how many other positions, for example, will you be in the position to present something to the “general public” (whether it’s useful or not is another story..)?

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| **Preparing written work** | I wrote up experimental and research findings in conference abstracts, a paper published in the peer-reviewed journal *Journal Name*, and my Master's thesis. |
| **Oral Reports or Presentations** | I presented technological problems & solutions during weekly laboratory meetings and presented research updates to thesis advisers. |
| **Presentations to General Public** | I gave a 1-hour lecture of my thesis work to an audience composed of academics and interested members of the general public. |

**2.2.5 Social Implications of Engineering**

This was typically the most difficult section for me to populate and I suspect it will be the same for many others. Luckily with my later experience in medical devices, impact on the public and the significant of regulation are not difficult to cover.

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| **The value of benefits of engineering work to the public** | The research I performed worked towards establishing *new measurement methods for a novel biomedical technology*. *(This novel biomedical technology is)* considered the u201choly grailu201d of *(solutions to a biomedical problem*, offering numerous advantages over current *(current solutions)* for the patients who need them. A proven method for monitoring the *development of this novel biomedical technology* is critical to this concept becoming a reality. |
| **The safeguards in place to protect the employees and the public and mitigate adverse impacts** | All WHMIS and other laboratory safety guidelines were followed during procedures to ensure employee safety. All published findings were peer-reviewed to ensure the correctness and integrity of the scientific and engineering methods used. |
| **The relationship between engineering activity and the public at large** | N/A |
| The significant role of regulatory agencies on the practice of engineering | N/A |

And that’s it, folks! I’ll have 4 more of these entries, one for each of my past jobs. If you have any questions, please leave a comment, send me a tweet, or even an e-mail.