Professional Self-Assessment Report

1. **How have I satisfied the learning objectives of the course and contributed to team and course outcomes?**

   1. ***"Describe various forms of technical communication and the reason for using them"***
      In the lectures with Gregg Motter, a lot of discussion on how to effectively communicate between the customer and engineer was discussed. Technical communications are widely used in industry today and they help focus the key goal of a project. Examples of technical communications are found within Six Sigma quality training program. The documents of the program include FAST Diagrams, Houses' of Quality and Voice of Customer. FAST Diagrams are 2-3 key word identifiers to explain the necessary steps to meet project requirements. Because of the simplicity of the diagram, individuals without a technical background can easily understand each objective. A House of Quality displays the essential functions needed by the customer in a graphical, house shape. This is used to identify the absolute musts that are needed for a successfully completed project and where the most time should be spent when dividing up tasks. Last is the Voice of Customer. This document is a list of open-ended questions that specifically determine what the customer is expecting. This is usually incorporated into the House of Quality discussed.

   2. ***"Write well-organized technical reports"***
      So far throughout the course, technical reports have been very important to clearly explaining project goals. The first technical report required was the Project Proposal. In this report, 3 main necessary components were needed, first and foremost, an informative background to explain the need for the project and explain how current technology is being used today. Secondly, well thought-out technical approach as to how the team is to accomplish the task and the research required to do so. Additionally, there were things that the team has not had to deal with such as budget costs and timetables to ensure that the project can be funded and also be completed on time. Another technical document created this semester was an Application Note. This document was an informative instructional approach to complete a technical goal. With this document, clearly explaining logical steps to non-technical minded individuals was the most important focus and required a very meticulously details report. These reports really helped to increase the skills necessary for technical documentation.

   3. ***"Write a team proposal for a major design project and obtain approval"***

This topic was discussed a bit in the last section, but the approval part was not. In regards to obtaining approval for the task, our team had multiple extra steps included in the process. In addition to submitting a proposal to the ECE 480 class instructors, an extra proposal was required by the United States Air Force Research Laboratory (AFRL). This process was very difficult, but with much perseverance and work, the government also accepted that proposal and work was then begun promptly on the project. What was taken from working with the government is that there are a lot of steps and government red tape that needs to be completed before projects can begin and in order to successfully start a project quickly and promptly one must be very motivated and active with speaking to their customer whom in this case happened to be the AFRL.

4. *"Comprehend appropriate content and style of oral presentations"*
Oral presentations are difficult for many people and from the course I have been able to improve upon my own oral skills. The most important things I have learned are that to have a successful presentation, one my come prepared. Being prepared means that a team will practice the presentation before presentation day and everyone knows their part that they will be speaking on. In terms of the content to present, it is better to keep simple bullet points on topics that will be discussed during the presentation and not just read information right from a slide to the audience.

5. *"Access relevant standards and interpret their meaning and application"*
Codes and information pertaining to the frequencies that can be used to transmit data were examined and discussed in the group when deciding which wireless sensor network (WSN) to purchase for the task of health monitoring. The AFRL did not have any specific requirement relating to the type of WSN to be used or of any FCC regulations that would have to be followed when configuring the network, but the team made sure to understand the application of our WSN.

6. *"Delineate the principal design criteria and constraints for an electrical or computer engineering design project—e.g., cost, size, power, environmental factors, reliability, safety, maintainability, and reusability"*
Reusability was highly sought after when it came to the decision of which WSN development kit should be used. I personally pushed for a battery-free WSN that would improve the reliability and additionally is easily reusable for the future. Also, a low power WSN was a must so that as little power as necessary would be consumed for the transmission of the data packets to a computer host. Cost was a little high, but the push for an alternative power source could easily save money in the future for operation costs and maintainability.

7. *"Describe and understand the overall engineering design process—e.g., project justification, identification of constraints, establishment of design criteria, establishment of timetables, identification/scheduling of critical path, the partitioning of work, project monitoring, and project evaluation"*

   The AFRL specifically told the group that there was no wrong way to analyze a wireless sensor network's (WSN) health. This gave the team the option to research alternative options to current WSNs and to look towards better future applications with new emerging energy harvesting technologies. I was the manager in the group, and timetables and schedule of goals necessary milestones necessary was a must. The team was split into 2 distinct engineering majors, 2 electrical and 2 computer engineers. I being an electrical engineer focused my attention on the sensor board layout and that the component were working properly or functioning correctly while testing. From speaking with our sponsor, the team was able to discover the main necessary goal expected from our involvement in the project. Back to the partitioning of work, the electrical team was tasked with the actual hardware of the WSN and the computer team was in charge of a GUI creation that would display data in a very simple and clear understanding. These roles were assigned to each team member and communication and weekly updates allowed each team member to report their progress on the project.

8. *"Describe and understand contemporary industry practices and trends with respect to electrical and computer engineering"*

   Currently much of the money for WSNs goes into maintenance and the upkeep of the network. The design followed by our team solves a lot of the issues with maintenance related costs and provides a functioning, reliable WSN. The implementation of the easy to use GUI to help interpret the data being received from the WSN will help operators to identify if am issue arises in the network thus fast and easy maintenance can be done when it is necessary for the network.

9. *"Describe, understand, and apply key tools used in the overall electrical and computer engineering design process"*

   Throughout the project, a multitude of tools have been used in analyzing network health. The use of a Hypercast terminal had to be configured in order to successfully collect the important transmission data. Additionally, the use of the Infiniium DSO9064A Oscilloscope to collect measurements of voltage across a particular resistor on the sensor boards allowed for the calculation of current that could be analyzed for correct sensor operation. Python was utilized in the creation of the GUI interface such that is interprets the data received from packets into an observable program that an operator can easily understand.

10. *"Understand the benefits and potential problems of teaming, describe qualities and processes of effective teams, and describe the role of teamwork in system design"*
This was something that definitely was something the team had to work with this semester. Everyone works differently and thinks different ways so all team members had to discover how everyone works and how to best work together. As manager I had to defuse situations that arose in regards to the initial design proposed. I personally like to create a type of think tank and hash out details of the goals and design to follow, but others in the group preferred to work alone. The best practice I realized in managing a team is not to force individuals participate in team building type activities, but to just give everyone a pre-defined goal that they should complete and gather regular updates about the status of their assignment. Also, finding available times for the whole team to meet and discuss about important deliverables was difficult, but manageable.

11. *"Acquire and understand information contained in contemporary technical literature—e.g., trade journals, magazines, books, conference proceedings, and supplier literature—about hardware components, software, design tools, third-party suppliers, etc."*
A lot of research was required in this project and understanding the steps already taken in other technical documents was vital in understanding the approach the team should take in monitoring the health of the network. NASA had documented a particular communication protocol they had used in designing their WSN and the team used this information a criteria in determine which WSN would be best for our application. After finally deciding on which network development kit to purchase, the team was able to purchase the WSN off of Mouser Electronics, a well-know and good distributor of electronic components.

12. *"Browse the web to acquire information about electrical and computer engineering, software, design tools, third-party suppliers, etc."*
This was explained in the last statement above for information about WSNs. Google was highly used in finding different sources for the original WSNs under consideration for the project proposal. Specifications about the WSN purchase were found from the electronics company's website.

2. **What have I learned about the design process from my work on the design project. Restate your portion of the overall project as defined in your team's design proposal, which was developed and completed in week 6 of the semester. Describe your work during the semester on your TECHNICAL portion of the design project. In your write-up discuss your work in terms of the overall engineering design process – e.g., project justification, identification of constraints, establishment of design criteria, establishment**

of timetables, the partitioning of work, project monitoring, and project evaluation. Also discuss your work in terms of design iterations that occurred during the semester."
My role for the project was fault determination and systematic failure of nodes. Through this role, my objective was to discover how to fail the different nodes within our network and to come up with a way to report this information to the user observing the different sensor nodes. The WSN used in the project has a wireless sensor board that controls all sensor outputs. The 3 sensors on the board are light, temperature and humidity. Each of these sensors has jumper pins located on the wireless sensor board. These nodes can easily be failed by simply pulling the connection jumper pin. This was the first and most simple failure that was able to be induced in the network. Further research on failures within networks uncovered research papers describing algorithms used to determine if a node within a network is acting strangely. This approach is beyond the scope of our knowledge and the project goal given thus a more simple average analysis was decided upon. This average analysis will be able to determine after many samples if a sensor is acting strangely or outside of a normative norm for the condition it is placed in. Since my role was also as acting manager, I was running the communication between the facilitator and the sponsor whenever any issues would arise and keeping together a schedule to coordinate the task necessary to deliver a working product to the AFRL at the end of the semester. From our meeting with our sponsor, the main objective that was stated to us was to just have something functioning. That has been our goal as the project has continued and by limiting the design to simple procedures throughout the semester, I have kept the team on track with getting a working design built and configured.

3. **What technical communications have I done this semester? List the reports and presentations you have help prepare. Also indicate those presentations for which you were a speaker.**
I helped in the preparation of every presentation that has been given this course. These technical communications include Voice of the Customer, Pre-Proposal & Proposal, Application Note, Design Issues Paper, Final Report and all Oral Presentations. I was a speaker in both the Proposal and Technical Oral Presentations and will be speaking in the Final Oral Presentation on Design Day.

4. **What is the impact of this course on my career objectives and professional goals**?
This course has thrown me into a real-world application of a project and taught me the skills necessary to work in a team and successfully complete the project to a sponsor's requirement(s). New tools such as Six Sigma practices have helped in investigating the most important aspects and outcomes desired of projects and will likely helped decision making in my professional career in the future. Taking on the role of manager and making sure that the tasks required are being completed has helped me develop my leadership roles. In the

future I plan to potentially manage a team of individuals and this experience will benefit me for that role.

5. **What are my primary strengths and weaknesses?**
My strengths are in my organizational skills, time management and group focus. I am able to continue to remind and keep individuals focused on tasks at hand and also to help meet required team deadlines. I love to be on schedule and things running smoothly, but this experience has shown me that a lot of projects run into issues and dealing with those issues is another skill I have developed during this semester. A weakness I have is not asking enough questions. I will take on tasks sometimes not fully understanding what needs to be done and then have a result that was not exactly what was wanted. Luckily, my team members have been able to help me better understand tasks and focus attention in the necessary areas that need to be addressed for the project.

6. **Where would I like to be professionally five years after graduation?**
I hope that I will be in a position of engineering that I love. Whether this role is a managerial role or not that is not of great consequence to me. I believe that loving your job or having a passion for the position that you are in the most important thing to me. If a person works in a job they hate, they are likely to not produce quality work and both they and the company will suffer, thus I think it is most important to find the job you love. I am hoping to complete a rotational program with a company and be highly immersed in my job that I love.

7. **What lifelong-learning steps must I plan to undertake in order to achieve this five-year professional goal?**
Applying to many companies to experience all that electrical engineers can do in a variety of fields. This will allow me to find that job that I will love and can contribute to. Throughout this process, learning all about the job functions and all the things that have to be considered when designing a new product or assembly line. I have to become an expert at my job if I wish to eventually become a manager. Being a better leader and building on the skills from managing my team will help me reach the goals I have set for myself.

Appendix
Attached is my resume as the final page of the report.

Stuart Andrzejewski
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Objective
To obtain an electrical engineering position that will allow me to utilize my education and work experience for the benefit of the company as well as for personal growth and professional advancement.

Work Experience
Johnson Controls Inc.
Intern
May 2013 – August 2013

- Greatly aided in the flashing process of a Multi-Function Display (MFD) with the construction of a new flashing fixture and a revised flash procedure
- Significant help during an enormous vehicle cluster issue which resulted in massive amounts of analysis and testing
- Construction of a fixture and instructions for quick, easy measurements of a Combiner - Heads Up Display (C-HUD)

Autoliv Electronics America
Intern
May 2012 – August 2012

- Collected Blind Spot Monitoring (BSM), Rear Cross Path (RCP) & Lane Change Assist (LCA) data from test vehicles
- Extensively analyzed vehicle safety test data
- Created a user instruction manual for the DEWESoft software program on how to configure the program for specific testing procedures
- Time using CANalyzer CAN software program & Velodyne tracking software and function

Gamestop
Game Advisor
October 2007 – May 2012
Duties: Provided excellent customer service and inventory control

Education
Michigan State University
Student
3.52 GPA
January 2011 – Present
Expected Graduation: Dec 2013
Major: Electrical Engineering

Lansing Community College
Student
August 2008 – December 2010
3.4 GPA
Major: Engineering

Grand Ledge High School
Graduate
September 2004- May 2008
3.965 GPA
Activities: National Honors Society, Bowling Club, Quiz Bowl and German Club

Awards and Honors
Lansing Community College Honor's Program
Michigan Merit Award
National Society of Leadership and Success

Computer and Programming Proficiencies
Microsoft Office, Excellent in Word, Excel and Powerpoint
Programming: Visual Basic, Python, C Progamming, WinIED (Assembly Code)
Talented in MATLAB and PSPICE
Experience with AutoCAD and VHDL