From an academic perspective, this senior design project will serve to guide my research in a more structured way. I have done research in the past, but without formal documentation or goals beyond semester reports. With the addition of senior design requirements, I will have a more rigorous structure for documenting my progress. I will be able to take the processes I use for senior design and apply them to future research work, which will increase the quality of the results I produce. Additionally, the project will introduce me to more machine learning concepts, as well as concepts for data processing and time-series data, which I would not be exposed to otherwise in my coursework. Overall, this senior design project will serve to bolster my research experience and provide me with more exposure to several interesting topics.

A few of my classes have prepared me for this kind of project. Since the topic of the project is machine learning, the courses AI: Principles and Applications (CS4033) and Machine Learning (CS5137) provided a theoretical basis for machine learning techniques, which I can use to guide my research. Without these courses I would have to rely on self-taught machine learning strategies and would not have as good of an understanding of the theory surrounding machine learning. In terms of soft skills, Introduction to Effective Speaking (COMM1071) taught me to be more effective in my presentations and other speaking areas, which will help me when I need to present my work. Intermediate Composition (ENGL2089) gave me more experience with compositions techniques I can use when writing reports. The technical courses will help with the design and work of the project, while the soft skills courses will help with presenting my results to a wider audience.

My co-op experiences at Siemens Digital Industries Software were instrumental in providing me with the skills I will need for this project. While not related to the topic of my project, my first three co-op semesters as a developer introduced me to professional development, some strategies of which I can use for this project, such as tracking progress and setting deadlines. Additionally, I had to create presentations for my peers at the end of each semester, which has prepared me for any presentations I need to make for this project. My last two semesters were as a research co-op working on generative adversarial networks, which is much more aligned with the topic of this project. I got a lot more experience working with machine learning topics and will be able to use that knowledge for more advanced strategies in this project. I interacted with several machine learning tools that are in use today and learned how to navigate them so I can use them for any tasks I need to complete for the project.

I find this project interesting because it intersects the interesting topic of machine learning with worker safety. The best use of technology is to improve lives, so using machine learning to help improve working conditions is a very important topic to me. My approach on this project will start with researching current techniques for human activity recognition. I will generate ideas based on this starting point and decide how to build off current work to improve it and apply it to the problem of lift risk detection. Using the knowledge gained from this, I will develop a model that can be used for this purpose and evaluate it on real-world data. I will then present my findings and how they can be applied in a real setting.

I expect that the results from this project will be promising, because human activity recognition has a lot of research to build from. By the end I will ideally have a model that is capable of detecting a lift and classifying it according to its risk level, as well as an idea of how it could be implemented in a real system. The main metric to evaluate myself is by the performance of the model. If it performs well enough to be acceptable in an industrial environment, then it would be considered successful. However, there is a possibility of the model not working as well as I hope. In that case, fully documenting the failure and determining why success wasn’t achieved is still a valuable result from research. Regardless of the result of the research, full documentation and analysis of the results increases the amount of available knowledge regarding the topic, which is a success.