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CS5001 Senior Design

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09 - 15 - 2021

Assignment 3

The senior design project my group and I are currently expecting to research/build is a nerf gun turret that will fire upon individuals in specific circumstances. These circumstances include if the face of an individual is detected on a camera, or if a motion sensor is tripped. This group consists of only computer science students, so I believe an area we're all strong in is software development and programming. I believe this experience will allow us to successfully develop software that can perform some of the necessary tasks for this project (e.g. use machine learning to identify faces, control when the nerf gun fires, etc.). However, I believe my group and I lack experience with physical hardware and devices, so some aspects of this idea (pulling the trigger, creating/monitoring a motion sensor, etc.) may be difficult to implement.

I've personally taken specific courses at this university that I think will provide a good foundation for the experience/information needed to complete this project. I've taken MATH1062 (Calculus II), MATH2076 (Linear Algebra), CS4033 (AI Principles and Applications), and CS5137 (Machine Learning). I believe, if my group were to implement some form of machine learning for facial recognition, the knowledge I've gained from these courses will allow me to implement this. I've also taken many programming courses such as EECE3093C (Software Engineering), CS3003 (Programming Languages), CS2021 (Python Programming). I think these courses gave me the necessary experience I'll need to create and implement code for this project. I've also picked up skills and experience from my coops.

I worked at the tech company London Computer Systems for four semesters. My position was that of a quality assurance software tester for one semester. During this time, I discovered and reported defects to my team, coordinated with software developers to verify code changes had addressed certain issues, and was responsible for creating and executing test cases. I was a software developer for the other three semesters of my coop. In this position, I reviewed software changes made by others to ensure program quality and designed, developed, and implemented code changes to software. I also gained experience working with a team of competent software developers. I believe my time spent on coop provided me with efficient software development

skills and practices as well as good testing habits that will allow me and my team to competently work on and complete this project.

I'm excited to work on this project for several reasons. The first of which is that I feel like this is the best opportunity I'll have at university to create something that not only am I proud of, but something my friends and family can be proud of too. This project could be a neat feather in my cap that tells others I learned something at school and made something awesome with it. Secondly, I think this project idea is difficult enough that my team and I can pick up new skills along the way. For example, like I said earlier, I feel the software aspect of this project won't be too difficult, but the hardware aspect (pulling the nerf gun trigger, creating/monitoring a motion sensor, etc.) is something I do not know very well at all. However, I think researching this and coming up with our own solutions will be a great opportunity to learn about subjects that weren't present in our traditional CS curriculum. I think our preliminary approach to this project will be deciding what aspects of this are absolutely necessary to include and which aspects aren't. For example, should we design and build a track that moves and adjusts the angle of the nerf gun depending on the position of whoever is spotted on camera? If so, how will that be done and can it be done in an efficient way that won't take months to complete? Otherwise, let's adjust the parameters of our project so we don't need to implement the track specifically and can instead focus on the bigger picture.

At this point, the only expected result that I wish for this project is that the nerf gun will fire when someone has been detected via facial recognition or a motion sensor being tripped. I'm not sure of the smaller, more specific results that I wish to see since my group and I haven't discussed them yet. I'll personally evaluate my contributions by objective metrics such as the total amount of time I spent working on this project and how many lines of code I've written. I'll use more subjective metrics such as how often I was able to successfully help group members complete their work, or how others feel and view our project as time progresses too. Besides the obvious deadline date, my group and I will know when we're done once the project has successfully completed the goals we set for it. If our project can do that, and it was able to do that with little sacrifice to what we originally wanted to do, then I would feel that I had done a good job creating this project.