NVESD 2- Tank Motion Simulator

Overview
The objective of this project is to design, prototype, and test a Tank Motion Simulator whose end goal is to utilize computer vision and augmented reality systems. The simulator will be made up of three pan and tilts (gimbals) attached to each other representing the body, turret, and long range sensor. A computer application allowing for control of the simulator along with a 3D representation of the simulated tank will be produced. The challenges faced in this project relate to time limitations and issues incorporating a 3D model into the user interface.

Objectives
The objectives of this project were to create an application that can control three pan and tilts with a joystick controller and have the outputs adjust the position of a 3D simulated tank. It was also desired that the user can set soft stops, velocities, accuracy and latencies for each pan and tilt through the user interface.

Approach
- The customer needs and goals were evaluated in order to create a schedule
- Concept generation and selection were used for the connecting plates for the Burchfield and Quickset as well as for creating the GUI
- Stress and strain calculations were performed for different materials to use for the connecting plate
- Prototypes were created out of acrylic to test fitment and screw hole accuracy
- CAD models were created in SolidWorks for both the connecting plates and 3D tank model
- The final product was machined from 6061 aluminum
- Full panning and tilting cycles were performed to ensure that the final product would function as expected
- C++ was used for the GUI, with testing performed for debugging and performance evaluation

Outcomes
- Successful implementation and control of the tank body and turret was achieved; however, time limitations made implementing a sensor unfeasible.
- A 3D simulated tank was developed and successfully implemented in the user interface.
- The completed project will allow NVESD to test sensors and augmented reality applications in the future without having to install equipment and purchase armored vehicles, allowing them to save both time and money.
- The project resulted in the initial development of a state of the art simulation tool.