

3D Paint

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Computer Vision HIT

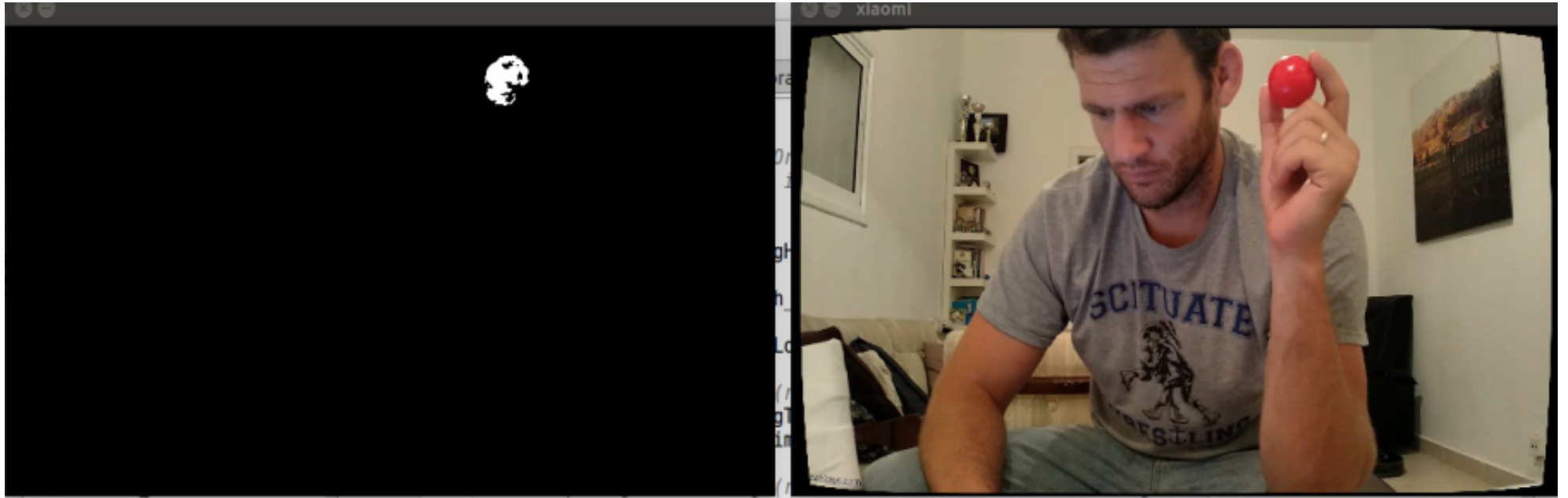
Project Overview

- **3D Paint is stereo camera set up that employs object detection to track the three dimensional path an object takes.**
- **It allows the user to 'paint' in three dimensions, with real time plotting.**

Object Detection With Color

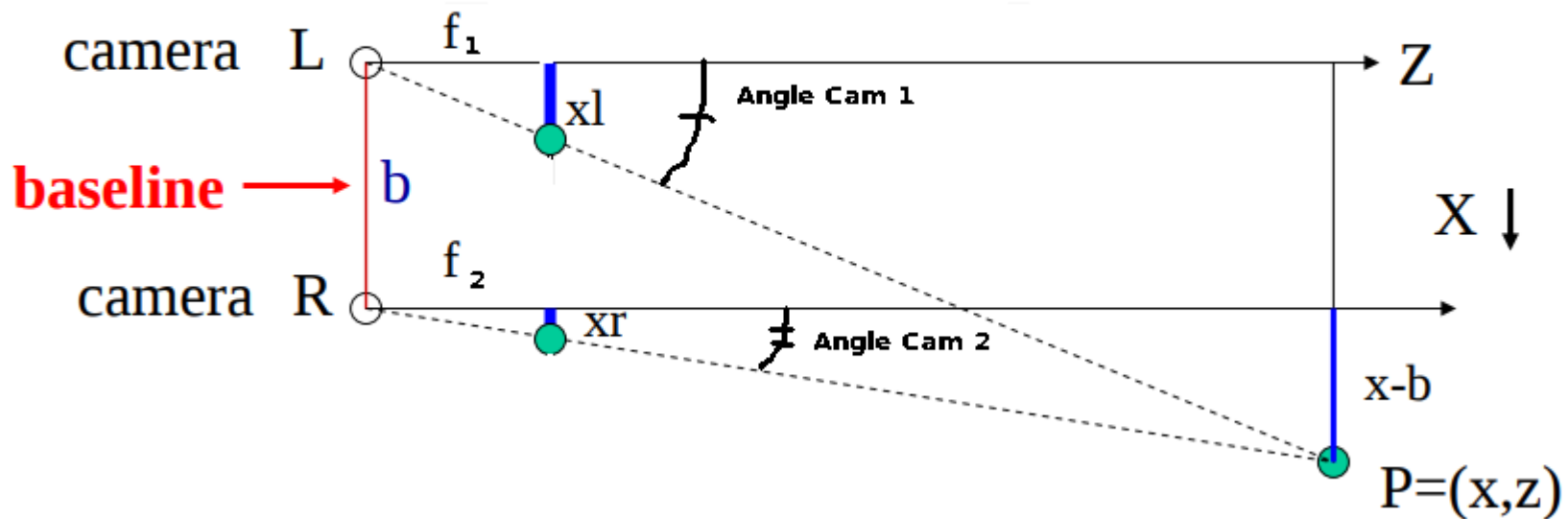
- **Object detection can be accomplished with a variety of techniques such as feature matching.**
- **Our set-up detects objects by their color. We decided to use the color red to identify and track our object in order to 'paint' its path.**

Object Detection With Color



Depth Estimation With Stereo

- Our stereo camera set-up employs simple geometry to find real world X, Y, Z coordinates.



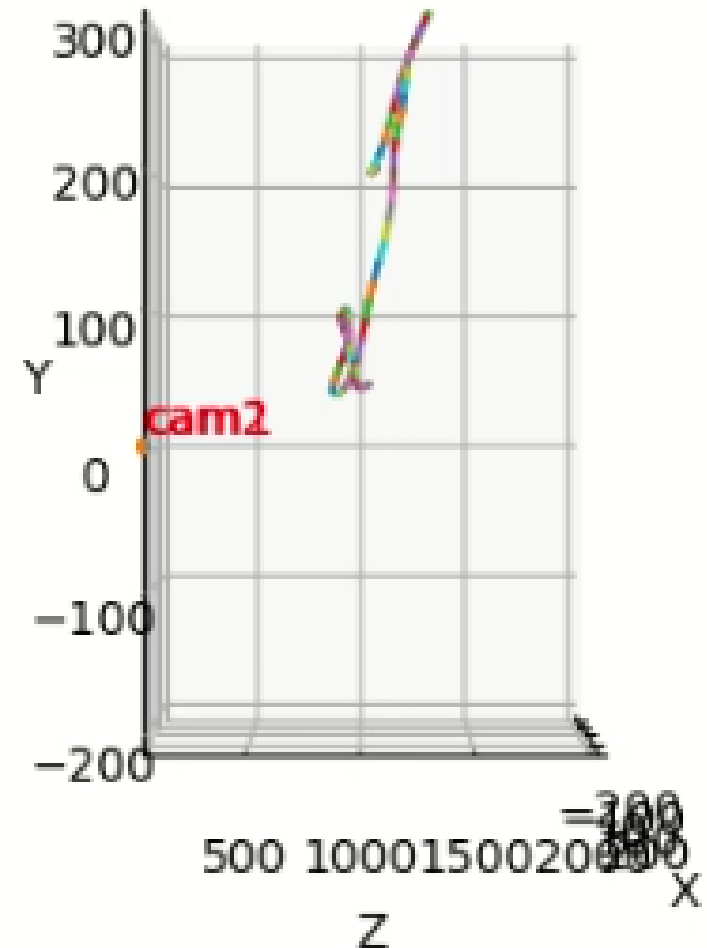
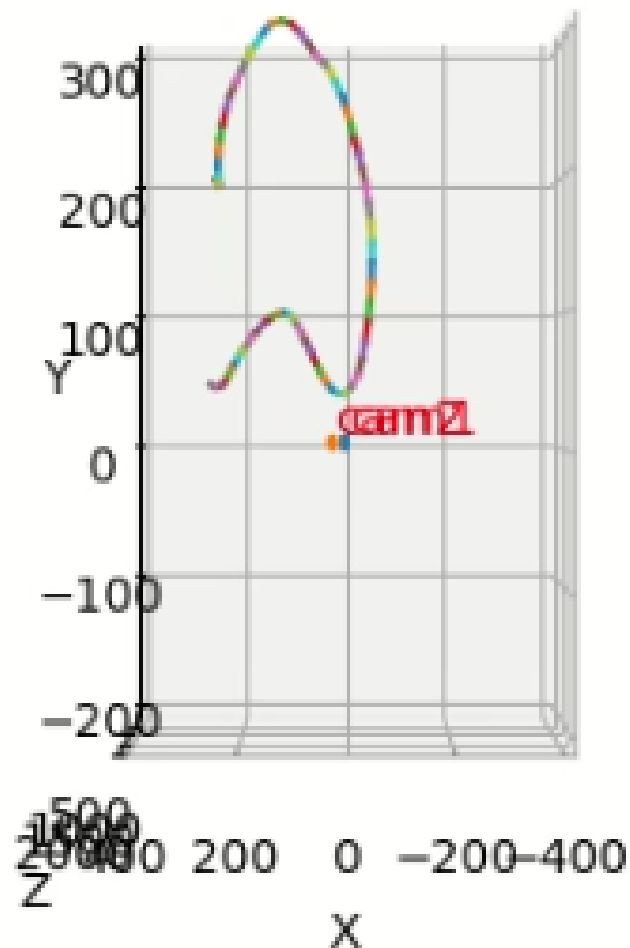
Project Set Up

- **Two different cameras were used: a Xiaomi mi A1 rear camera, and a Logitech 720 HD web camera. Both were calibrated in order to diminish distortion.**
- **OpenCv's Library was used for object detection and calibration. The Matplotlib library was used for plotting.**

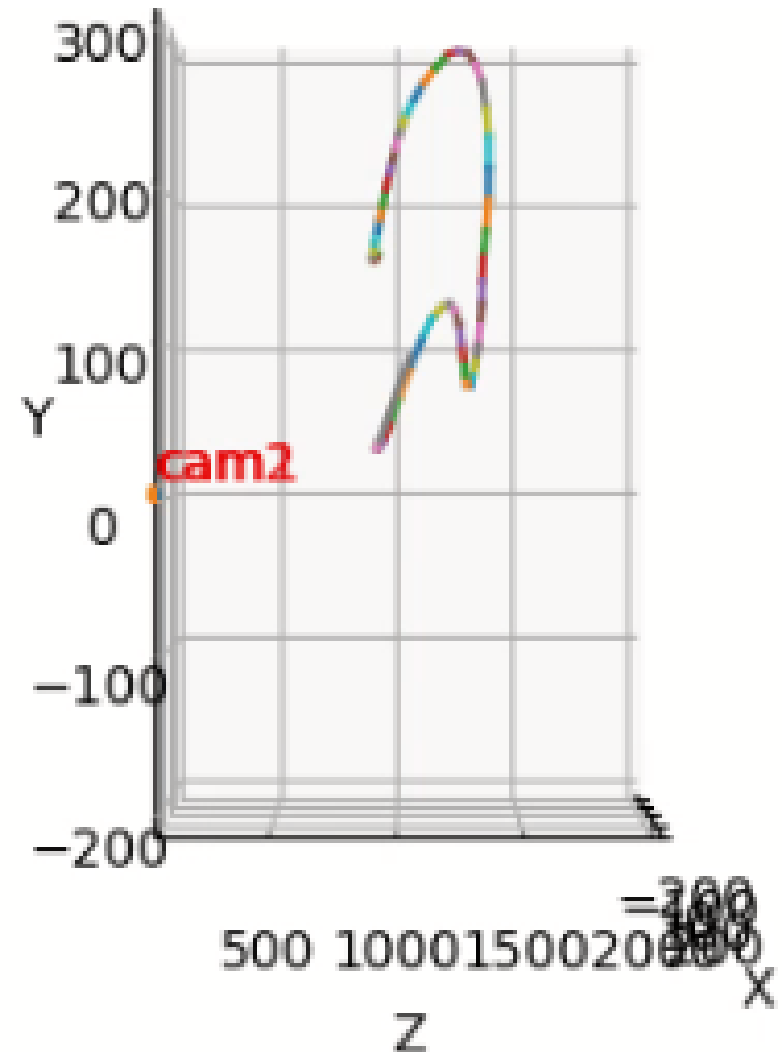
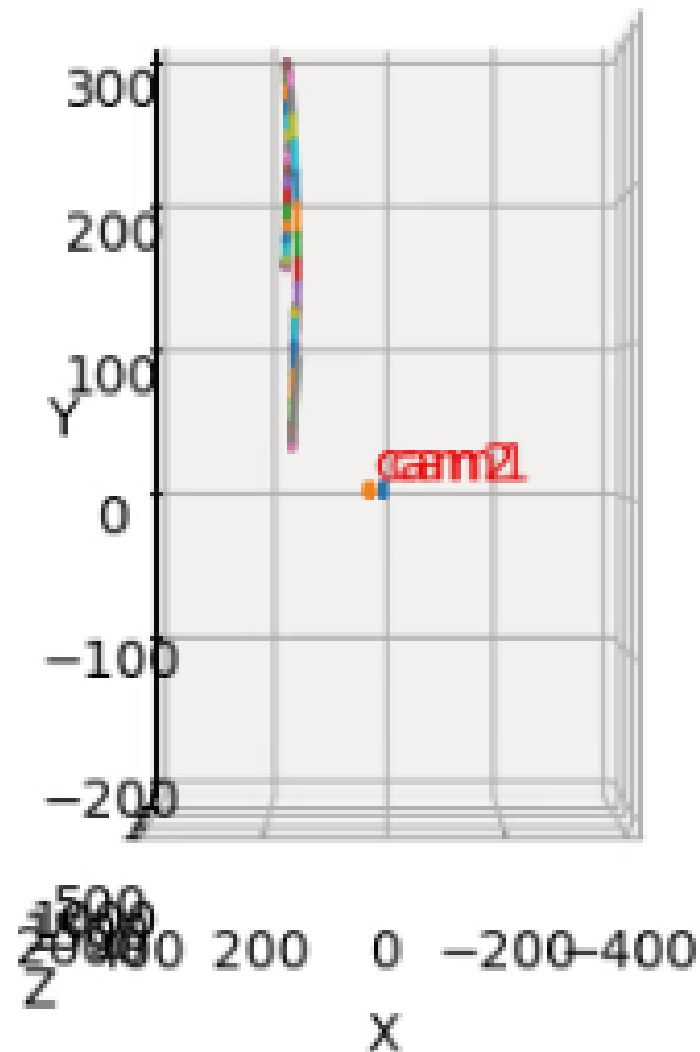
Results

- **The project effectively, if not perfectly, tracked the object and plotted its coordinates in real time.**
- **Errors were analyzed. The largest being an approximate 10 cm disparity between measured depth and the actual depth of the object.**

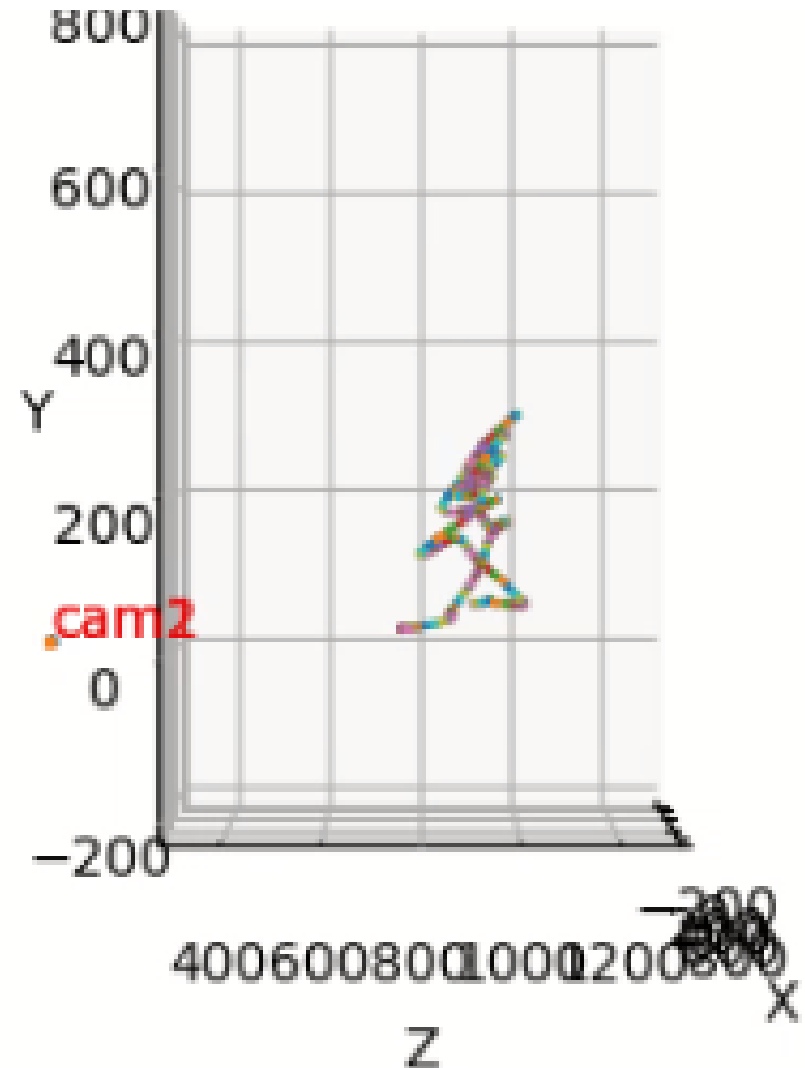
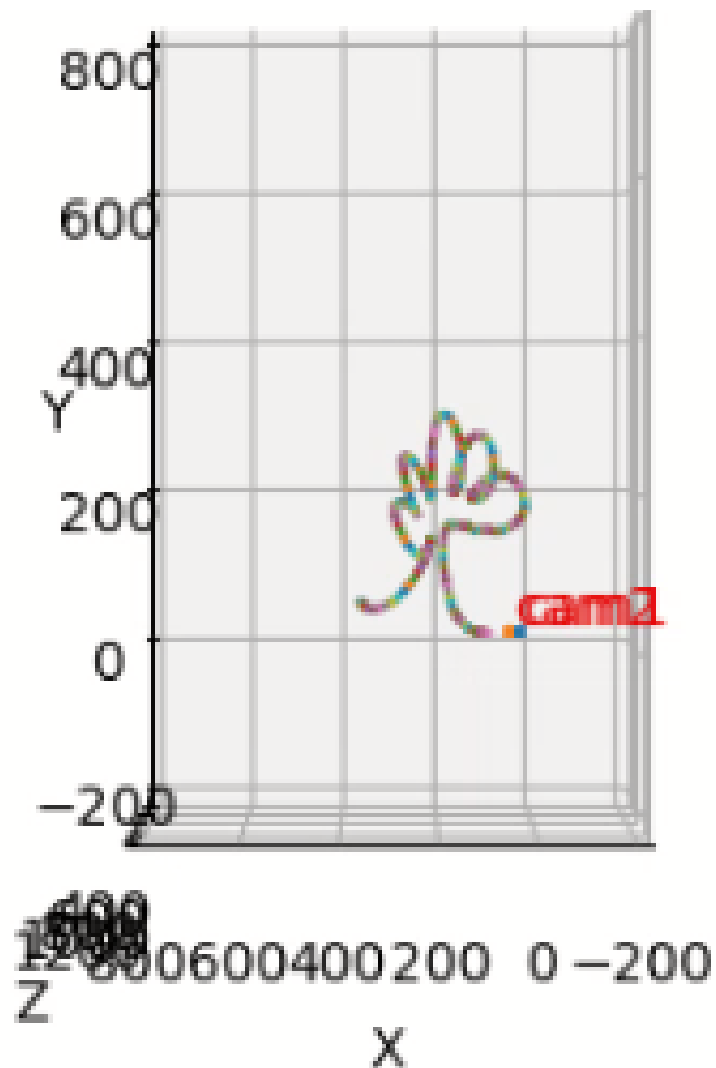
RESULTS - 'Perpendicular Bet'



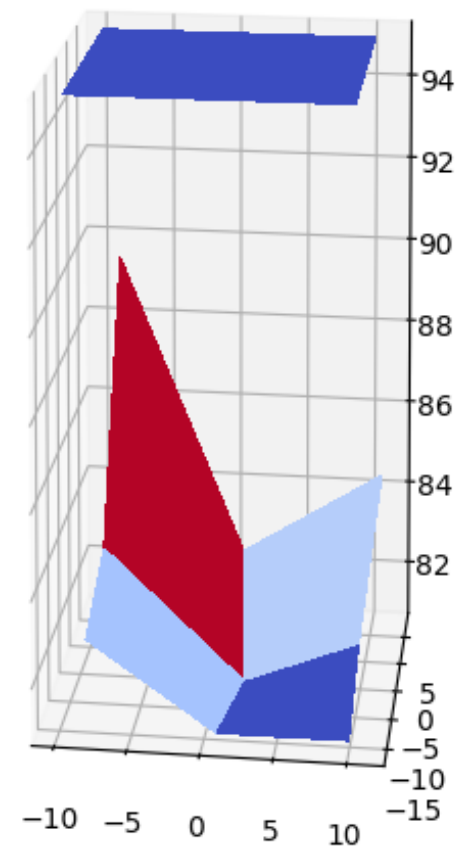
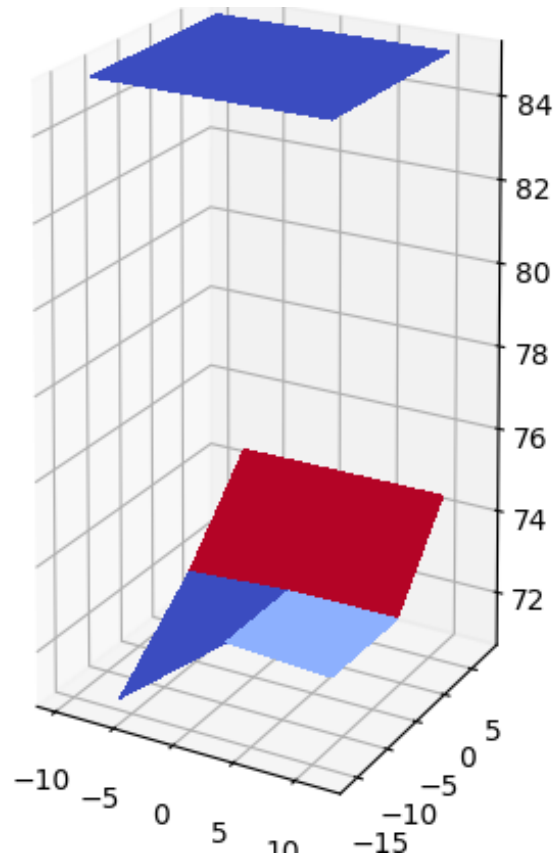
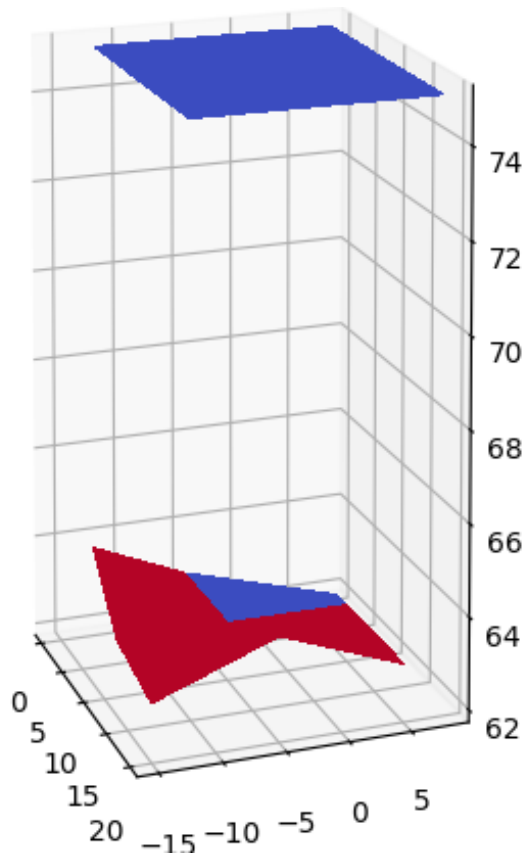
Results - 'Paralell Bet'



Results - 'Tree'



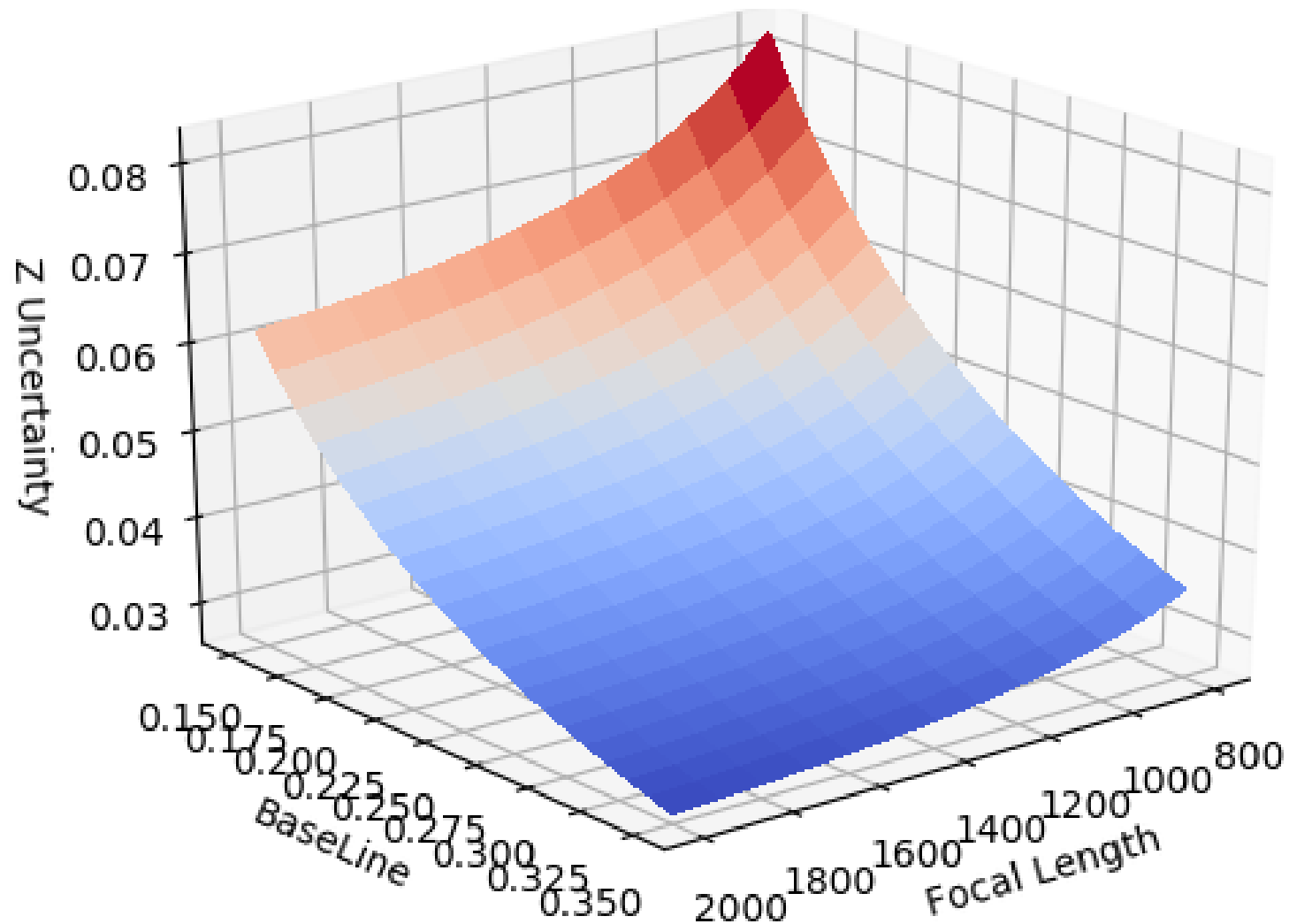
RESULTS - Measured Points



RESULTS - Video



RESULTS - Error Analysis



SUMMARY

- **The project succeeded to track, estimate depth, and plot the 3D path of a given object.**
- **Depth estimation was skewed.**
- **Hardware restrictions led to lag and a less desirable user experience.**