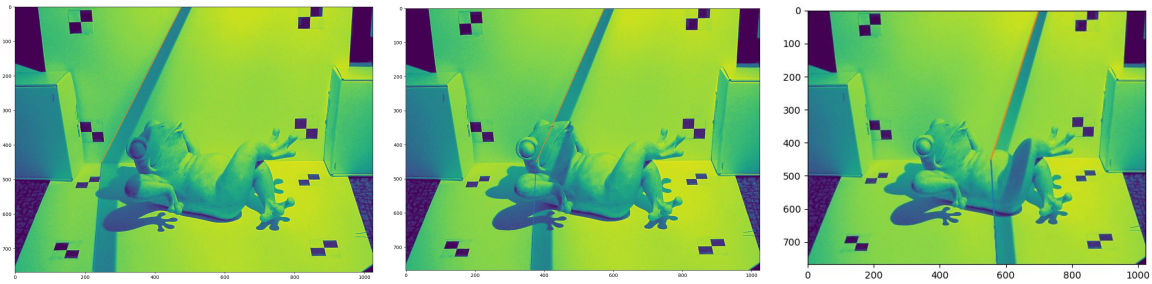
Alice Lai
15-463 Assignment 6

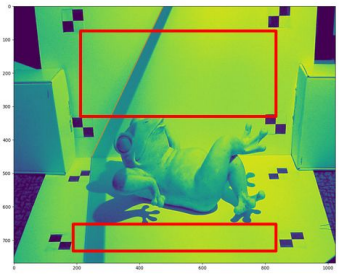
1.1 Video Processing

Spatial Edge Localization



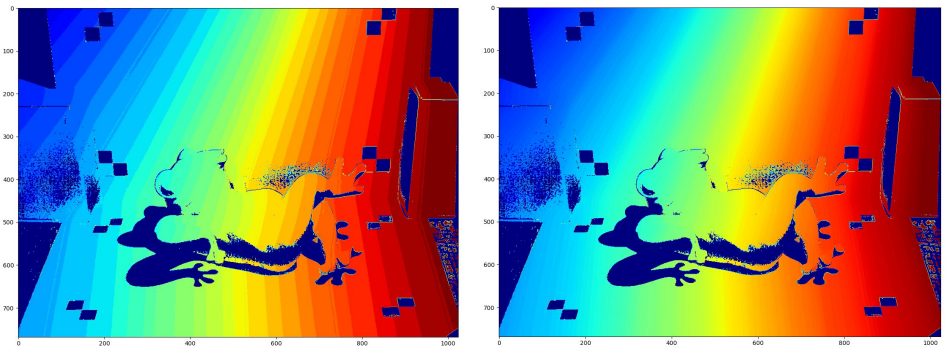
I detected shadow locations where the sign was -1, since I assumed that the scene (masked with the low contrast mask) would have positive values. For the actual line detection, I used a least squares solver.

I detected the shadow line on the vertical plane in the region above the frog, and then the shadow line on the horizontal plane below. I also added additional points at the y-location of where the horizontal and vertical planes meet. For the frog object it was at y=450px. Regions of interest are shown:



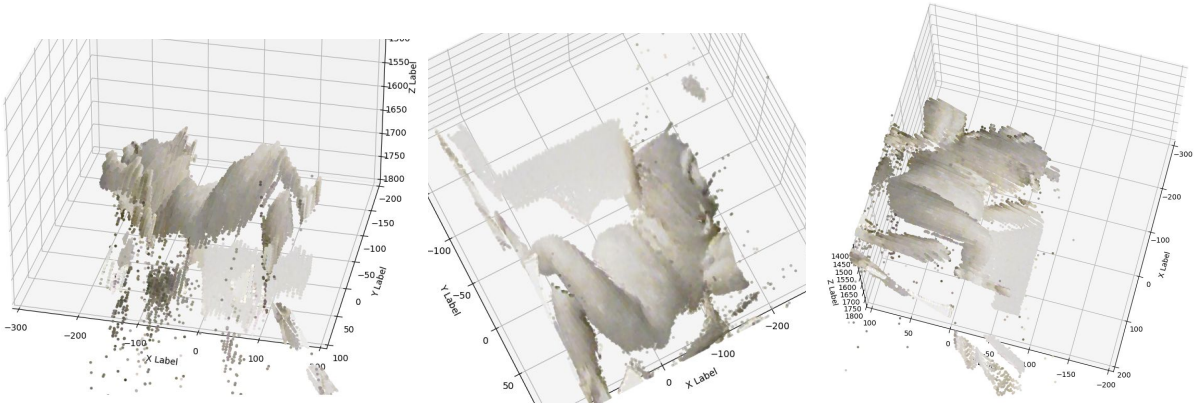
Temporal Edge Localization

I looped through all the frames in the directory and detected the frame in which the pixels were first covered by the shadow. I stored the previous difference image so that I could do frame interpolation. Since there are 166 frames in the frog directory, and 32 values to be quantized to, I took the raw frame value computed from the difference image, divided by 5.1875, and then cast it to an integer for displaying purposes.



On the left is the temporal image quantized to 32 values, and on the right is the temporal image used for 3D reconstruction.

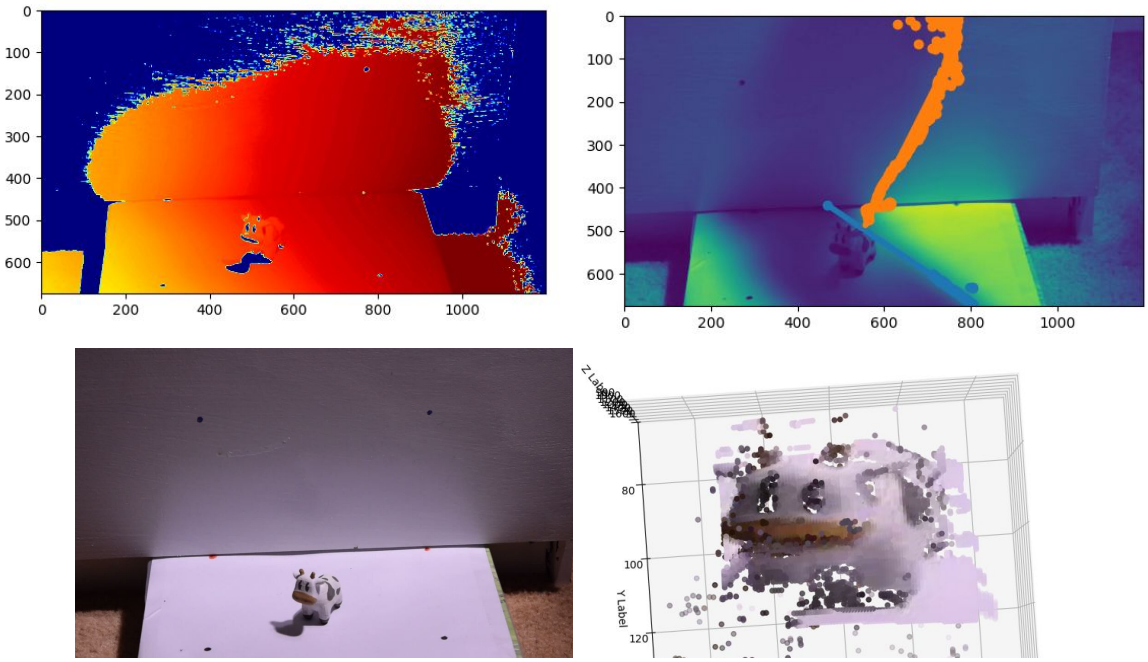
1.3 Reconstruction



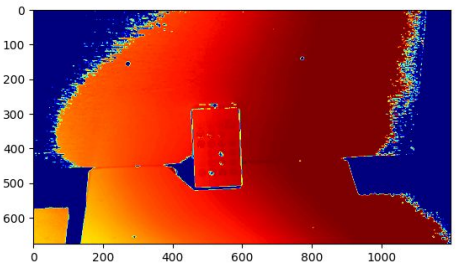
In order to optimize the reconstruction results, I created a low contrast mask to mask out all of the areas in the image that already were very dark. In particular, I set all of the regions in the difference image that corresponded to the dark areas to 1.0, since my algorithm for detecting the shadow line essentially checks whether or not the sign flips to -1.

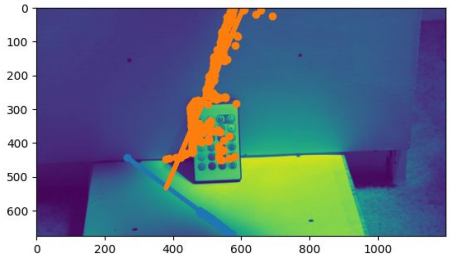
2.0 Building your Own Scanner

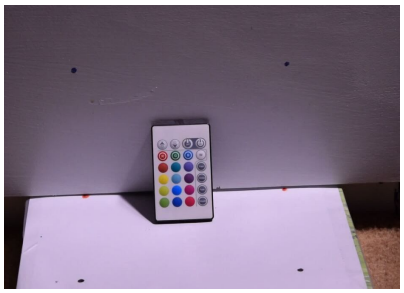
First Object (Cow)

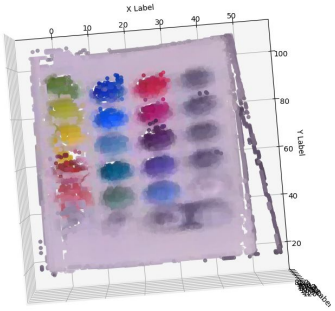


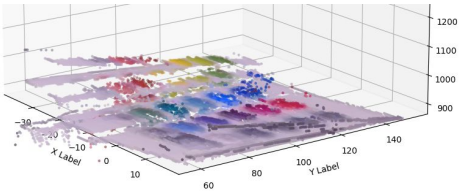
Second Object (Remote)











Note: I had a great deal of trouble trying to create dark, sharp shadows, which is why the reconstructions for these images are much worse than the frog ones. I retook the images about 10 times, and this is unfortunately the best that I could get. I think if I had a more powerful lamp and a thin, long stick that I could get better results, but I sadly do not have these items at home.

Picture of setup: