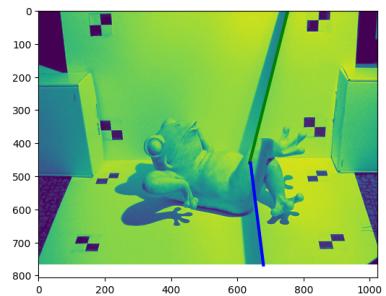
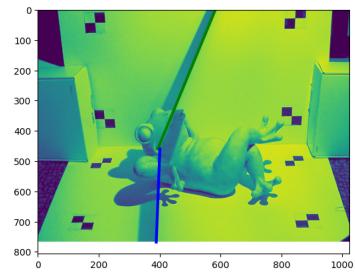
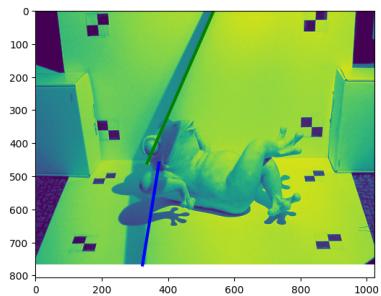


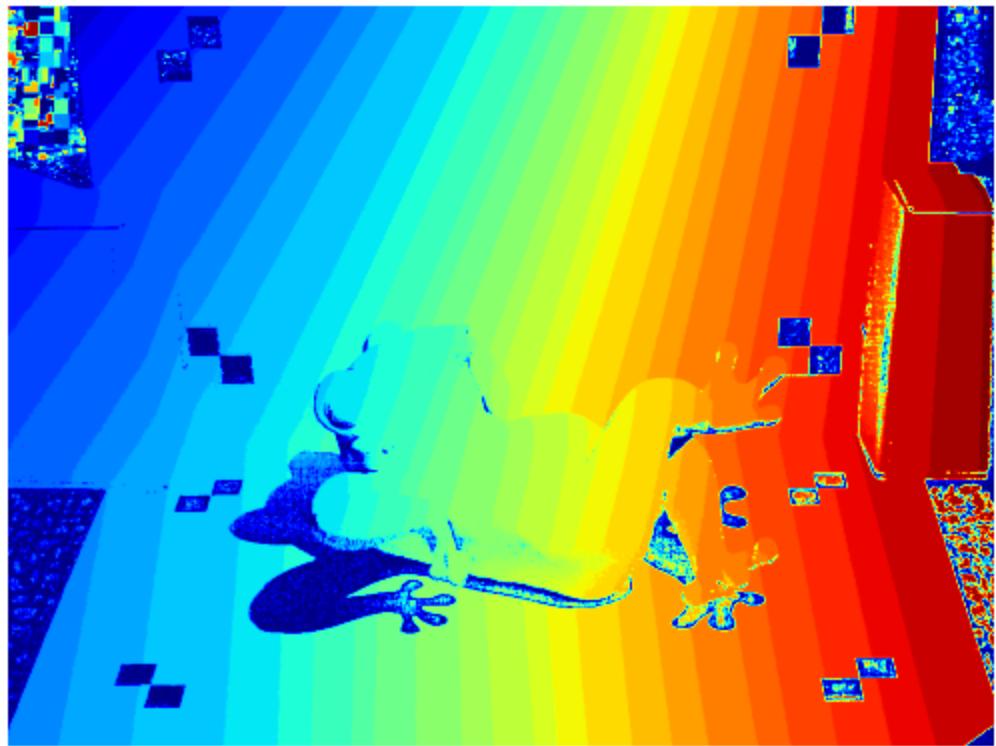
Assignment-6

AndrewId: richamis

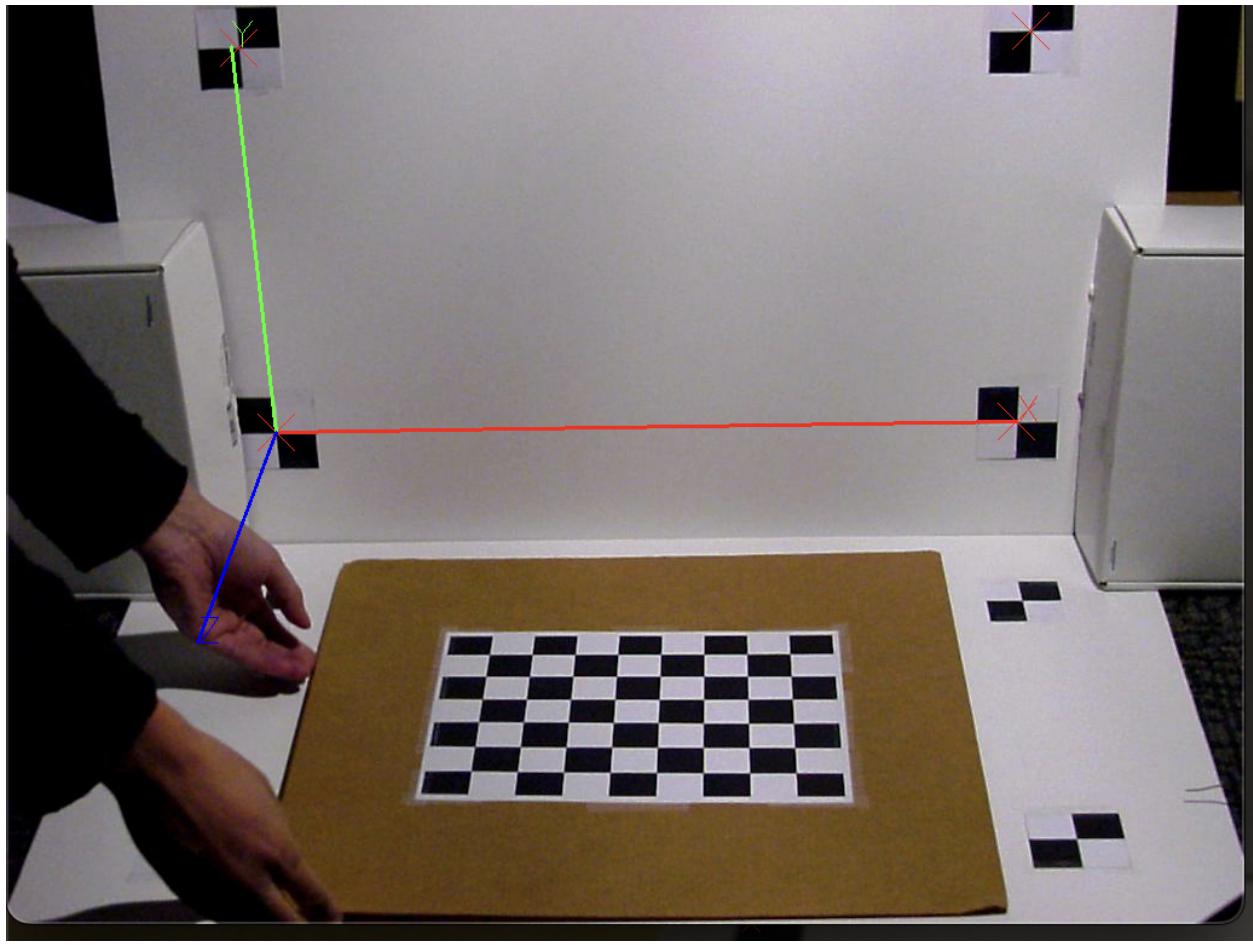
1. Implementing structured-light triangulation (100 points)

1.1 Video processing (25 points)





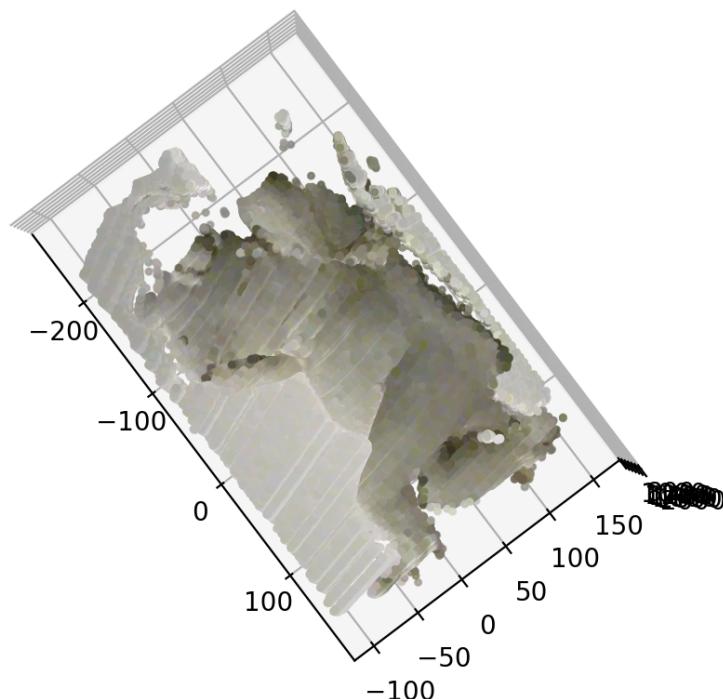
1.2 Intrinsic and extrinsic calibration (50 points)



1.3 Reconstruction (25 points)



Figure 1



x=149.6857, y=27.2150, z=680.7498



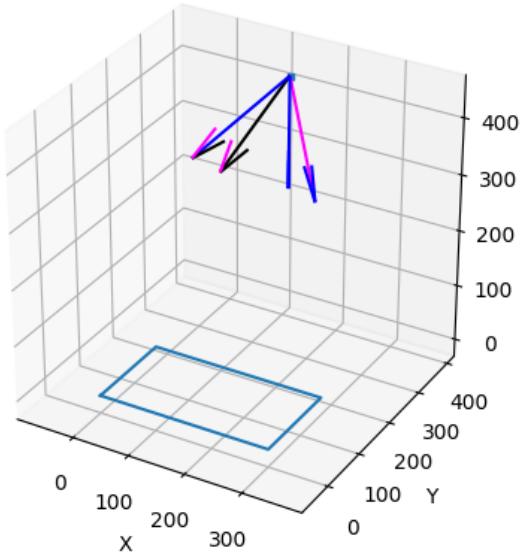
Discussion

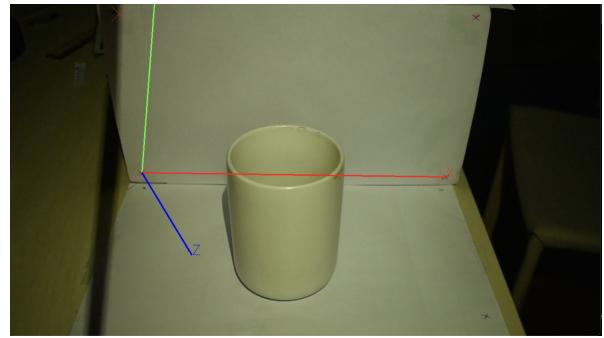
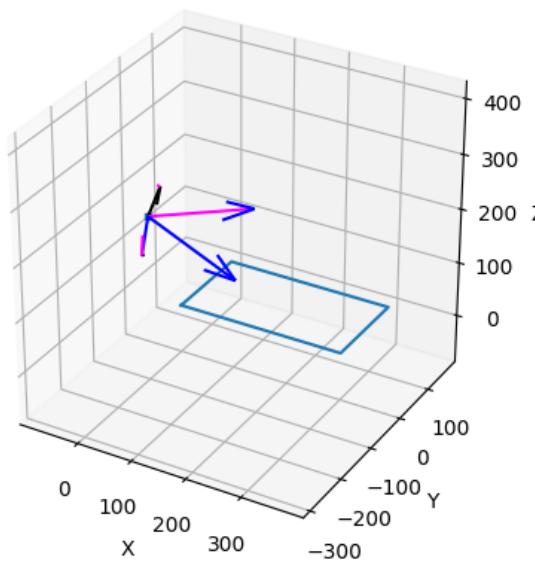
1. We need to first find the line equations for every pixel when the shadow crosses that pixel. We estimate the x and y limit of the shadows such that it is not obstructed by the object. We do this by solving for the column where the sign of the difference image changes and calculate the equations of line as shown above.
2. For intrinsic calibration, we use the checkerboard images and then estimate the extrinsic by known 2D-3D correspondences by calculating location of corners of the plane in pixel and world space.

3. Now we calculate the normal for the shadow plane from the 2 shadow lines on each plane by choosing 2 points in each line
4. We backproject the pixel from the cropped image and then get the 3D point from the intersection between the shadow plane and the ray.

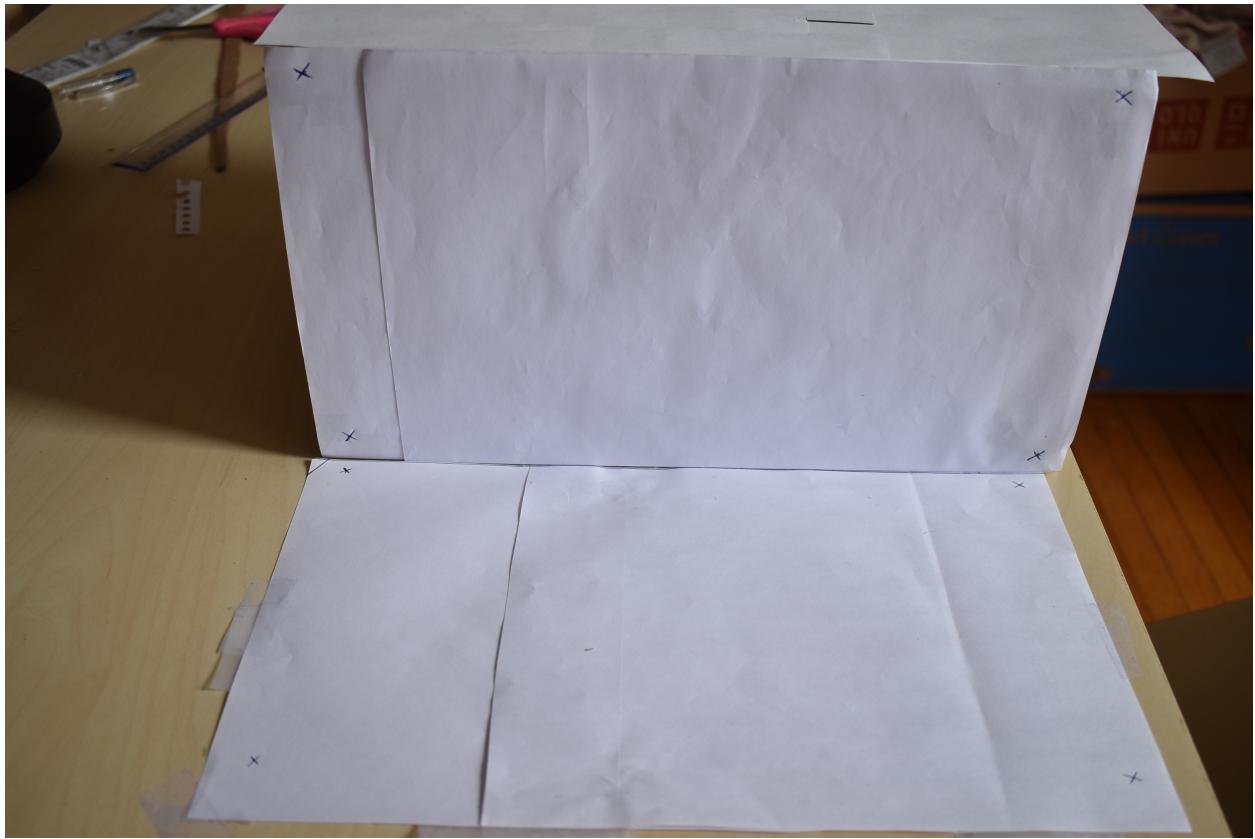
2. Building your own 3D scanner (100 points)

Calibration



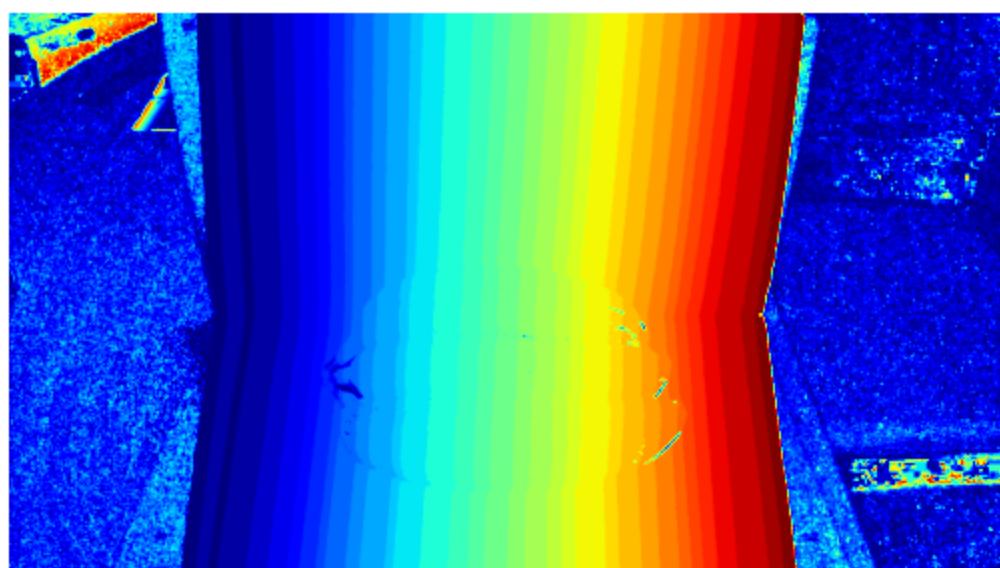


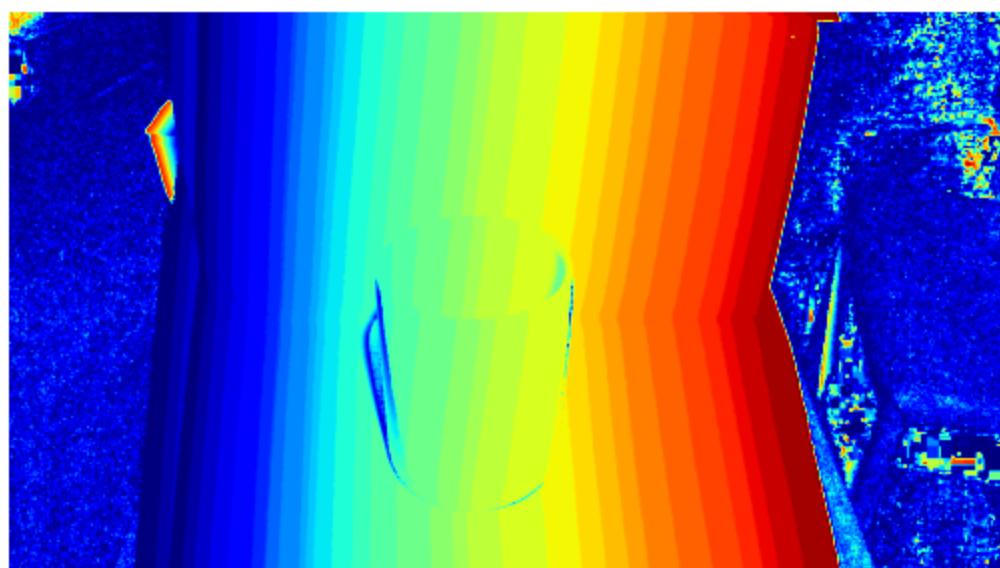
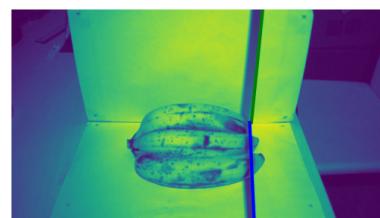
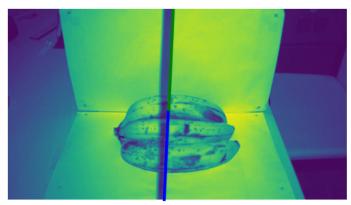
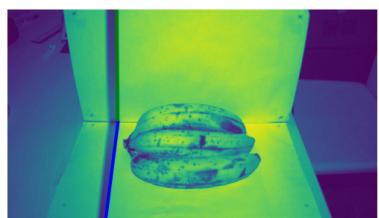
Setup



Objects

Banana and cup







3D reconstruction

