15-663 HW6

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0 Collaborations

I collaborated with my flatmate Shamit Lal (shamitl) for the capture of the video for the self captured images. We also borrowed the setup from Sachit Mahajan(sachitma) to capture the images.

1 Implementing structured-light triangulationo

1.1 Video Processing

1.1.1 Spatial shadow edge localization

The spatial edges for the various objects can be seen in Figure 1.

1.1.2 Temporal shadow edge localization

The temporal edges for the various objects can be seen in Figure 2

1.2 Intrinsic and extrinsic calibration

The intrinsic and the extrinsic calibration matrix values can be seen in the Figure 3 and Figure 4 respectively.

1.3 Reconstruction

The reconstructed outputs for some of the examples along with some representative images can be seen in Fig 5 and Fig 6 respectively. There are various steps taken to ensure a good reconstruction. These are as follows :

- Threshold the initial images so that all regions that are the ones belonging to the shadow regions can be identified easily.
- After getting the zero-crossing points for the vertical and horizontal lines, running a RANSAC in order to not create lines consisting of outlier zero-coordinates.

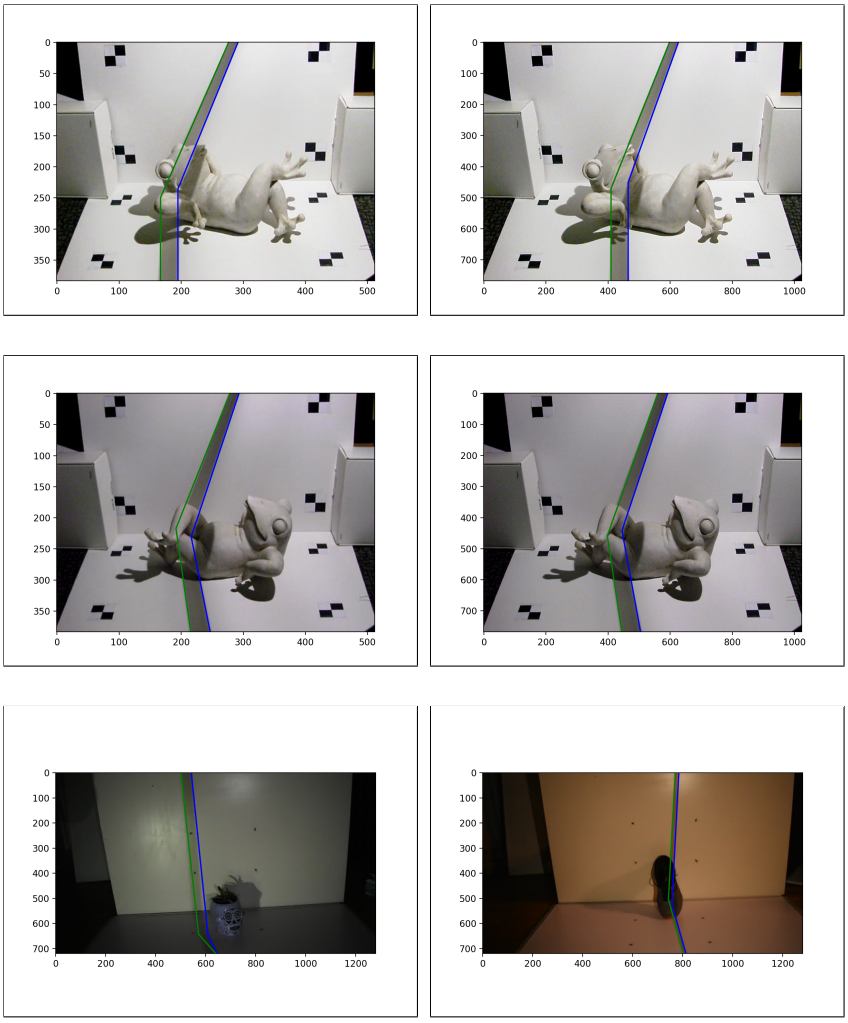

Figure 1: The spatial edges for some examples. The first column shows the low-resolution(left) and high resolution(right) outputs for the object frog in one orientation.The second column shows the low-resolution(left) and high resolution(right) outputs for the object frog in second orientation.The third column shows the outputs for the objects captured.

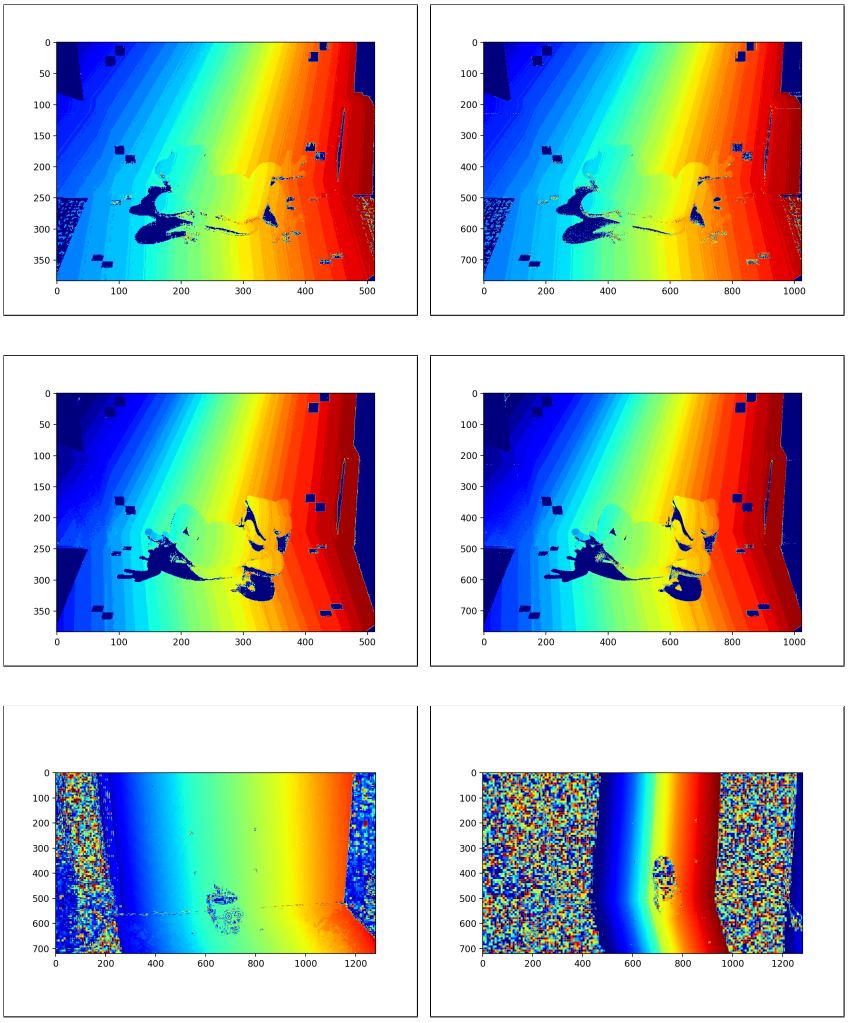

Figure 2: The timestamp edges for some examples. The first column shows the low-resolution(left) and high resolution(right) outputs for the object frog in one orientation.The second column shows the low-resolution(left) and high resolution(right) outputs for the object frog in second orientation.The third column shows the outputs for the objects captured.

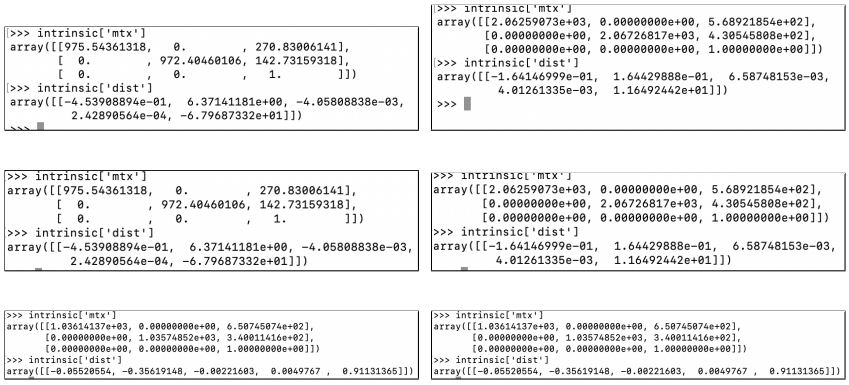

Figure 3: The intrinsic parameters. The first column shows the low-resolution(left) and high resolution(right) outputs for the object frog in one orientation.The second column shows the low-resolution(left) and high resolution(right) outputs for the object frog in second orientation.The third column shows the outputs for the objects captured.

- Handling cases of slope tending to infinite especially, by taking the mean of all the values as constant and a placeholder for the slope.

2 Building your own 3D scanner

The intrinsic and the extrinsic parameters of the setup are reported in Figure 3 and 4 respectively. The temporal and the spatial edge localization are reported in Figure 2 and Fig 1 respectively. The reconstructed outputs along with some input examples can be seen in Figure **??** and Figure 7 respectively. The setup for the capture is also illustrated in Figure 8

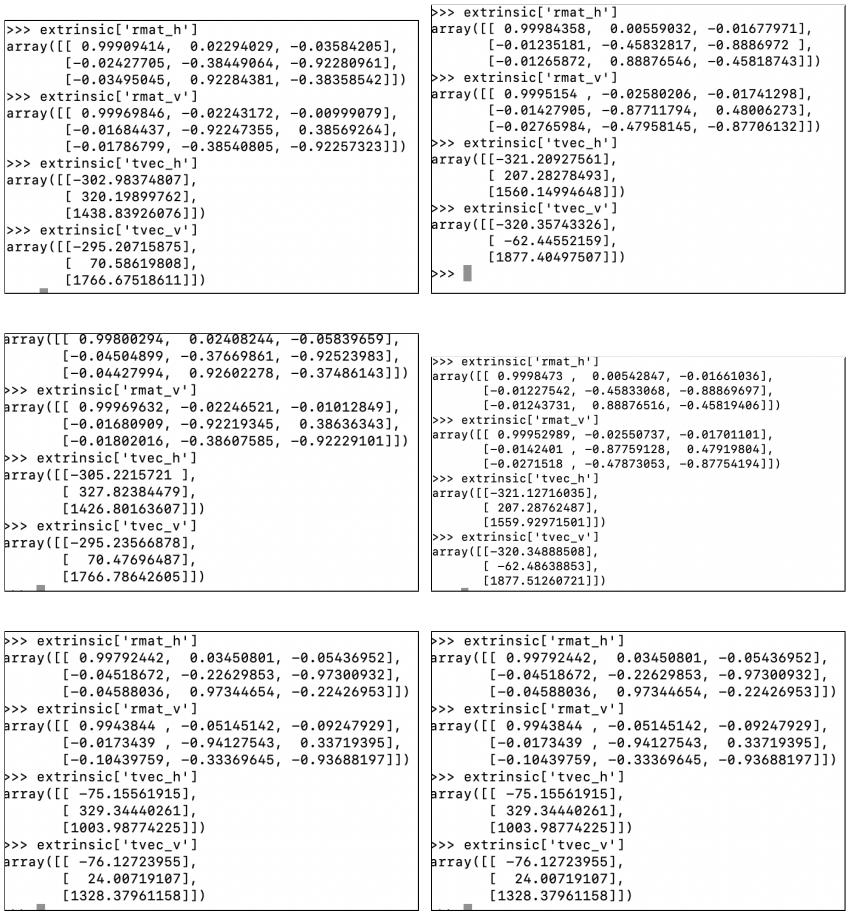

Figure 4: The timestamp edges for some examples. The first column shows the low-resolution(left) and high resolution(right) outputs for the object frog in one orientation.The second column shows the low-resolution(left) and high resolution(right) outputs for the object frog in second orientation.The third column shows the outputs for the objects captured.

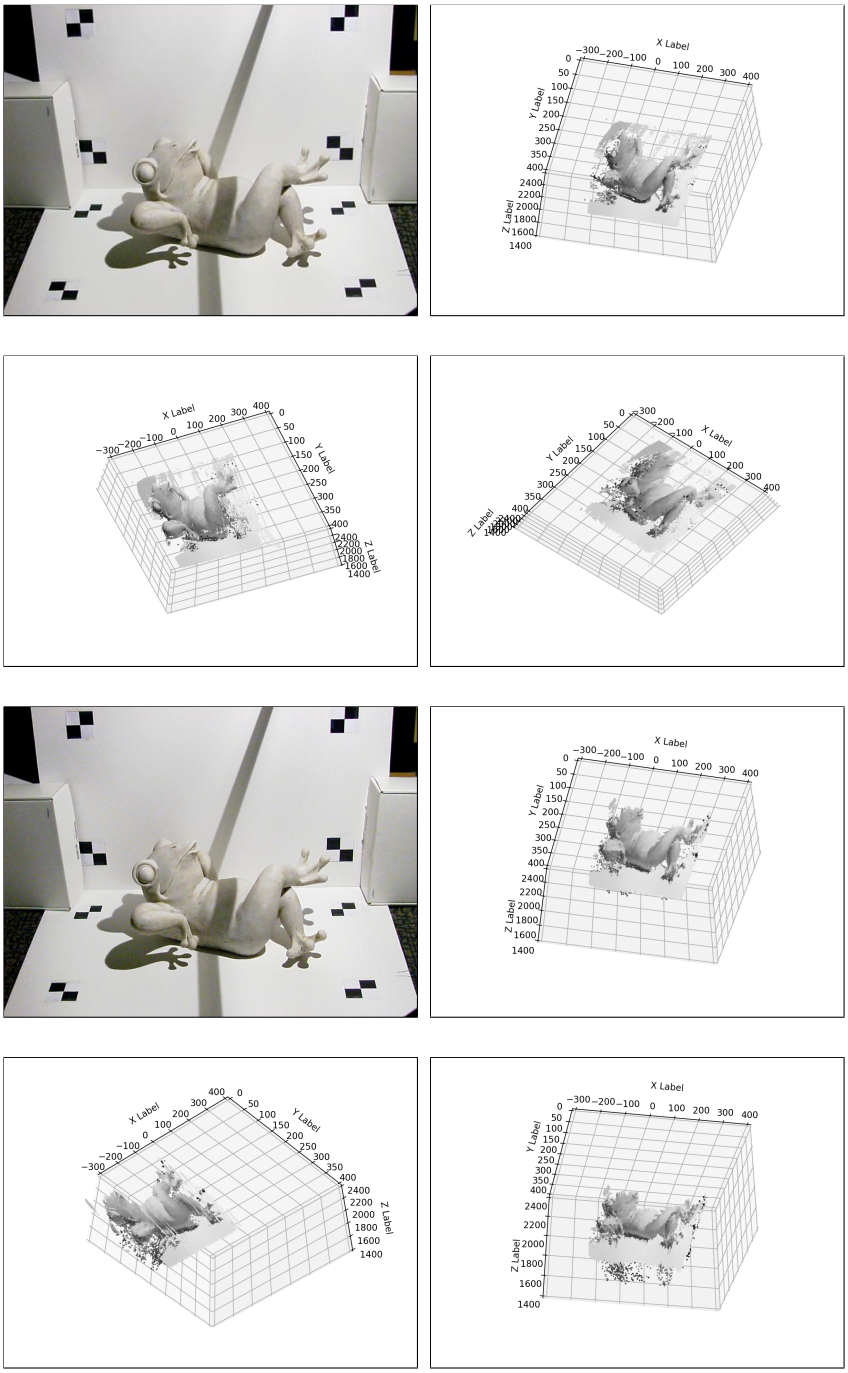

Figure 5: The reconstructed outputs for low-resolution(top) high-resolution(bottom) images for the frog in one orientation.

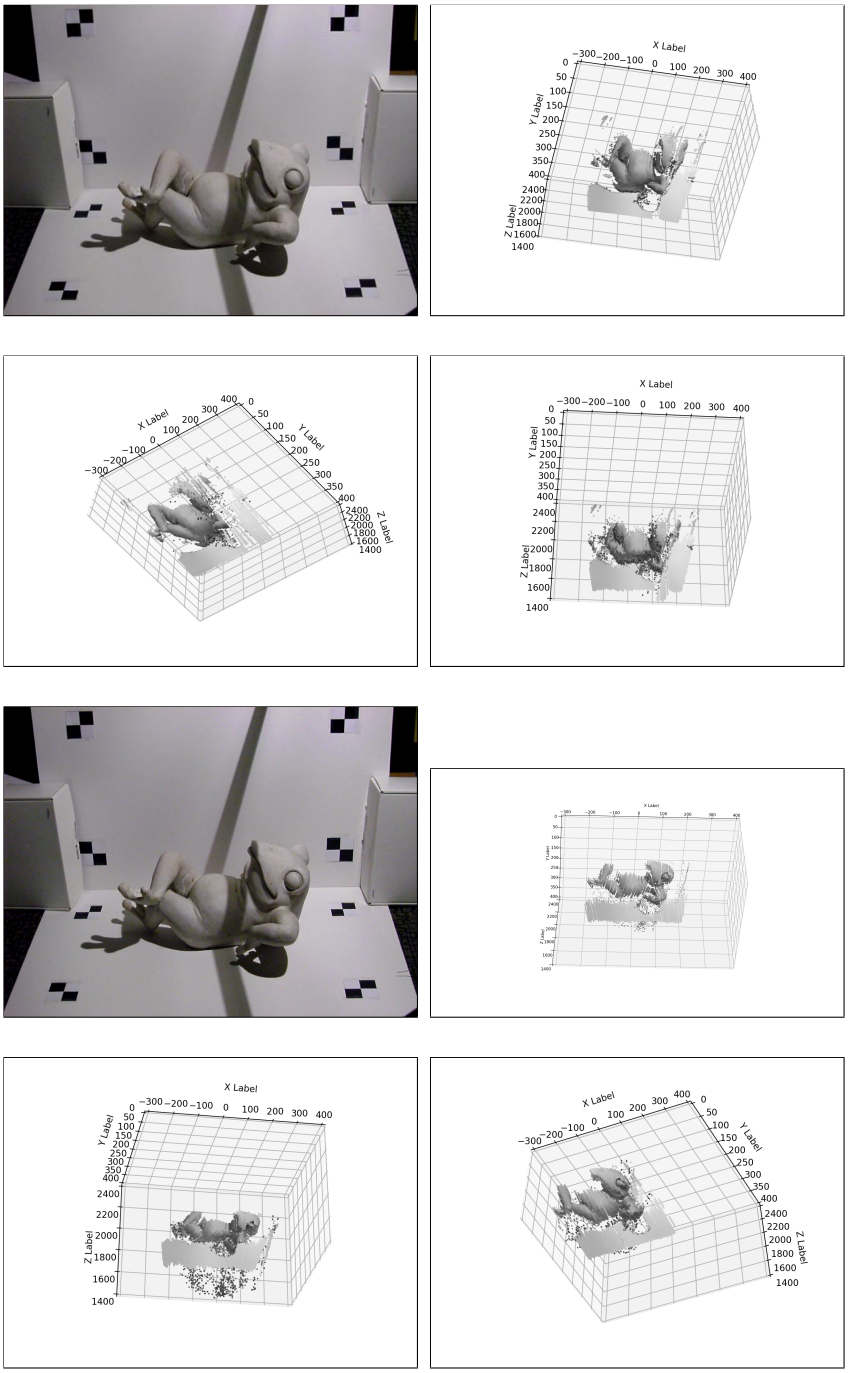

Figure 6: The reconstructed outputs for low-resolution(top) high-resolution(bottom) images for the frog in second orientation.

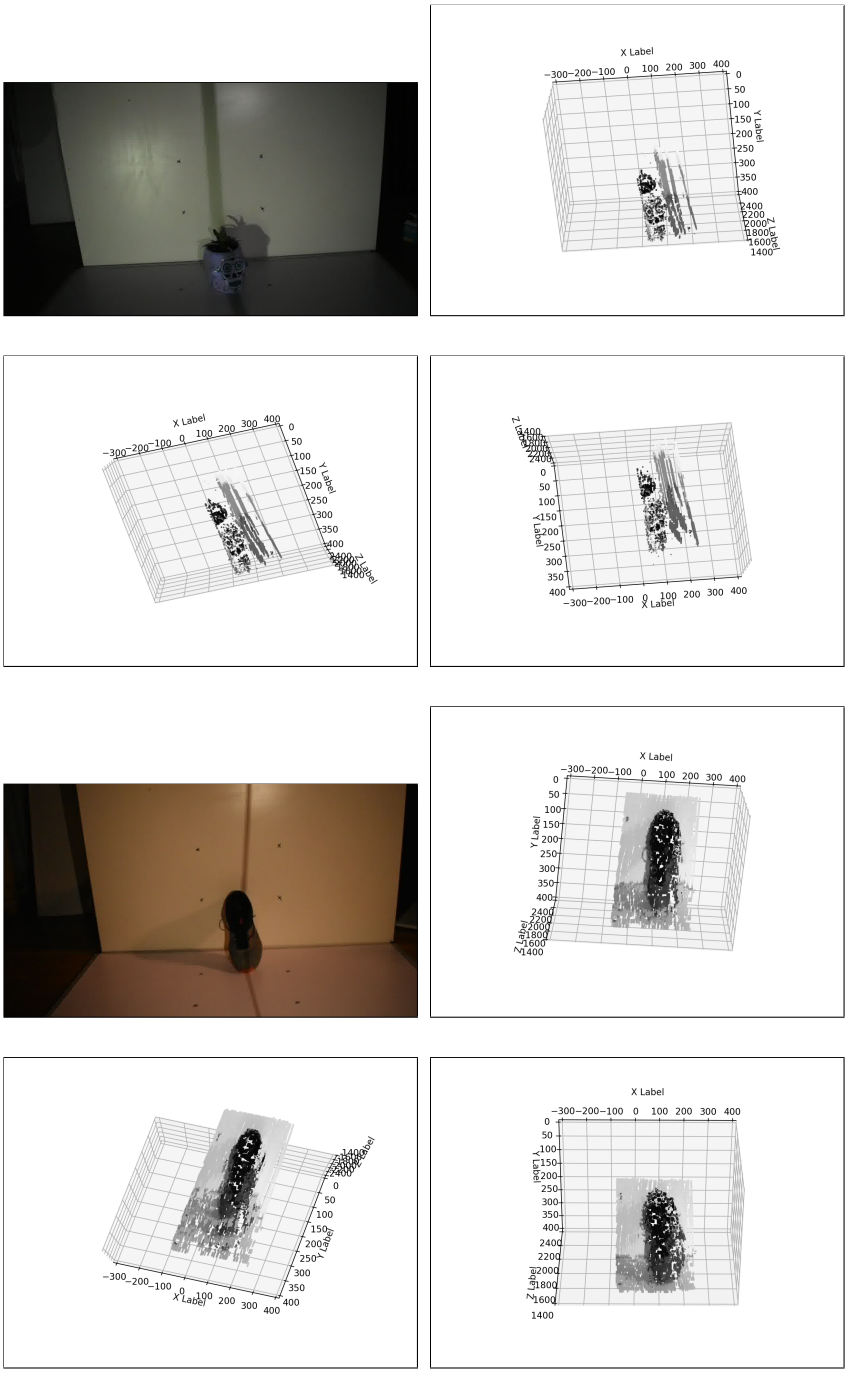

Figure 7: The reconstructed outputs for two different objects captured along with the representative images.

Figure 8: An illustration of the capture setup. The points marked for the extrinsic calibration, object and the camera can be seen.