

# Homework Assignment 6

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## Instructions to Run

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```
Assumed file structure
```

```
root/  
- calib/  
- frames/
```

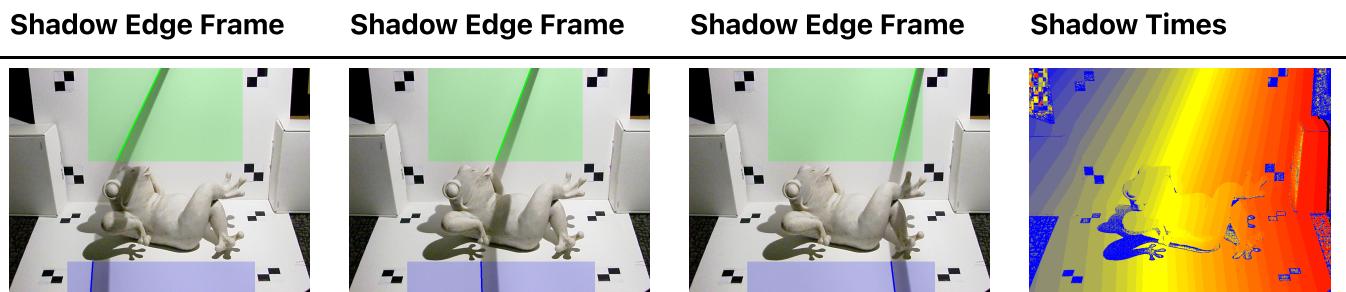
```
python main.py --args  
--src_dir: Path to frames/ directory.
```

Will write all results to root/out/. File paths must be manually changed  
`in capture_exposure_stack()` and `direct_indirect()`.

# 1 Implementing structured-light triangulation (100 points)

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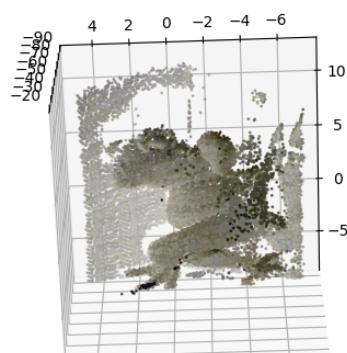
## 1.1 Video processing (25 points)



## 1.3 Reconstruction (25 points)

Reconstruction

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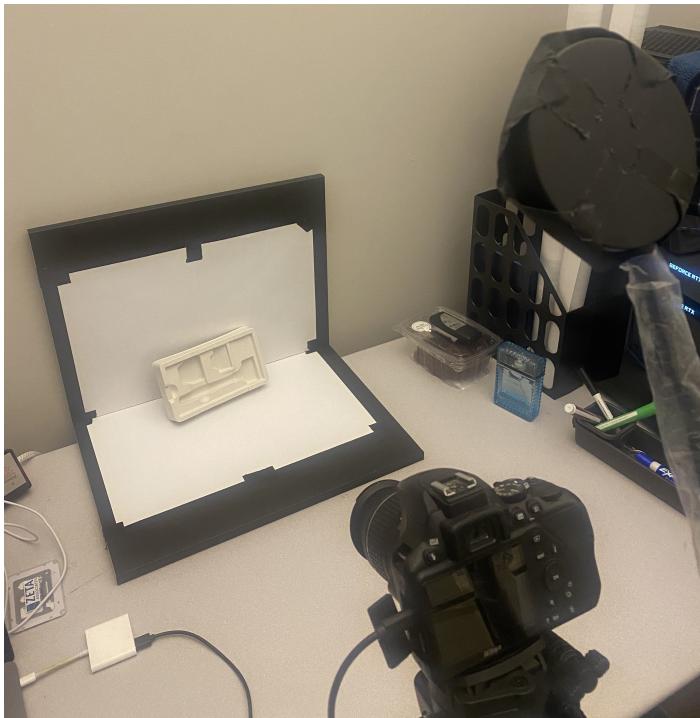
# 2 Building your own 3D scanner (100 points)

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Setup

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## Setup



Scene 1:

**Scene**

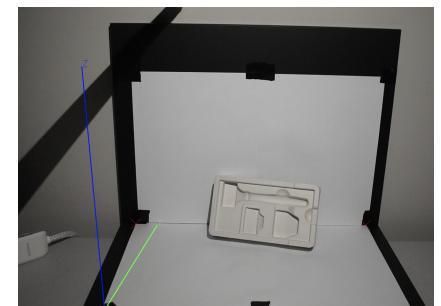
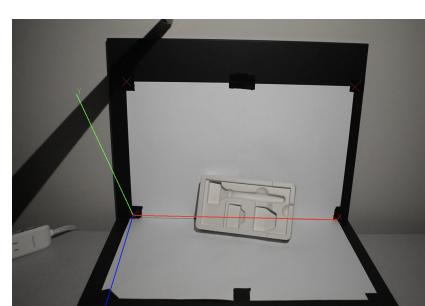
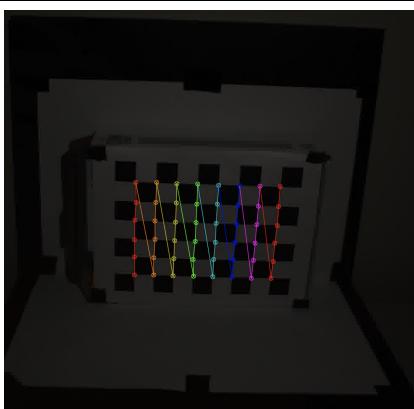
**Shadowed Scene**



**Intrinsic Calibration**

**Extrinsic Calibration (Vertical)**

**Extrinsic Calibration (Horizontal)**

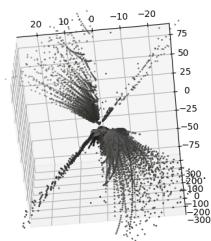
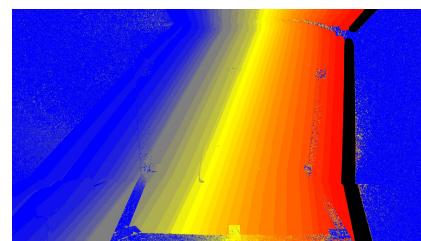
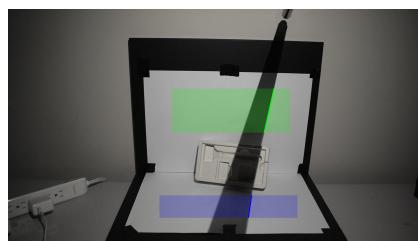


**Estimated Shadow Edges**

**Estimated Shadow Time**

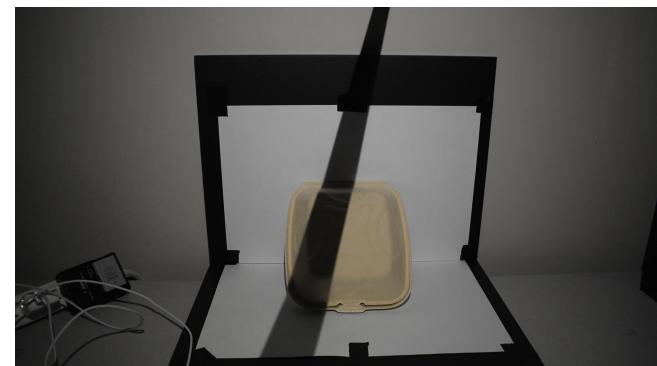
**Final Reconstruction**

Estimated Shadow Edges	Estimated Shadow Time	Final Reconstruction
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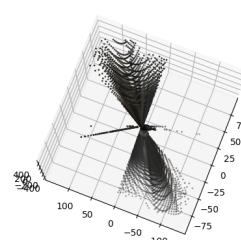
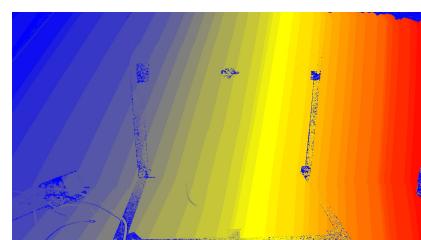
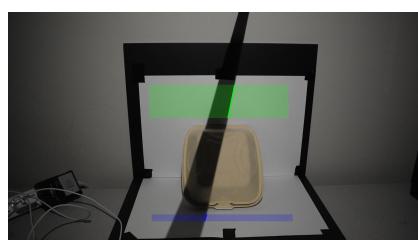
Scene 2:

Scene	Shadowed Scene
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Same intrinsics and extrinsics

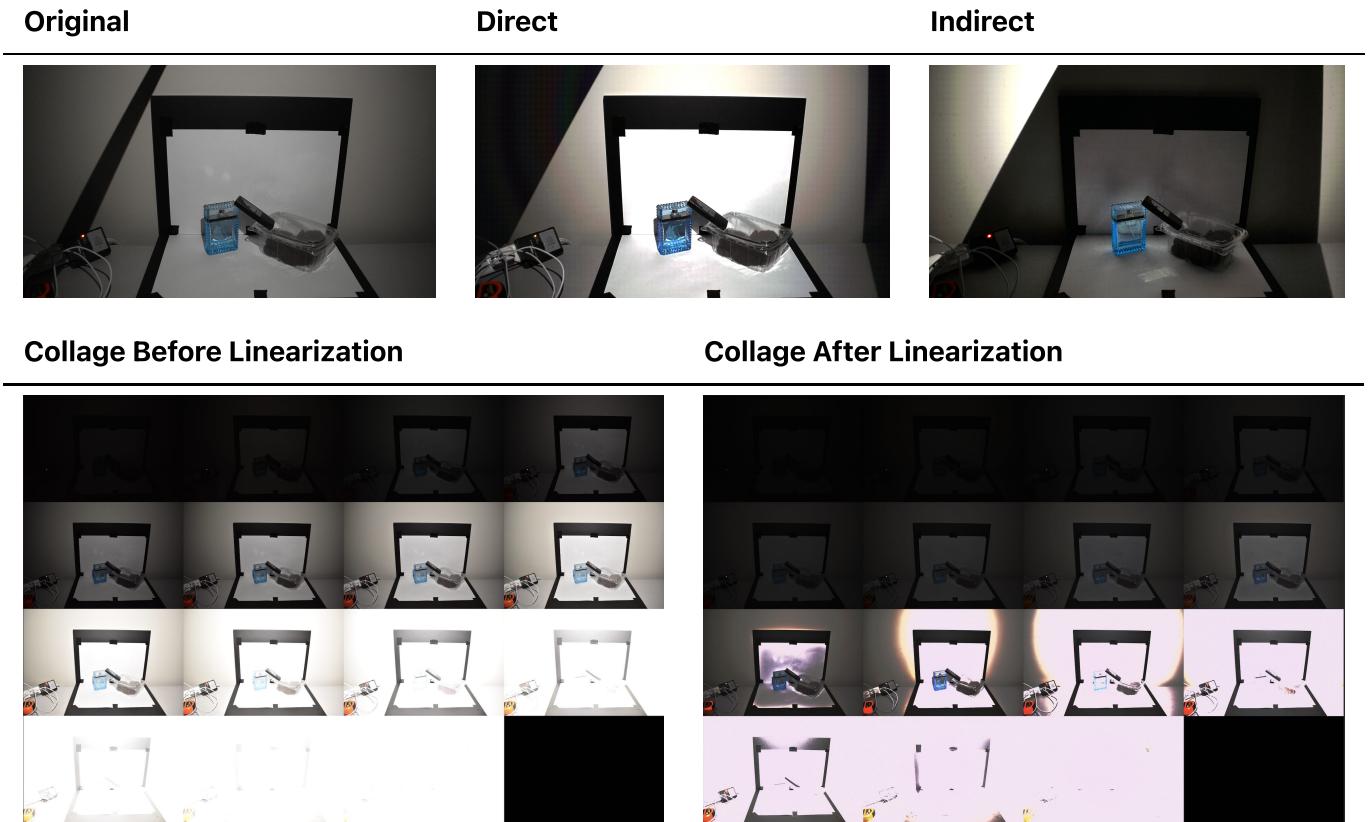
Estimated Shadow Edges	Estimated Shadow Time	Final Reconstruction
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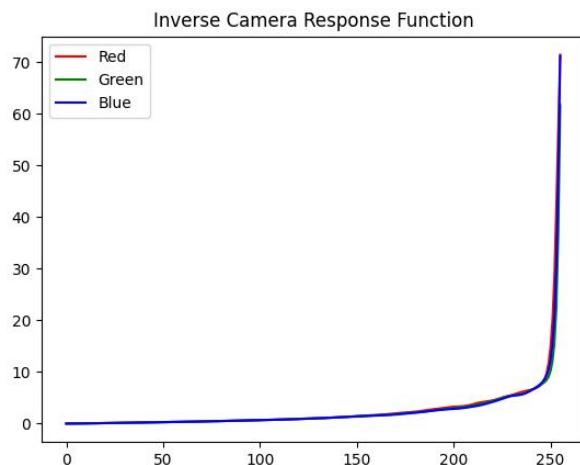
It's very unclear to me why the reconstruction is not working as intended. I know my code/algorithm is correct as it reconstructs very nicely in the first image, but this reconstruction result was the same across many different objects, lights, rods, rod distances to lights, and many other factors. I also tried filtering out based on pixel contrast as suggested in the hints, depth along the ray, and statistical outlier rejection methods but none of these were fruitful. I even asked peers to run this through their code and it yielded similar results so would really appreciate any leniency you may have here and feedback you may have as to why this failed so drastically so I can learn for the future, thank you!

## 4 Bonus: Implement direct-indirect separation (100 points)

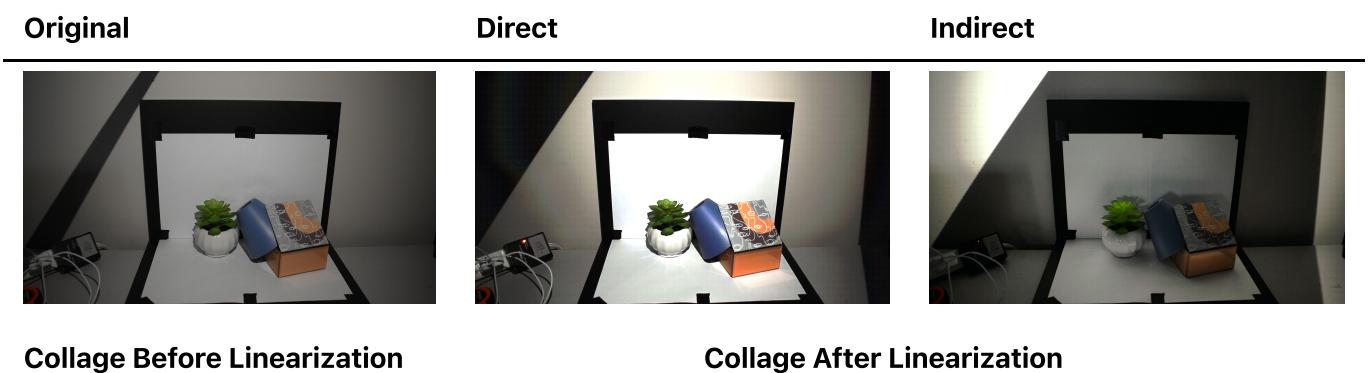
## Scene 1:

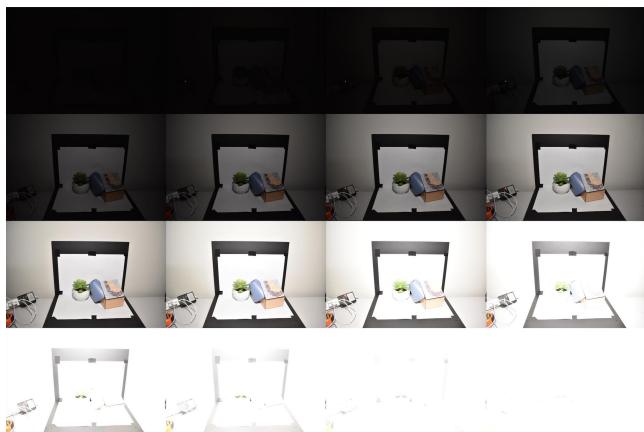
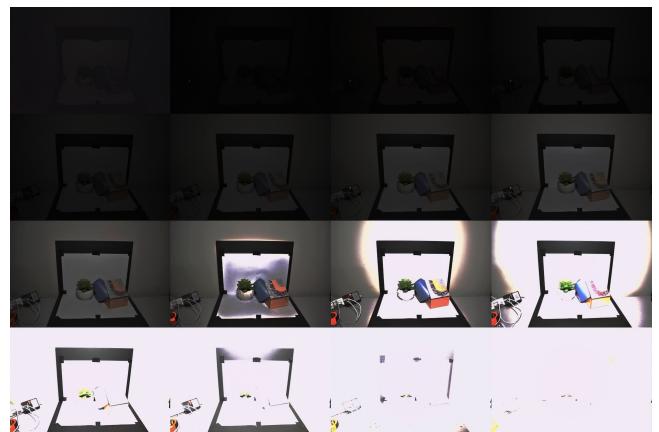


## Inverse CRF



## Scene 2:



**Collage Before Linearization****Collage After Linearization****Inverse CRF**

Inverse Camera Response Function

