

# COMPUTATIONAL ZOOM

*Art 185GL Research Presentation*

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**Focal Length:** the distance between the center of a lens or curved mirror and its focus; a measure of how strongly the system converges or diverges light



[1]

**Dollying:** moving the camera in or out of the scene while the focal length is progressively changed so as to maintain the magnification of the main subject



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[3]

**Multi-Perspective Cameras:** can image different depth ranges in the scene with different focal lengths; can generate compositions that are not physically attainable

PDF

# CHALLENGES

1. Varying these parameters  
(camera position and focal length)  
must be precise.





# CHALLENGES

2. The range of focal lengths covered by the lenses at hand may be limited, thereby reducing the range of compositions that can be captured.



# CHALLENGES

3. Any adjustments to the composition using these capture parameters must be decided by the photographer before capturing the sequence





# PROCESS



[4]

**Step 1: At capture time, the photographer takes a dolly-in video without changing the focal length of the lens- thus supporting widespread consumer devices such as camera phones.**

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***Step 2:*** After capture, the computational zoom framework allows photographers to modify the FOV, the extension distortion, and the perspective of the image.

### 3 MAIN COMPONENTS



1. Dense depth reconstruction from a dolly-in sequence
2. Specification of desired multi-perspective camera.
3. Image synthesis of the final result.



# EXAMPLES



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# EXAMPLES



# EXAMPLES



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**The next step...?**

# Citations

[1] <https://imgur.com/XBIOEvZ>

[2] [http://38.media.tumblr.com/tumblr\\_m8ki7mTRfy1qjymoao1\\_500.gif](http://38.media.tumblr.com/tumblr_m8ki7mTRfy1qjymoao1_500.gif)

[3] <http://i.imgur.com/XBqQEGq.jpg>

[4] Sen, Pradeep, Jan Kautz, Orazio Gallo, and Abhishek Badki. *Computational Zoom: A Framework for Post-Capture Image Composition*. Publication no. 4. 4th ed. Vol. 36. N.p.: n.p., 2017. Print. ACM Transactions on Graphics.