# Translation-capable Panorama Using Light Field Imaging
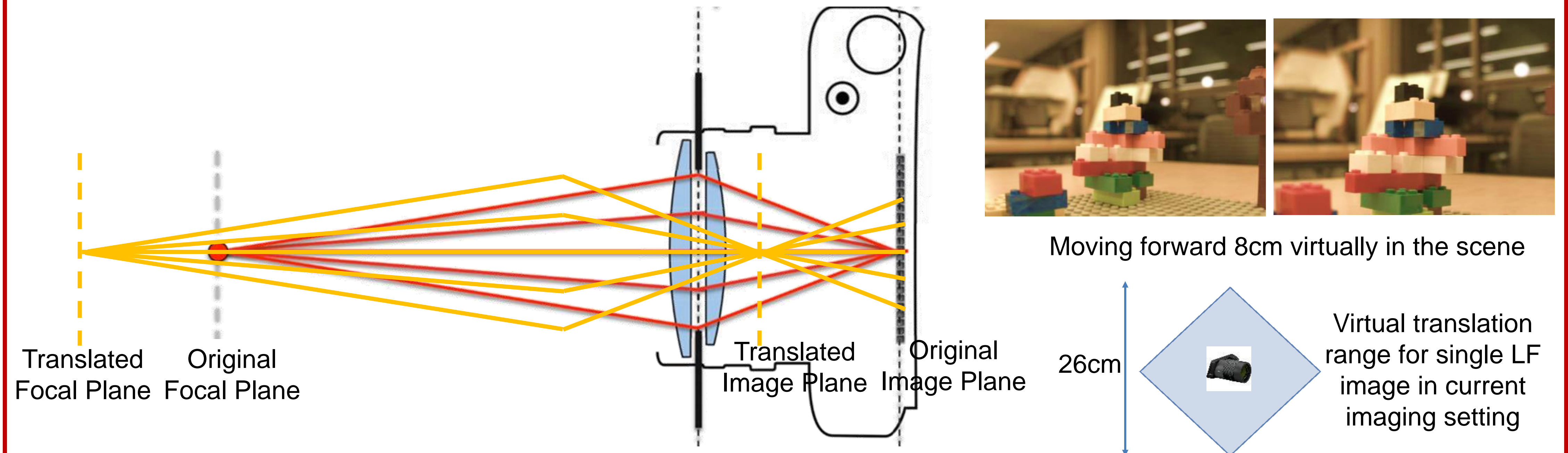
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## Motivation

Current 360 degree camera create panorama enabling users to rotate views around. However, it has to stay in a fixed position, which is the center of the scene. We propose to solve this problem by using light field (LF) imaging technology to add translation capability to conventional panorama, since the LF's ability of refocusing, linear translation and depth sensing has been proved in 2D planar case.

## Translation in Light Field Imaging



Translated Focal Plane   Original Focal Plane   Translated Image Plane   Original Image Plane

Moving forward 8cm virtually in the scene

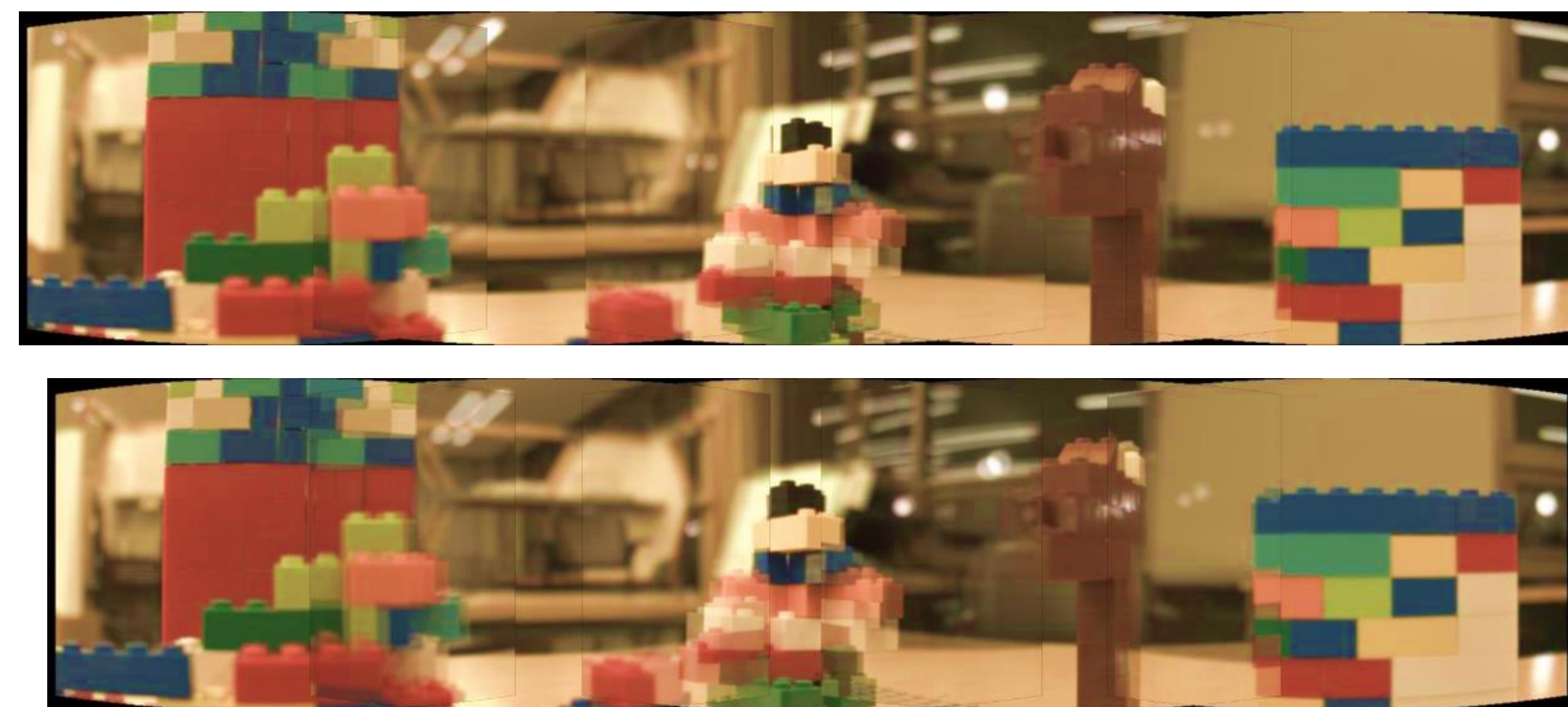26cm   Virtual translation range for single LF image in current imaging setting

## Imaging Setting

Camera: Lytro Illum, FOV 43.5°, keep the focal length to be 30mm, focal plane 26cm, ISO 250, shutter speed 1/20s.

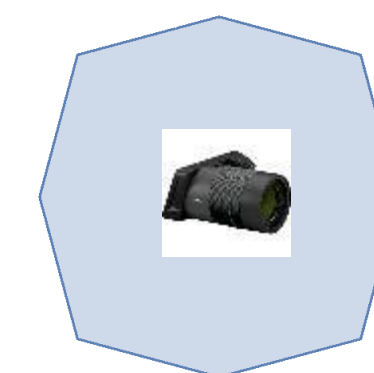Images taken at the position every 22.5°.
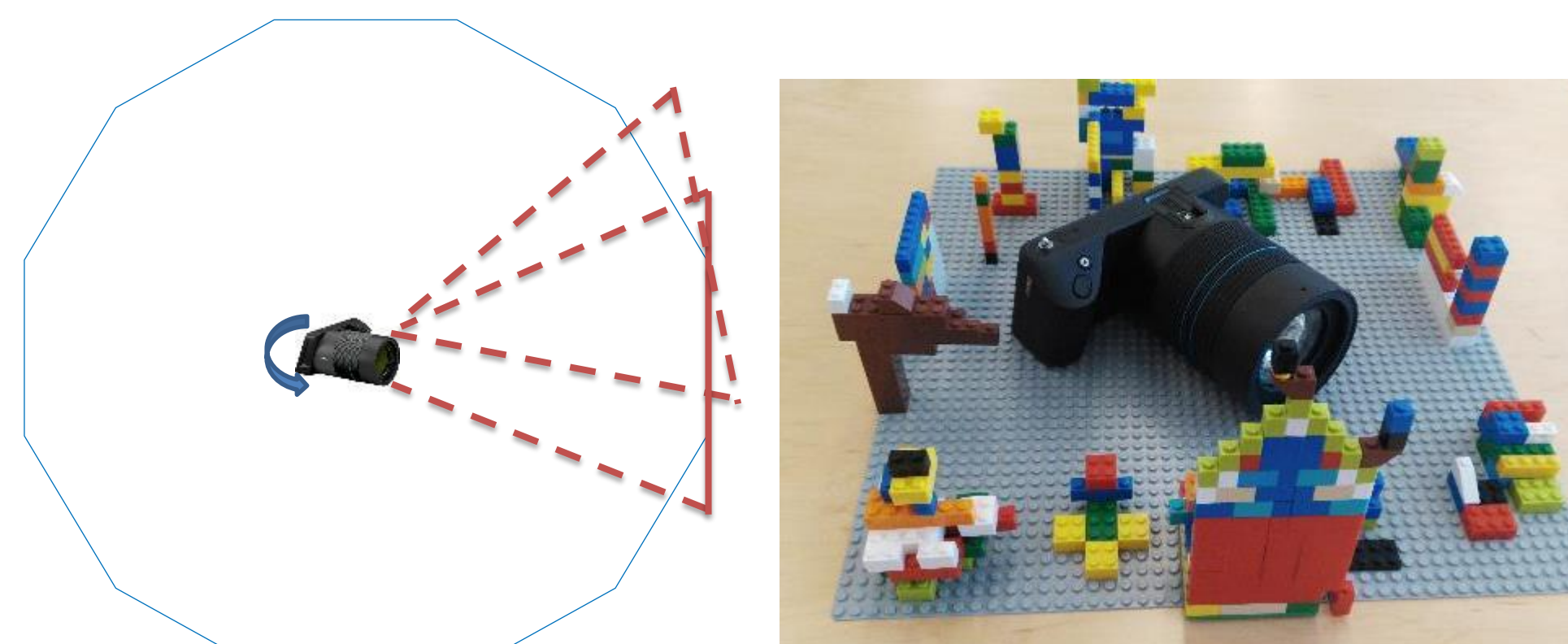


## Panorama Reconstruction



Moving forward 2cm virtually in the scene

7.2cm   Virtual translation range for panorama in current imaging setting

## Conclusion

Using LF Imaging, we demonstrate the translation capability in a panorama, which implies the 6-degree of freedom in a LF powered 360 degree image/video. Although the translation range is limited to several centimeters, it could be useful in micro-scene shooting.

## Reference

[1] Szeliski, Richard. "Image alignment and stitching: A tutorial." Foundations and Trends® in Computer Graphics and Vision 2.1 (2006): 1-104.

[2] Wanner, Sven, and Bastian Goldluecke. "Globally consistent depth labeling of 4D light fields." Computer Vision and Pattern Recognition (CVPR), 2012 IEEE Conference on. IEEE, 2012.