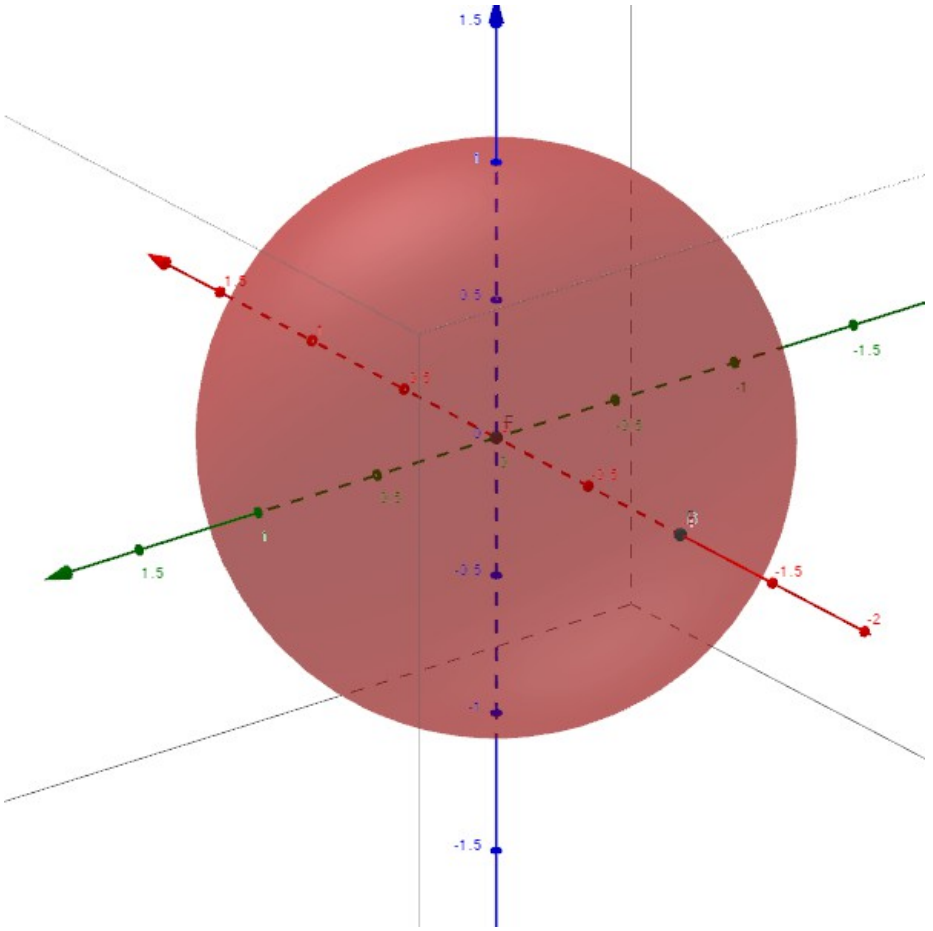
Assignment 2: Panorama

Jakob Brünker
24.05.2016

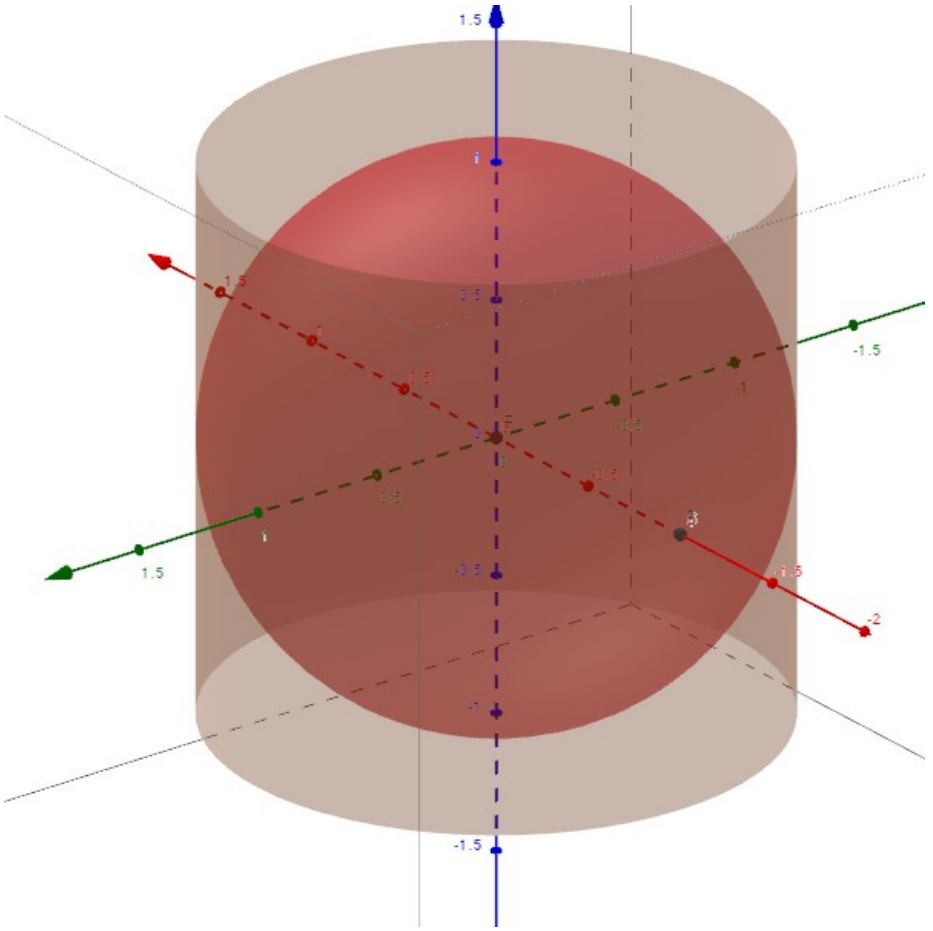
- Mapping to Cylindrical Panorama
- Creating the Panorama
- Using the image to look around the scene
- Using HDR input images
- Using the image in combination with a preexisting normal map

Mapping to Cylindrical Panorama

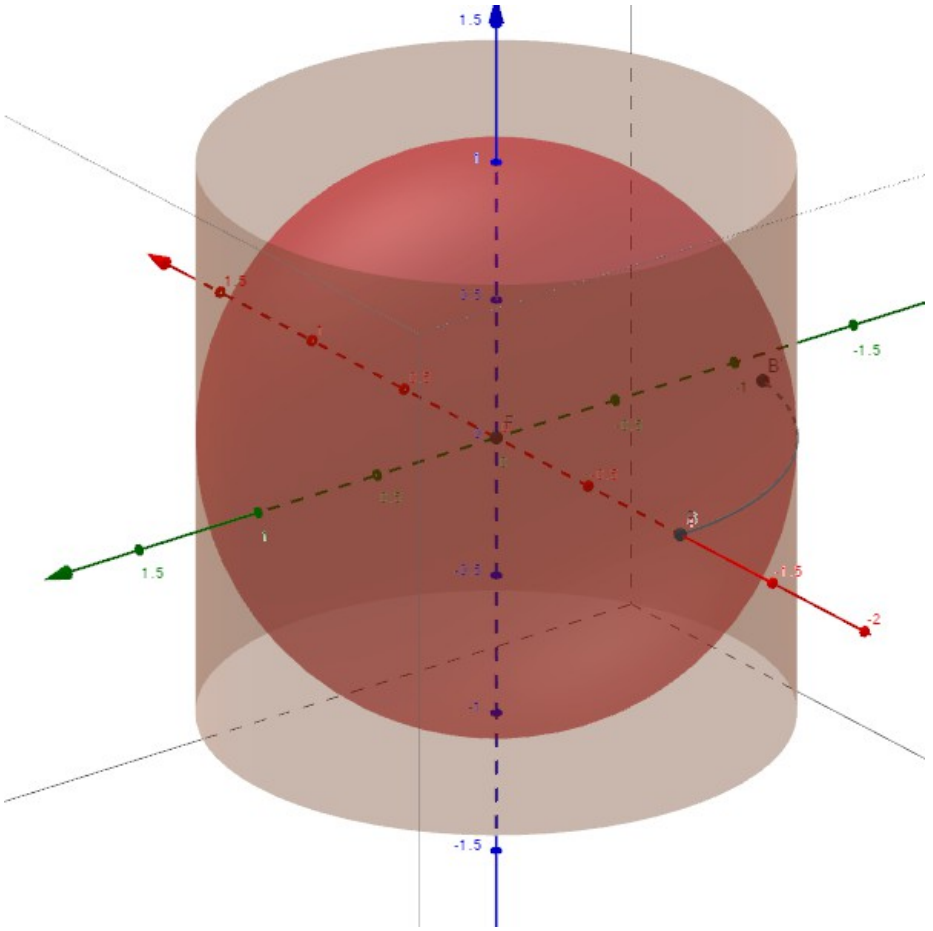


These images are created with GeoGebra

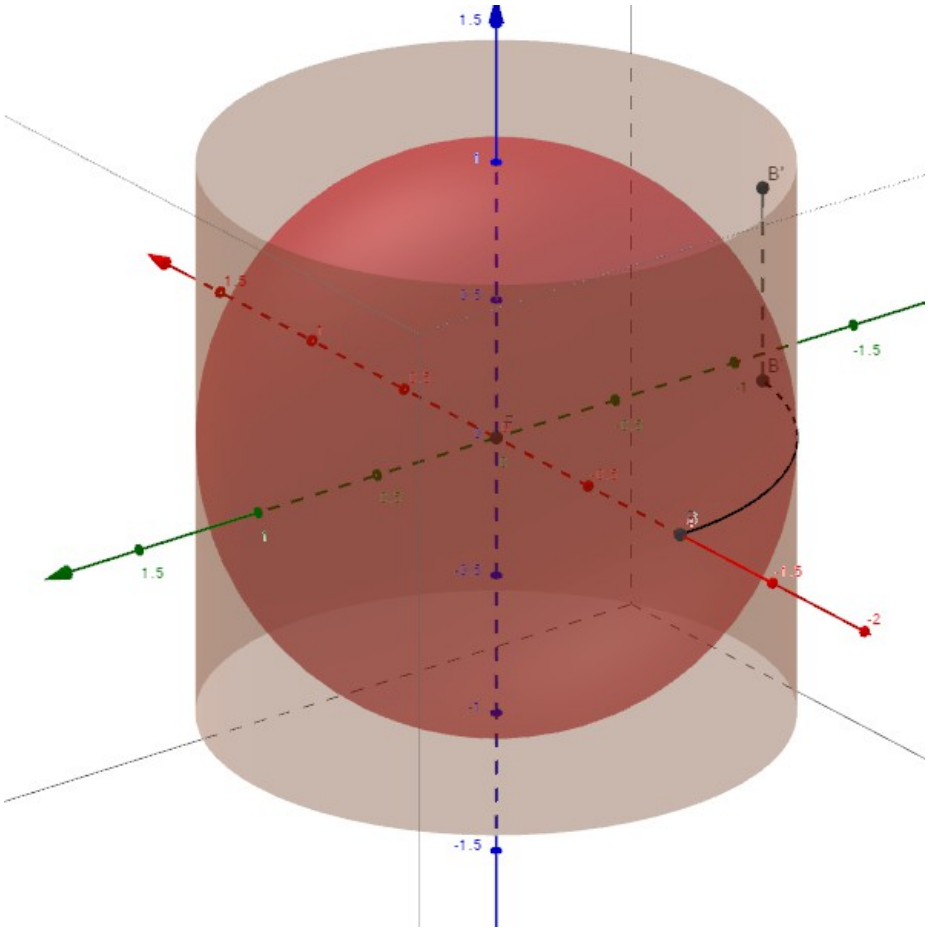
Mapping to Cylindrical Panorama



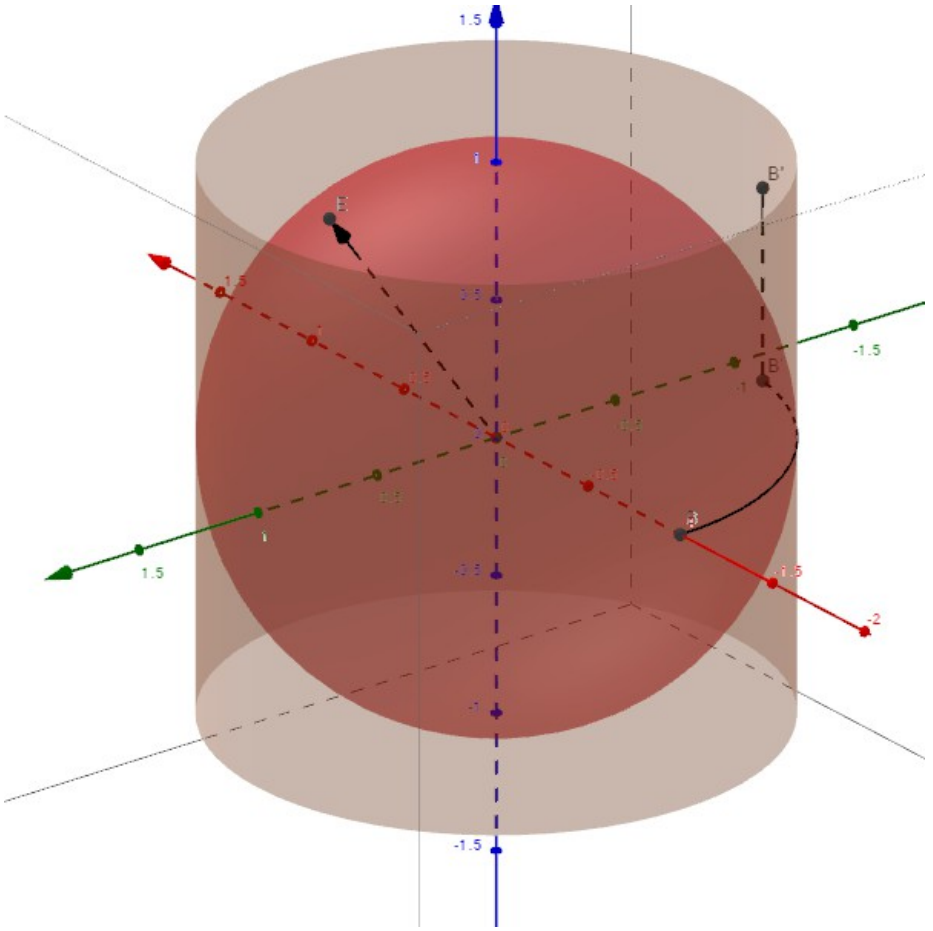
Mapping to Cylindrical Panorama



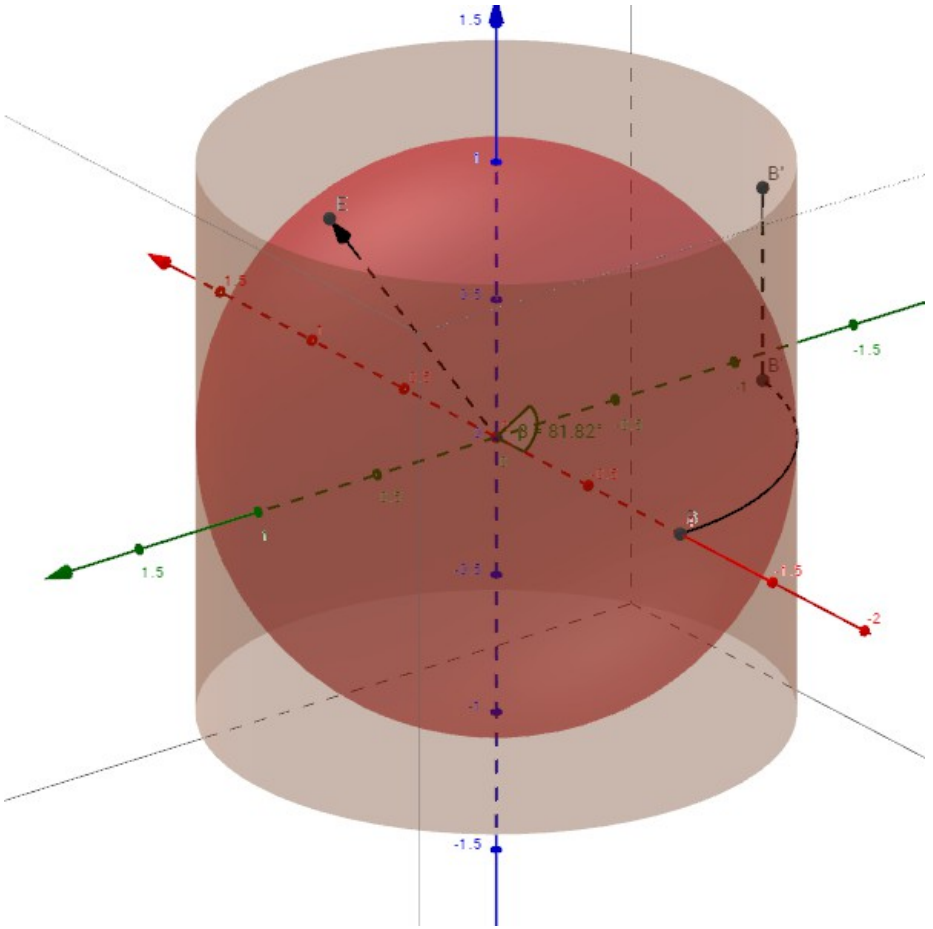
Mapping to Cylindrical Panorama



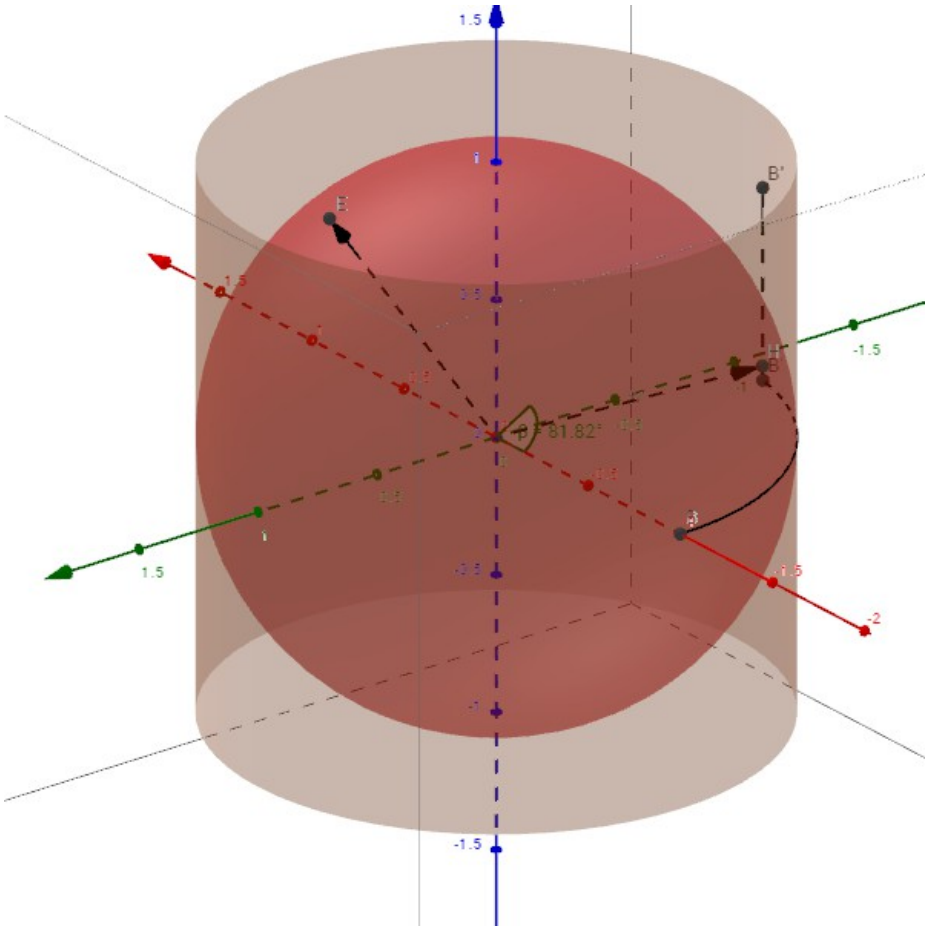
Mapping to Cylindrical Panorama



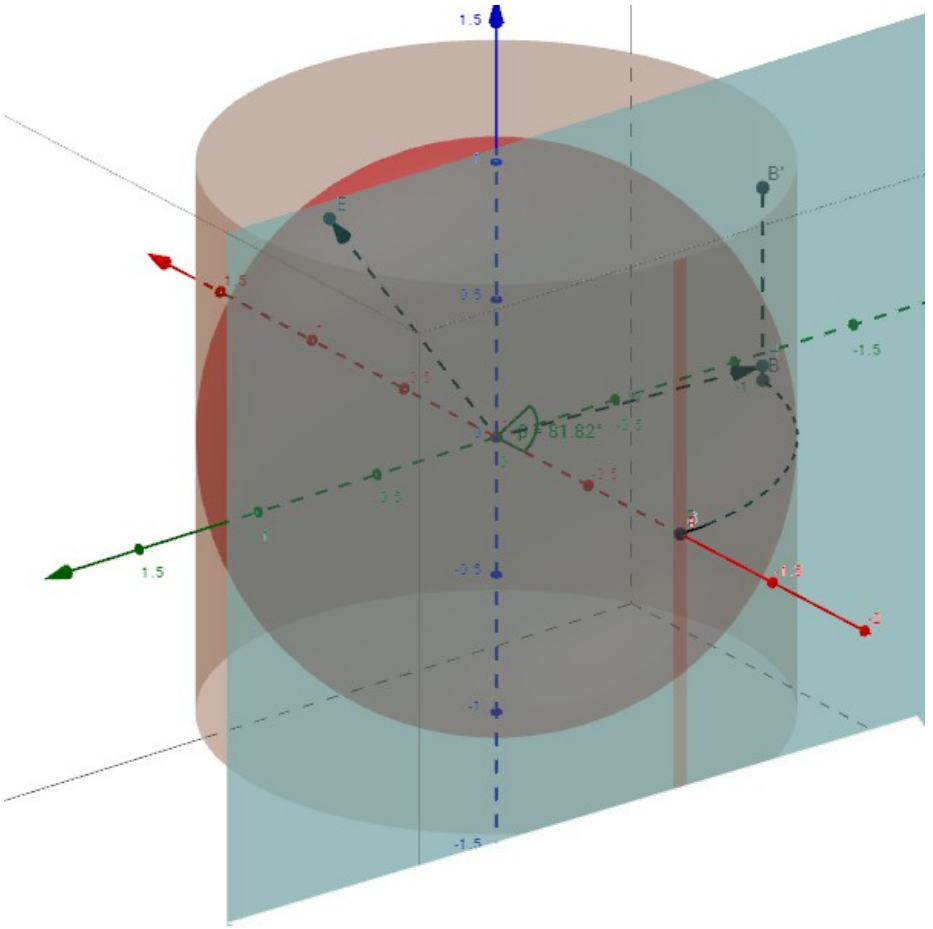
Mapping to Cylindrical Panorama



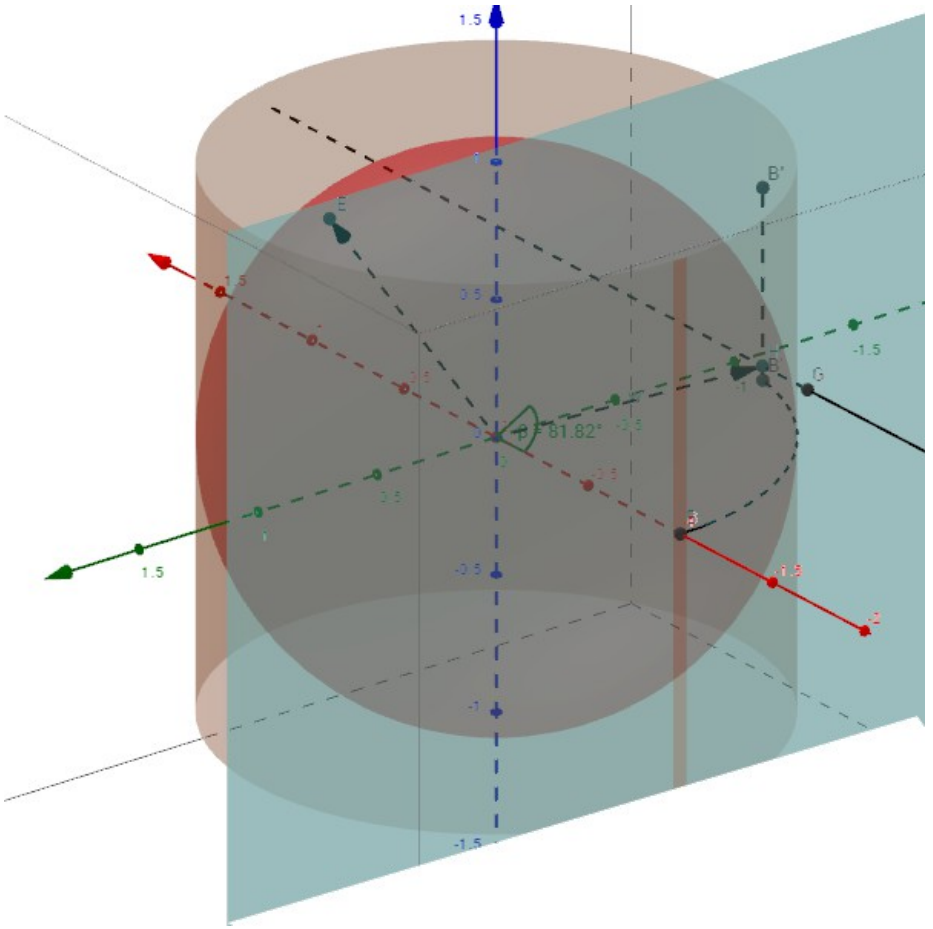
Mapping to Cylindrical Panorama



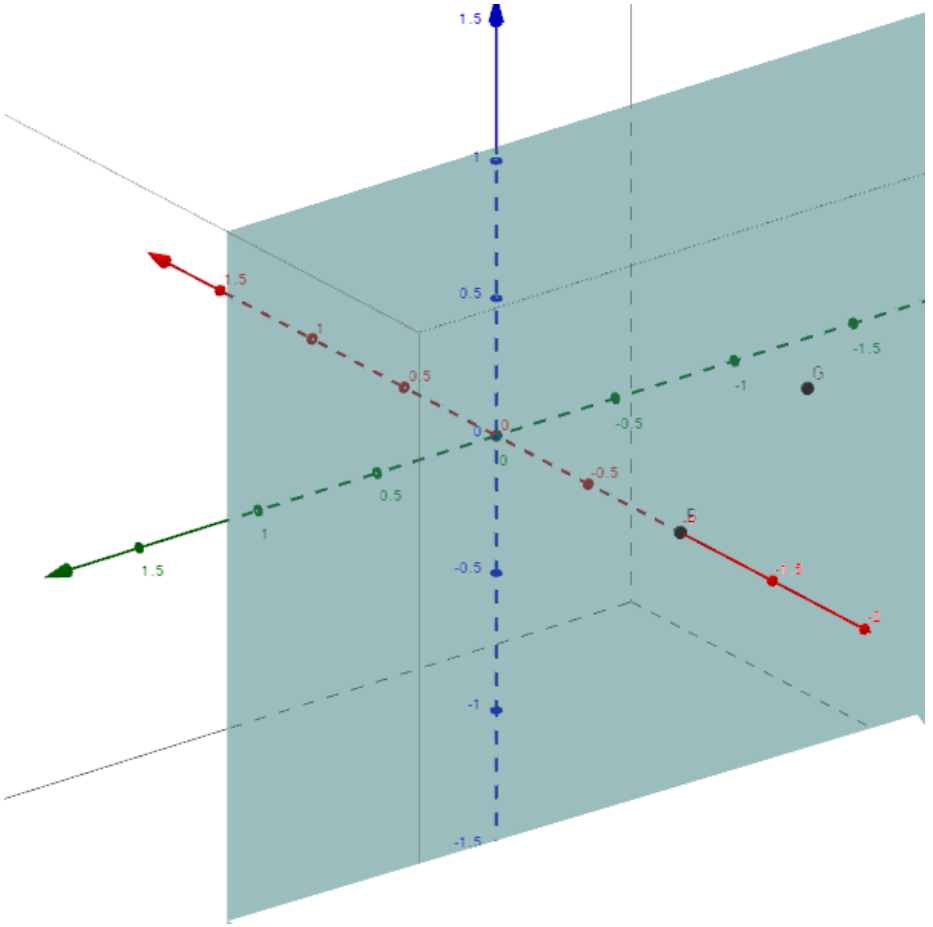
Mapping to Cylindrical Panorama



Mapping to Cylindrical Panorama



Mapping to Cylindrical Panorama



Mapping to Cylindrical Panorama

Given: α : angle around cylinder; d: vertical offset along cylinder

Rotate around z-axis and move vertically: $p = \begin{pmatrix} \cos(\alpha) \\ \sin(\alpha) \\ d \end{pmatrix}$

angle between p and original point $\begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$: $\beta = \cos^{-1}\left(\frac{p \cdot \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}}{\|p\|}\right)$

cross product between p and $\begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$: $u = \begin{pmatrix} 0 \\ p_3 \\ -p_2 \end{pmatrix}$

rotating $\begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$ by $\frac{\beta}{2}$ about u and projecting onto image plane (i.e. ignoring x coordinate) yields:

horizontal image coordinate: $\frac{u_3}{\|u\|}\sin\left(\frac{\beta}{2}\right)$

vertical image coordinate: $\frac{u_2}{\|u\|}\sin\left(\frac{\beta}{2}\right)$

(image coordinates are normalized to [-1,1])

matrix for rotation about arbitrary axis taken and adapted from
https://en.wikipedia.org/wiki/Rotation_matrix#Rotation_matrix_from_axis_and_angle

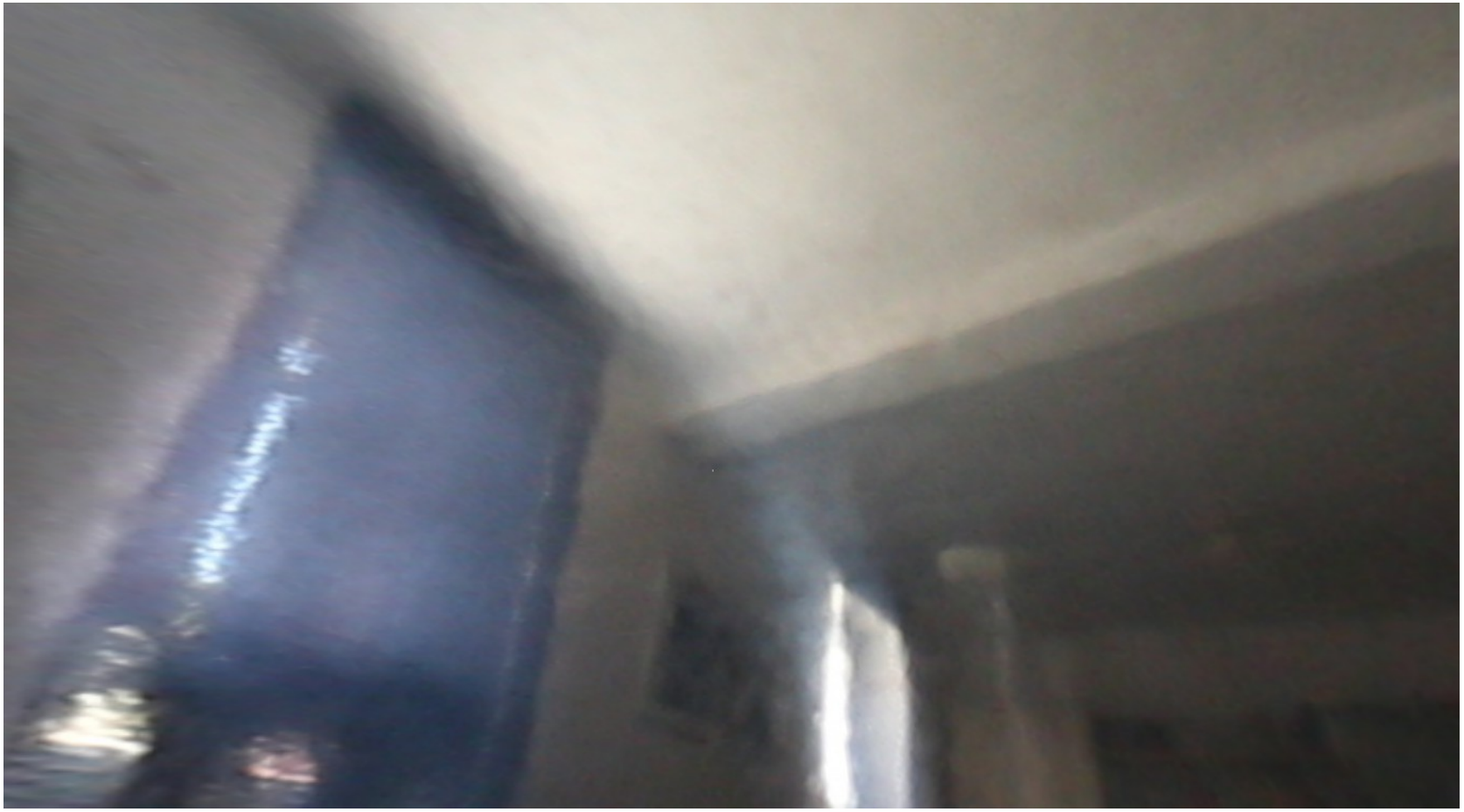
Creating the Panorama

Using the image to look around the scene

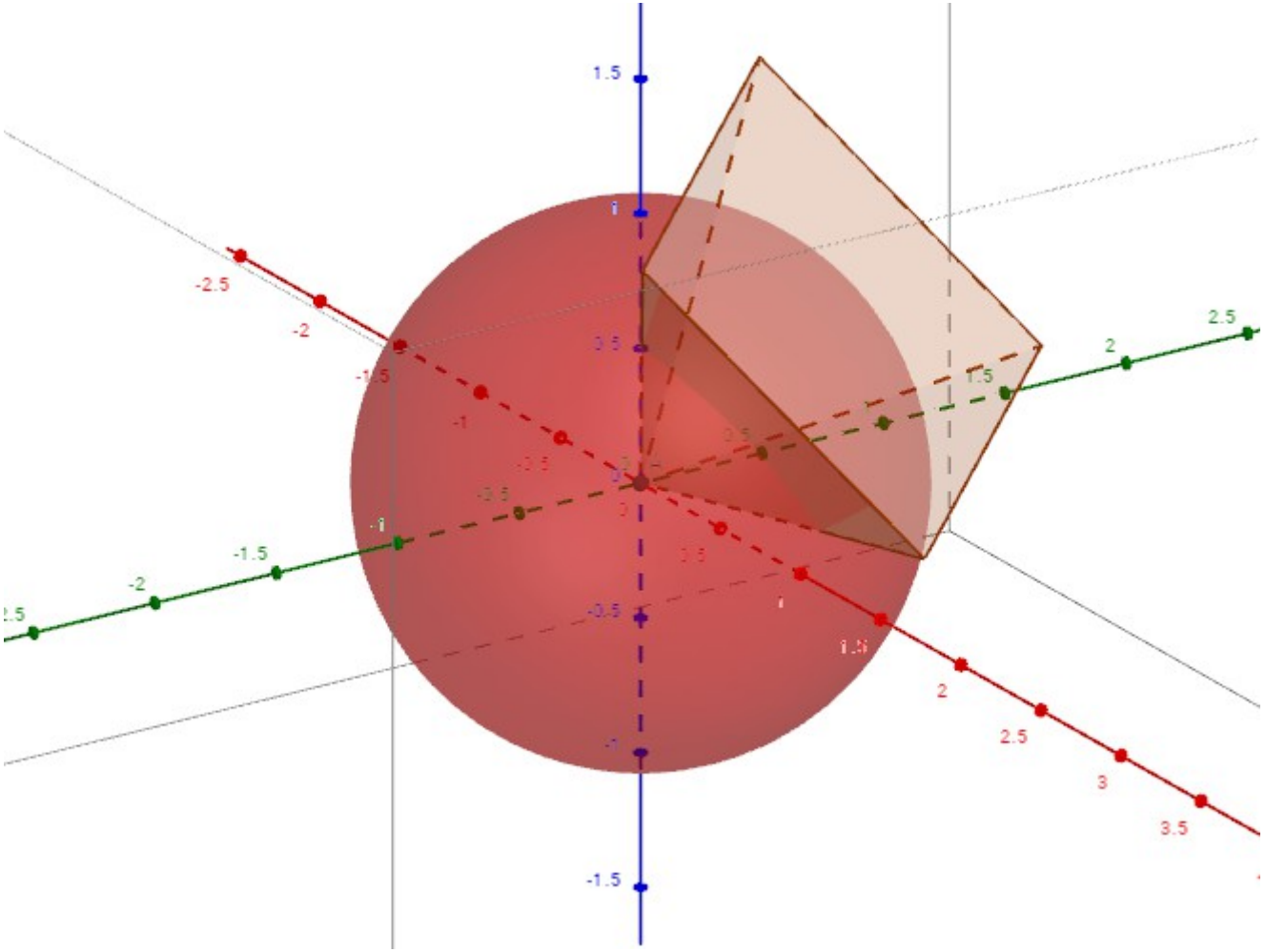
Using the image to look around the scene

Using the image to look around the scene

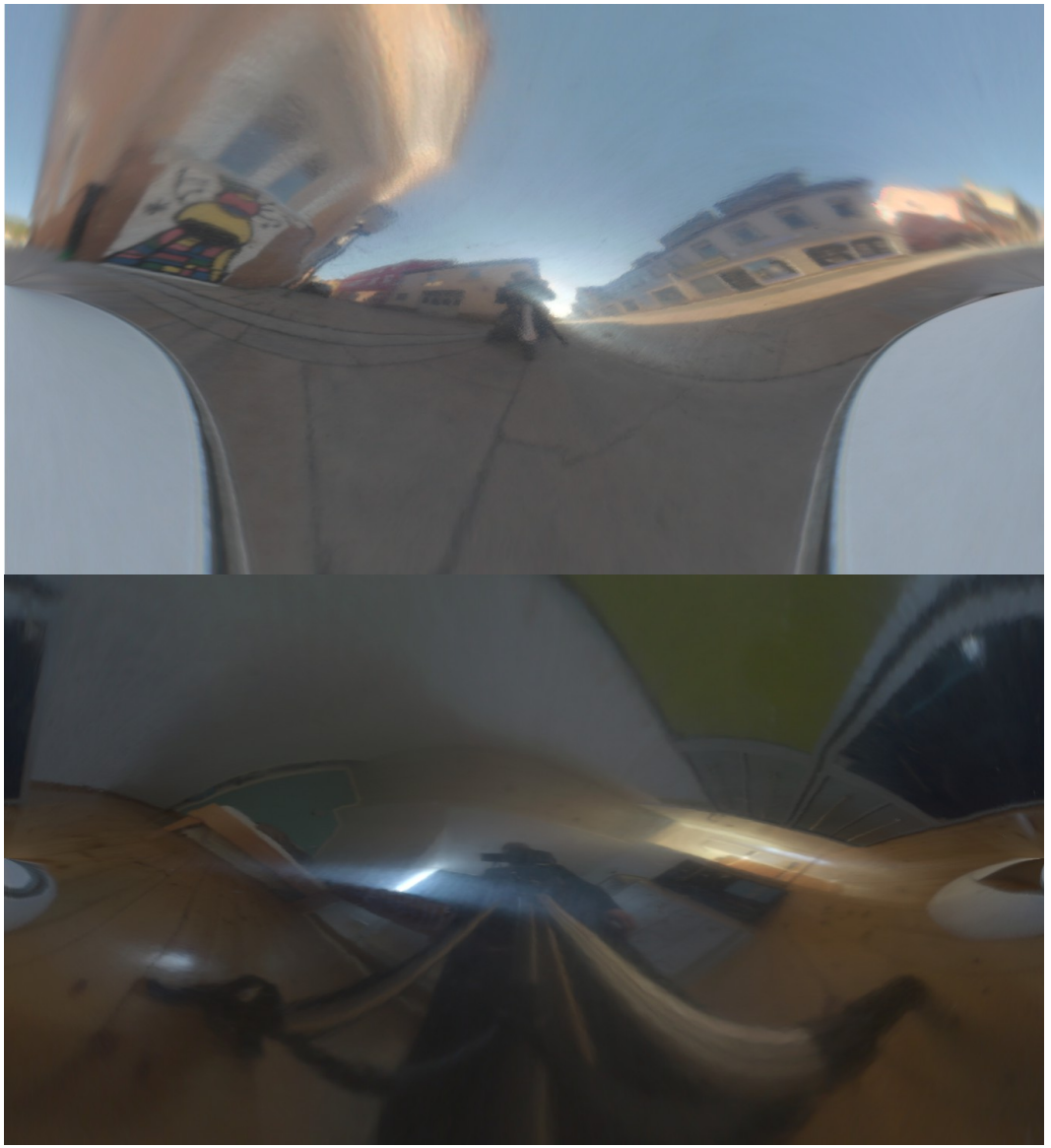
Using the image to look around the scene



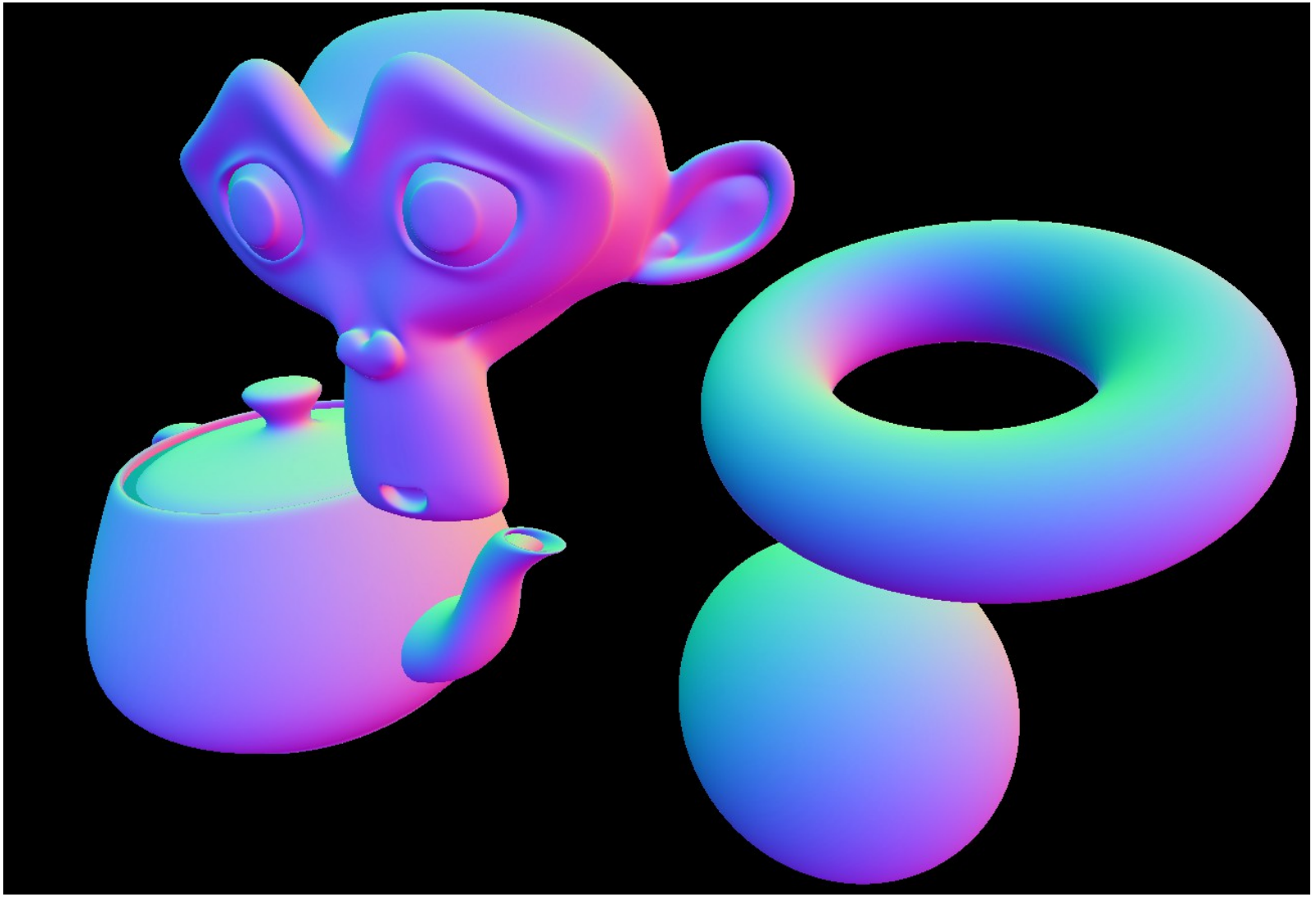
Using the image to look around the scene



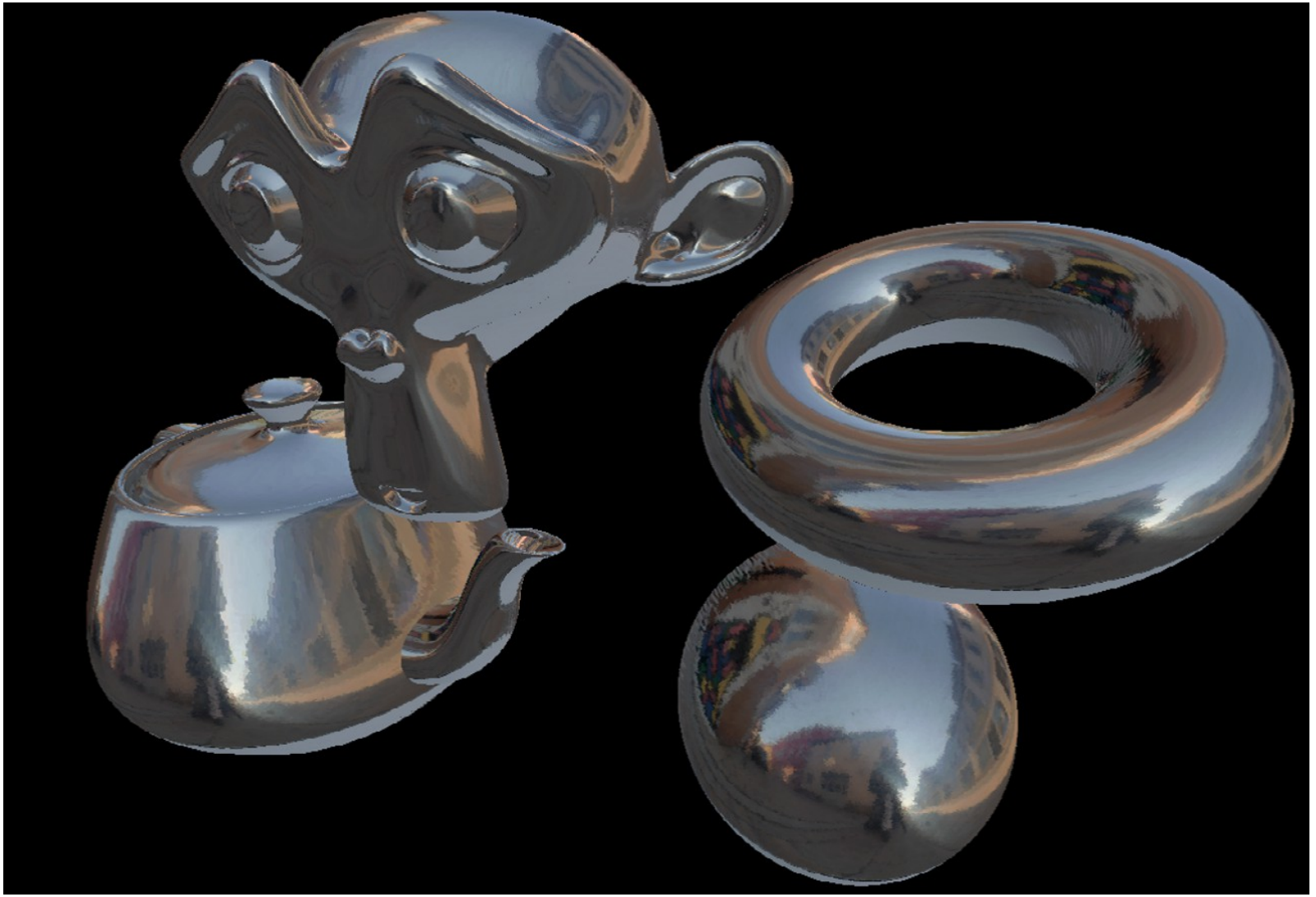
Using HDR input images



Using the image in combination with a preexisting normal map



Using the image in combination with a preexisting normal map



Using the image in combination with a preexisting normal map