EE 267 Virtual Reality: Lab 3

Instructions

Students should complete this lab before starting on Homework 3. Completing the lab will give you useful information that will aid in completing the homework assignment.

Task 1: Visual Acuity

In Homework 3 you will be implementing a foveated rendering technique in an attempt to reduce computation while maintaining a perceptually equivalent image. We can do this by taking advantage of certain limitations of our visual systems. There have been centuries of research investigating our visual system which we as engineers heavily rely on. In this homework, we take a first order approximation and only assume the visual acuity fall-off as a function of eccentricity. However, the visual system is much more complicated, and our perceived visual acuity is affected by other factors. Read the following article to learn more about the factors affecting visual acuity and its limitations: http://webvision.med.utah.edu/book/part-viii-gabac-receptors/visual-acuity/.

Task 2: Depth of Field in Cameras

In Homework 3 you will be implementing depth of field rendering, attempting to mimic the natural depth of field that we perceive on a day to day basis. You can experience this first hand by holding a finger in front of your eyes. Close one eye, and look to your finger. You'll see that the background blurs out. If you now look to the background, you'll see that the background comes into focus but your finger now blurs out. This blurring that you see is due to the limited depth of field of your eyes' optics. The amount of blur that you experience is not always the same; it is a function of your pupil size and focal length. This exact principle also exists in photography, and the depth of field is typically used to make an artistic "bokeh", drawing attention to certain parts of a picture. Read the following tutorial offered by Cambridge in Colour, to understand how depth of field operates in cameras, https://www.cambridgeincolour.com/tutorials/depth-of-field.htm.

Task 3: Anaglyph Stereo

There are right and wrong ways of rendering (or capturing) stereo images, as discussed in class. Paul Bourke does an excellent job of explaining this along with some depth that we use to perceive depth. Read the "Calculating Stereo Pairs" section here: http://paulbourke.net/stereographics/stereorender/.