

Perception and Virtual Reality--Final Project

Due: Monday December 8 (See Timeline at the end of this document)

Final Project Description: For the final project in this course you will complete a paper that examines some topic in vision, computer graphics or virtual reality that was not covered in class, or examines a course topic in more depth. The project will involve exploring a topic area that is of interest to you and beyond the scope of the regular course material. Exploring this topic will involve reading background material from books or journals on vision or virtual reality. A list of topic areas you might consider is given below. You are welcome to consider topics outside of this list. The paper should typically be around 8 - 10 pages, double spaced, 12 point type.

Content of paper:

The particular issues addressed in your paper will depend on the topic area. I do not want you to simply read one textbook summary of a topic and just reproduce the textbook-like summary. Your paper should outline the problem, discuss experiments that address the problem and provide some critical analysis. Your paper should draw from at least 5 separate sources (books or journal articles). An example for organizing your paper is as follows:

Introduction: What is the topic or question you are studying and why is it interesting?

Background: Information that is important for understanding the problem or topic being addressed.

Current approaches or theories: What are some current approaches for addressing or understanding the topic? How do different approaches or theories compare to one another? What experiments or simulations support the different approaches or theories?

Conclusions: How well do current theories account for the problem being addressed? What aspects of this topic still need to be investigated?

Presentations: Each person will give a short, 7 minute, presentation to the class discussing his/her project.

List of topics:

You may choose one of the topics below or one of your own. You can find information on some of these on the web.

Vision Topics:

Color Vision--

Theories of color vision

Color Constancy: How do we maintain a consistent perception of colors under a wide range of lighting conditions?

Retinex theory

Texture analysis

Object Recognition

Perceptual Grouping

Visual Interpolation

Figure-Ground Organization

Face Recognition

Attention: Visual Search

Change Blindness--Large changes in the scene can occur during saccadic eye movements or during a short blank of the image and people do not notice the changes.

3D object motion--There are some interesting papers on how outfielders run to catch fly balls.

Illusory Contours

Biological Motion Recognition--People are very good at recognizing biological motions, such as walking, running, etc, from sparse information (points of light). How do we do this?

Shape from shading--We are very good at using shading cues to determine the 3D shape of a surface. How does this work?

Virtual Reality topics:

Computer Graphics: Texture Mapping

Animation techniques

Creating natural 3D scenes

Use of Artificial Intelligence

Effects of VR on behavior

(Note: searching on Google Scholar with "Virtual Reality" or "Virtual Environment" as part of the search string will give you lots of results that may generate ideas).

Resources:

Reference Requirement: Your paper must draw information from at least 5 journal articles or books. On-line sources are not acceptable unless they are a peer-reviewed journal (E.g. Journal of Vision). Please check with me if you are unsure if a source is acceptable.

The following journals (among others) have lots of good articles on vision or VR. The Holy Cross Libraries have some of them:

Vision Research

Perception and Psychophysics

Journal of the Optical Society of America A

Journal of Vision (an online journal)

Perception

Journal of Experimental Psychology: Human perception and performance

Presence: Teleoperators and Virtual Environments

There are also numerous books on vision.

Project Timeline:

Fri. October 31--Project Description: Turn in a 1 paragraph description of what your project will be. List at least one source that you will use.

Fri. November 14--Project outline:

Turn in a detailed outline and list of references for your paper. The outline should give enough subheadings to show that you have done some significant research and have an idea of the specific topics that you will cover in the paper.

Mon. December 1--First draft: Turn in first draft of your project.

Wed. and Fri. December 3 and 5--Presentations: Each student will give a 7 minute presentation on their findings.

Mon. December 8--Final paper due at Noon.