

Fundus Reading Hood

University of Wisconsin-Madison
College of Engineering-Biomedical Engineering
BME 200/300
December 7th, 2005

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Abstract:

In the grading of retina scans at the Fundus Photograph Reading Center, normal office light interferes with the graders ability to efficiently identify lesions and other spots on the retina that are indicative of certain diseases. Since these lesions are often very small it is imperative to have a standard environment in which the scans can be graded. The design of a monitor hood that blocks ambient light is the key element in obtaining accurate grading of retina scans.

§1. Problem Statement

The goal of this project is to develop a monitor hood that will block ambient light for the photograph graders at the Fundus Photograph Reading Center. Determining problematic sites in retinal scans is used to diagnose disease states in the eyes. A controlled environment is necessary for grading of these scans in order to assure correct identification of problematic sites. Creating a monitor hood will provide this controlled environment.

§2. Background

The Fundus Reading Center is a facility located on the UW-Madison campus. The photograph reading center "strives to further the understanding and treatment of preventable blindness through interpretation of ophthalmic images in clinical studies" (eyephoto.opth.wisc.edu).

Photographs, like those in Figure 1, are received at the Reading Center and are graded for ophthalmic research. The focus of ophthalmic

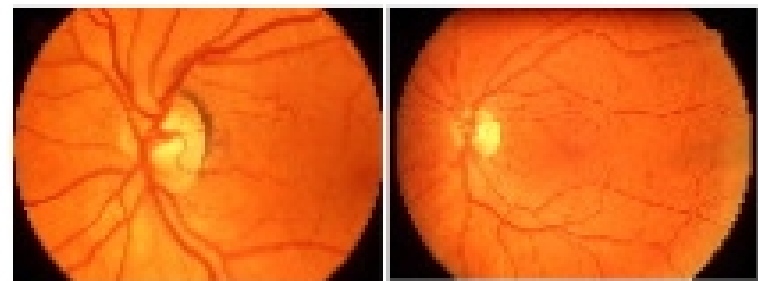


Figure 1. Fundus Photographs
<http://www.jhu.edu/wctb/coms/patient/photog/fundus.htm>

research at the Fundus Reading Center consists of five main categories: Diabetic Retinopathy, Age-related Macular Degeneration, Hypertensive Changes of the Retina, Studies of the Ocular Complications of AIDS (CMVR), and Age-related Eye Disease Study (AREDS). Since the retina can be assessed by noninvasive methods such as retinal photography, analyzing these photographs is preferred in relation to other invasive procedures. For example, retinal changes have been observed in many cases of hypertension and sclerosis.

When a patient is photographed, special cameras take images of the eye with the patient's pupil dilated. This procedure causes no discomfort to the patient and provides a photograph that details "the retina, the retinal vasculature, and the optic nerve head, optic disc from which the retinal vessels enter the eye" (www.jhu.edu).

The purpose of grading photographs at the Fundus Center is for retinal quality. This quality is important the viewing of arteriolar abnormalities and lesions of diabetic retinopathy. To insure quality of the photographs, there are many grading protocols for the readers to assess these ophthalmic images. (eyephoto.opth.wisc.edu)

The stereoscope also plays a role in grading retinal images and must be accounted for in our design. Stereo images are pairs of photographs of the same subject. (stereo.thurston.org) There are many techniques to view stereo images on the computer monitor such as parallel free vision and cross vision. (www.findarticles.com) However, the Fundus Reading Center uses a stereoscope to facilitate this process.

The purpose of viewing through a stereoscope is to view a pair of images as a single 3-D image. The stereoscope (Figure 2) is used by the grader while viewing the photographs. A lever on the side adjusts mirrors to converge the images. A horizontally-centered position is necessary for proper viewing of the ophthalmic images. The image will become more distorted the further from the center the stereoscope is positioned. The viewer may have to adjust and rotate from this horizontal position to attain stereo. There are two components that must be taken into consideration when viewing the images: the horizontal and vertical positions, as in a Cartesian grid. Horizontally, if that



Figure 2. A stereoscope similar to those used at the Fundus Reading Center