

# **Fundus Reading Hood:**

## ***Project Design Specification (PDS)***

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**Client:** Dennis G. Hafford

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**Function:** The goal of this project is to develop a flexible, easily stored monitor hood that will block ambient light. The monitor hood will be designed for LCD monitors used in grading retinal scans at the Fundus Reading Center.

### **Client Requirements:**

The client requires the design to:

- Allow a clear view of the monitor at all times.
- Have an adjustable length of 60.96 cm.
- Be easily removable from the monitor or not extend out more than 38.10 cm. when not in use.
- Not to extend significantly behind the monitor.
- Take up a minimal amount of space when stored.
- Taper to a closed viewing port of approximately 20.96 cm by 6.03 cm.
- Viewing port needs to be about 12.70 cm. down from the top of the monitor.
- Be self-supporting with no legs when extended.
- Have an adjustable angle of view to allow grader to maintain good posture.
- Be flexible to fit a range of monitor sizes.
- Light intensity under the hood should not exceed 64 lux

If time allows, the client also requests that the hood accommodate a fixture to secure a stereoscope to reduce fatigue from holding the accessory. The following specifications are required:

- 60.96 cm from the screen
- Horizontally-centered position
- Variable tracking
- Slight rotational ability

### **1. Physical and Operational Characteristics**

- a. *Performance requirements:* The hood will be used on a regular basis, likely for several hours each day. However, since the monitor is used for other tasks

the device must detach or retract to allow for complete viewing. The actual hood is not moving when it is in position, but changing positions will be estimated to occur at least 8 times per day.

- b. *Safety*: There will be very few safety concerns for the product. One minimal concern would be pinching of the fingers as mechanical folding occurs, but the forces will most likely not be strong enough to be dangerous, as the product will most likely be manually operated.
- c. *Accuracy and Reliability*:
  - The device must accommodate flat screen monitors with a depth of about 3.81 cm
  - Adjustment to each monitor type should be made.
    - Monitor dimensions to adhere to:
      - VP201b 44.45 cm W x 34.29 cm H x 3.81 cm D
      - FP2000 51.44 cm W x 42.55 cm H x 3.81 cm D
      - FP2001 44.45 cm W x 35.56 cm H x 3.18 cm D
- d. *Life in Service*: A likely product would be used for a number of years, possibly until the end of the client's research. Travel, revolutions, and cycles do not apply.
- e. *Shelf Life*: Shelf life will be indefinite as long as it is kept in optimal conditions (cool, dry place) as to not promote rusting of mechanical joints.
- f. *Operating Environment*: Conditions of operation include those in a standard, air controlled, regular office setting:
  - Normal room temperature operation (~70°)
  - Normal pressure ("the standard atmosphere" (1 atm) = 101.325 kPa)
  - Low humidity
  - Dirt and dust levels are low and negligible
  - Fluid corrosion will not be a factor, as the office setting does not produce volatile fluid to affect the product
  - Vibrations may cause loosening and detachment of the device from the computer monitor and should be kept to a minimum.
- g. *Ergonomics*: The device should be restricted to movement by manual force. It should have a small footprint (should not take up space behind the monitor) as there is very little room in many of the workspaces. The device should allow the monitor to be slightly below the eyes and angled up. If a ledge is attached to support the stereoscope it must pivot to allow the grader to maintain good posture.

h. *Size*: Static components of the reading hood should not exceed 38.10-45.72 cm, but the total extension should reach 60.96 cm with no additional support. The unit must be collapsible to a very small size, leaving no footprint behind monitor.

i. *Weight*: Product weight must be minimal, as no legs can be attached for support. Computer monitors must bear all weight.

j. *Materials*: Frame must be light and sturdy; screen/fabric for the sides cannot be transparent to any degree.

k. *Aesthetics, Appearance, and Finish*: Ideally, a dark matte finish will be applied to all inner surfaces of hood to reduce or eliminate light reflection. Product is not required to be aesthetically pleasing, so long as functionality is maximized.

## 2. Production Characteristics

a. *Quantity*: Roughly 15 units for all photograph graders at Fundus and the ability to easily manufacture more units if needed.

b. *Target Product Cost*: Optimal cost is under \$200 a unit, however, budget allows for the prototype to cost no more than \$2000.

## 3. Miscellaneous

a. *Standards and Specifications*: This product is not regulated by the FDA but has several national standards. The applicable standards from the International Ergonomics Associations standards include ISO 9241, ISO 9355, and ISO 14738. These standards address ergonomic requirements for office work with visual display terminals, for the design of displays and control actuators, and for safety of machinery, respectively.

b. *Customer*: The customer would like a design that is lightweight, compact, and easily moved and stored in the lab. Previous designs presented to the client were too big, stationary, and heavy for the facility.

c. *Patient-related concerns*: The privacy of patient data is a concern; however, the hood is offering further protection of privacy.

d. *Competition*: Several monitor hoods exist on the market from companies such as ColorGear, CompUshade, Photodon, Ergomart, and Hoodman. These hoods sell from \$25-\$80, a lower price range than our reading hood. U.S. patents for monitor hoods and similar coverings are 5,900,979; 5,243,463; D422,579; 6,356,439; 6,394,615. The purpose of these monitor hoods is to reduce glare and background light. None of these products focus specifically on the reading of ophthalmic images or blocking all ambient light. Also, they do not include an extended viewing window.