

Research of illumination methods

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In order for the device to be able to generate an image it is important to take an image of the eye when the retina is dilated. As we are illuminating the eye to see the retina (which causes the pupil to constrict), the light source needs to be able to flash within the time this takes if we are going to take multiple images in succession.

Time of flash: If a light is switched on it takes 0–0.2s for the pupil to constrict. This is called the latency period during which the pupil does not yet respond. The exact latency depends on the person and surrounding conditions but we will try to operate within this timespan. This would be possible using LEDs and an additional driver or a flash bulb (Ellis, 1981).

Potential Light Designs:

1. Direct Illumination

This would be illuminating the eye using a ring of LEDs sufficient to provide enough lux to reach the back of the eye in conditions that are not completely dark.

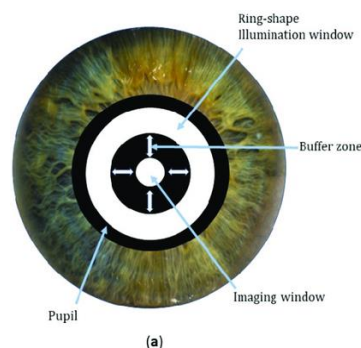


Figure 1: Image of direct illumination of pupil (Smartphone Fundus Photography, NIH)

2. Indirect Illumination

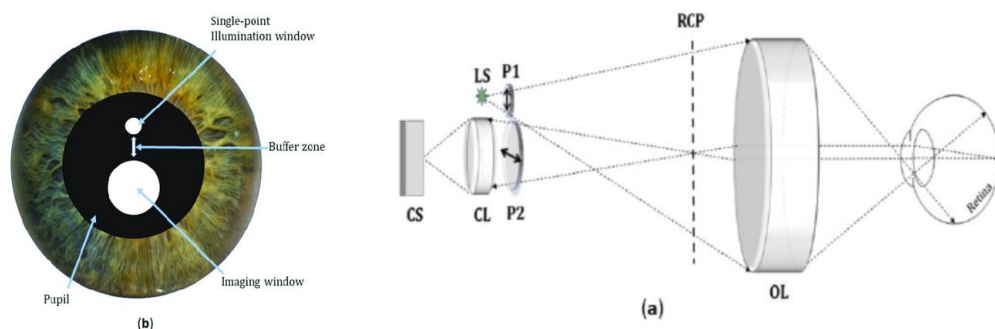


Figure 2: Image of indirect illumination of the pupil (MDPI, Chalam)

After some research we discovered the method detailed in Figure 2. This would allow us to image the eye potentially only using one LED which is focussed through the lenses we are already using. If we had more time we would have liked to research into this approach and test its validity as a solution.