

Visionaries
Eye Dominance Detection Instrument (EDDI)
Product Requirements Document

Document Number 00001

Revisions Level	Date
D	12-12-2014

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Authentication Block

EDDI Design Description Document (for OPT310 Senior Design Class)

<u>Rev</u>	<u>Description</u>	<u>Date</u>	<u>Authorization</u>
A	Initial PRD	10-27-2014	CAM, KML, YQ, ZZ
B	Updated PRD	11-11-2014	CAM, KML, YQ, ZZ
C	Updated PRD	12-03-2014	CAM, KML, YQ, ZZ
D	Updated PRD	12-12-2014	CAM, KML, YQ, ZZ

The EDDI is a senior design project. Its design inputs were derived from our interactions with our clinical and research partners, Scott MacRae and Len Zheleznyak.

Vision:

The product vision as stated in “Eye Dominance Detection Instrument Rev D” is a phablet to quantitatively measure eye dominance in humans in an efficient amount of time.

Environment:

As a clinical device, it needs to operate in the following environment:

Temperature

55-85 °F – operation range

Relative Humidity

Non-condensing – safe operation

10-85% - meets specifications

Phablet used in conjunction with EDDI contains a rechargeable battery.

During normal operation, may come into contact with a patient's face. It must be cleanable/ easily sanitized.

Should be used with instruction from a clinical assistant

Regulatory Issues:

No current restrictions.

Scope:

We are responsible for:

- Condensing the current eye dominance test to a portable device.
- Choosing a phablet
- Designing and constructing the housing
- Selecting and purchasing lenses
- Designing and debugging phablet app
- Research on making device commercially available in both clinical and non-clinical settings.

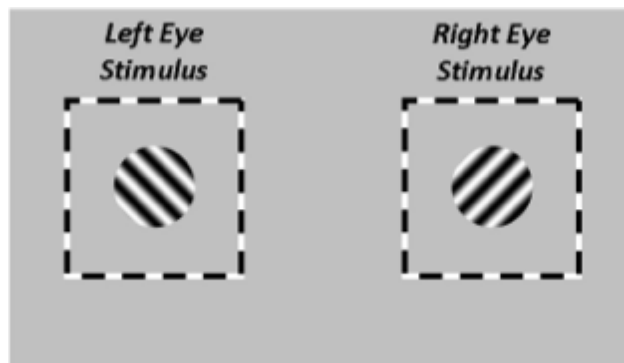
We are not responsible for:

- Mass producing EDDI
- Functionality with other phablets

Fitness for use:

The phablet will:

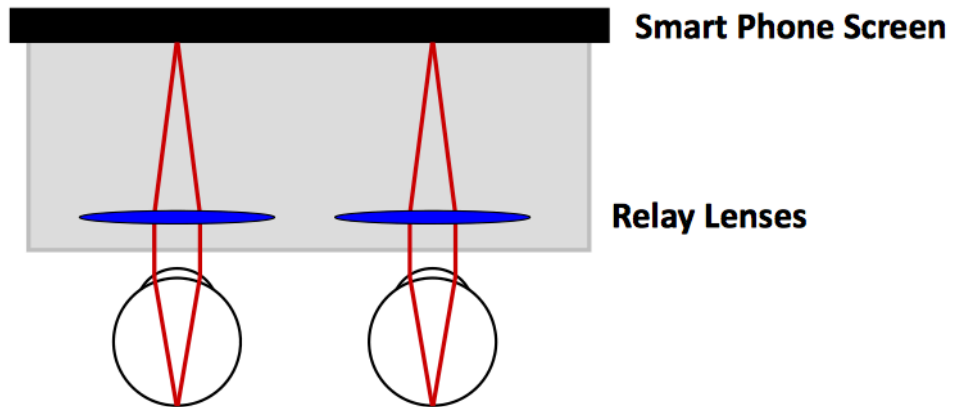
- Be capable of quantitatively measuring eye dominance
- Generate two independent patterns of sinusoidal fringes of a frequency of 4 cycles/degree with changeable contrasts; one for each eye
- Display patterns oriented perpendicular to one another
- Require that the image subtends an angle of 1 degree onto retina
- Include a square box around the pattern used to ensure the individual patterns overlap in patient's vision, as seen below:



- Correct gamma curve for a linear increase in gray levels
- Allow patient to convey which pattern orientation is visible in real time
- Generate numerical value representing right eye-left eye contrast ratio based on patient input and contrast values

The housing will:

- Contain two achromatic doublets; one for each eye
- Hold lenses one focal length away from screen to ensure light comes out collimated as shown below:



LENS SPECIFICATIONS

Aperture Diameter	25 mm
Focal Length	~50 mm
Thickness	<15 mm
Number of Elements	2
Spectrum	Visible (400-700 nm)
Aberration Correction	Chromatic and Spherical

It is desirable that:

- Patient can adjust one pattern position on screen
- Housing will allow for lens adjustment based on patient eye-spacing
- Test will take less than one minute
- The phablet can process vocal input from patient
- The housing design is aesthetically fit for a clinical setting
- The system costs less than \$2000
- The system has a cheaper version for more widespread use