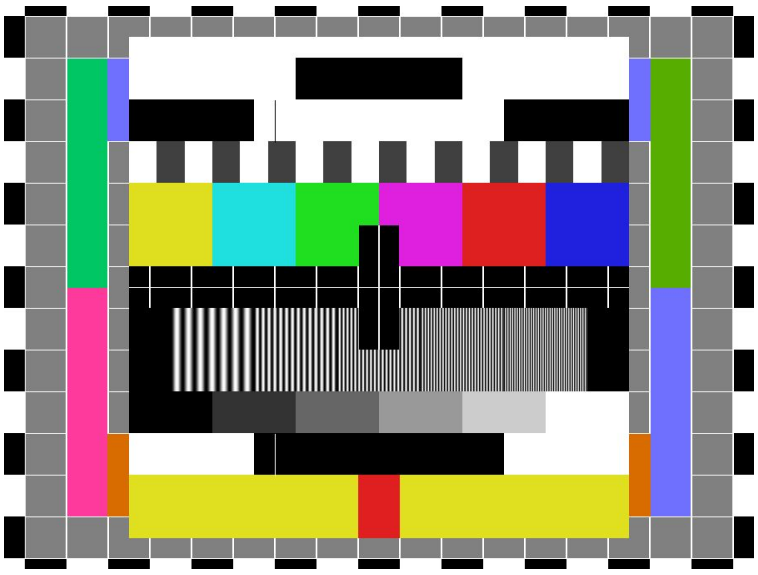
Department of Computer Science & Engineering
The University of Texas at Arlington

System Requirements Specification
CSE 4316: Senior Design I
Fall 2015



EyeLLuminati
Eye Tracker

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Revision History

Revision	Date	Author(s)	Description
0.1	10.28.2015	KB, JT	Document Creation

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1 Product Concept

A cost effective, accurate, modern looking, and powerful eye tracking system is to be built. Its ultimate application would be helping people living with disabilities such as ALS.

1.1 Purpose and Use

It should accurately track the pupil movement of the user using various computer vision algorithms.

1.2 Intended Audience

People with ALS, hospitals, Virtual Reality enthusiasts

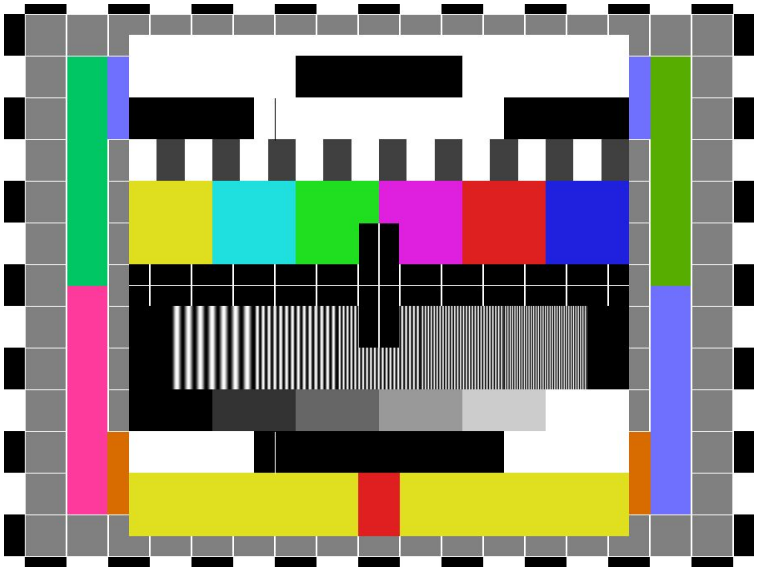

Figure 1: X conceptual drawing

2 Product Description

This section provides a description of your product and defines it's primary features and functions. The purpose is to give the document reader/reviewer enough information about the product to allow them to easily follow the specification of requirements found in the remainder of the document. Your header for this section should introduce the section with a brief statement such as: "This section provides the reader with an overview of X. The primary operational aspects of the product, from the perspective of end users, maintainers and administrators, are defined here. The key features and functions found in the product, as well as critical user interactions and user interfaces are described in detail." Using words, and pictures or graphics where possible, specify the following:

2.1 Features & Functions

The main function of the product will be to keep track of the pupil, and will accomplish this using a combination of the Cypress-CX3 MIPI to USB interface board to pull the camera data and the Odroid-XU4 to process the images and track the pupil.

2.2 External Inputs & Outputs

There will be no external data processed by the product. The only output from our product will be what the camera is seeing and the position of the pupil in the image.

2.3 Product Interfaces

There are currently no plans to implement a user interface, we may implement one later but it is a low priority task.

3 Customer Requirements

Include a header paragraph specific to your product here. Customer requirements are those required features and functions specified for and by the intended audience for this product. This section establishes, clearly and concisely, the "look and feel" of the product, what each potential end-user should expect the product do and/or not do. Each requirement specified in this section is associated with a specific customer need that will be satisfied. In general Customer Requirements are the directly observable features and functions of the product that will be encountered by its users. Requirements specified in this section are created with, and must not be changed without, specific agreement of the intended customer/user/sponsor.

3.1 Requirement Name

3.1.1 Description

A detailed description of the feature/function that satisfies the requirement. For example: The box will be slate blue. This specific color is required in order to ensure that the box matches other similar boxes in the Box Systems Premium line of products. Slate blue is specified as #007FFF, using six-digit hexadecimal color specification. It is acceptable and advisable to include drawings/graphics in the description if it aids understanding of the requirement.

3.1.2 Source

The source of the requirement (e.g. customer, sponsor, specified team member (by name), federal regulation, local laws, CSE Senior Design project specifications, etc.)

3.1.3 Constraints

A detailed description of constraints on satisfying the requirement (e.g. one such constraint might be: The specified color must be commercially available in paint capable of adhering to the material of which the box is manufactured. (See customer requirement 3.x for production material specification.)

3.1.4 Standards

A detailed description of any specific standards that apply to this requirement (e.g. NSTM standard xx.xxx.x. color specifications [?].)

3.1.5 Priority

The priority of this requirement relative to other specified requirements. Use the following priorities:

- Critical (must have or product is a failure)
- High (very important to customer acceptance, desirability)
- Moderate (should have for proper product functionality);
- Low (nice to have, will include if time/resource permits)
- Future (not feasible in this version of the product, but should be considered for a future release).

3.2 Requirement Name

Feeling

3.2.1 Description

The eyewear may be comfortable

3.2.2 Source

Dr. McMurrough

3.2.3 Constraints

A "comfortable" feeling is subjective.

3.2.4 Standards

N/A

3.2.5 Priority

High

3.3 Requirement Name

Pricing

3.3.1 Description

The system shall be affordable compared to competition.

3.3.2 Source

Dr. McMurrough

3.3.3 Constraints

The cumlative cost of the parts used to create the product.

3.3.4 Standards

N/A

3.3.5 Priority

High

3.4 Requirement Name

Portability

3.4.1 Description

The system shall be portable.

3.4.2 Source

Dr. McMurrough

3.4.3 Constraints

The size of the parts used to make the product.

3.4.4 Standards

N/A

3.4.5 Priority

Moderate

3.5 Requirement Name

Perception

3.5.1 Description

The system shall operate in real time.

3.5.2 Source

Fernando Do Nascimento

3.5.3 Constraints

Odroid and Cypress processing speed.

3.5.4 Standards

UDP/TCP/IP

3.5.5 Priority

High

4 Packaging Requirements

Include a header paragraph here. Packaging requirements are those requirements that identify how the delivered product will be packaged for delivery to the end-user; or how it will "look" when finished and delivered. For example, you might specify that the software required for operation will be pre-loaded on the hard drive, delivered on CD/DVD, or available via download. Software might be customer installable, or not, etc. Hardware components could be all in a single package, provided as a "bag of parts" to be assembled/installed by the user, painted a certain color, logos affixed, etc. Care should be taken not to duplicate requirements found in other sections of this document.

4.1 Requirement Name

4.1.1 Description

Detailed requirement description...

4.1.2 Source

Source

4.1.3 Constraints

Detailed description of applicable constraints...

4.1.4 Standards

List of applicable standards

4.1.5 Priority

Priority

5 Performance Requirements

Include a header paragraph specific to your product here. Performance requirements address items such as: how fast specific critical operations must complete; how long it takes to start/stop activities; how long the battery must last; maximum time it must take to set up; etc.

5.1 Requirement Name

Lagless

5.1.1 Description

The system shall operate in real time.

5.1.2 Source

Fernando Do Nascimento

5.1.3 Constraints

Odroid and Cypress processing speed.

5.1.4 Standards

UDP/TCP/IP

5.1.5 Priority

High

5.2 Requirement Name

Desired Capture Quality

5.2.1 Description

The system shall operate at 720p at 60fps.

5.2.2 Source

Joseph Trinh

5.2.3 Constraints

The camera used in the project.

5.2.4 Standards

None

5.2.5 Priority

High

5.3 Requirement Name

Minimum Capture Quality

5.3.1 Description

The system may have a minimum 640x480 at 30fps.

5.3.2 Source

Dr. McMurrough

5.3.3 Constraints

The camera used in the project.

5.3.4 Standards

None

5.3.5 Priority

Moderate

5.4 Requirement Name

Storage

5.4.1 Description

The system may store the information read by the eye tracker on the EEPROM of the Cypress CX3.

5.4.2 Source

Fernando Do Nascimento

5.4.3 Constraints

The storage size of the EEPROM.

5.4.4 Standards

None

5.4.5 Priority

Moderate

5.5 Requirement Name

Storage Overflow Compensation

5.5.1 Description

When the EEPROM is full, the system may overwrite the data on the EEPROM.

5.5.2 Source

Fernando Do Nascimento

5.5.3 Constraints

The programming of this function.

5.5.4 Standards

None

5.5.5 Priority

Moderate

5.6 Requirement Name

Camera Module Compatibility

5.6.1 Description

The system shall be compatible with a variety of camera modules.

5.6.2 Source

Fernando Do Nascimento

5.6.3 Constraints

The camera must have MIPI specifications.

5.6.4 Standards

MIPI

5.6.5 Priority

Moderate

5.7 Requirement Name

USB Controller Compatability

5.7.1 Description

The system shall be compatible with a Cypress CX3 controller.

5.7.2 Source

Fernando Do Nascimento

5.7.3 Constraints

The controller must have the specific interfaces necessary to connect with the rest of the hardware used in the project.

5.7.4 Standards

MIPI, CSI-2, USB 3.0

5.7.5 Priority

High

5.8 Requirement Name

Eye Tracking

5.8.1 Description

The system may track the movement of both eyes.

5.8.2 Source

Fernando Do Nascimento

5.8.3 Constraints

Acquisition of a second camera module.

5.8.4 Standards

MIPI

5.8.5 Priority

Low

5.9 Requirement Name

User Interface (UI)

5.9.1 Description

The system may have a UI.

5.9.2 Source

Dr. McMurrough

5.9.3 Constraints

Time required to create the UI.

5.9.4 Standards

None

5.9.5 Priority

Low

5.10 Requirement Name

Product Usage Environment

5.10.1 Description

The system should work indoors.

5.10.2 Source

Dr. McMurrough

5.10.3 Constraints

Halogen lights must not be used within the environment.

5.10.4 Standards

None

5.10.5 Priority

Moderate

5.11 Requirement Name

Interational Protection Rating (IP)

5.11.1 Description

The system shall adhere to IP code 51.

5.11.2 Source

Dr. McMurrough

5.11.3 Constraints

The material used to encase the electronic portions of the project.

5.11.4 Standards

The IP Code

5.11.5 Priority

Moderate

5.12 Requirement Name

Information Routing

5.12.1 Description

The system shall transfer information via usb 3.0.

5.12.2 Source

Fernando Do Nascimento

5.12.3 Constraints

The product's usb controller must use USB 3.0.

5.12.4 Standards

USB 3.0

5.12.5 Priority

Moderate

6 Safety Requirements

Include a header paragraph specific to your product here. Safety requirements might address items specific to your product such as: no exposure to toxic chemicals; lack of sharp edges that could harm a user; no breakable glass in the enclosure; no direct eye exposure to infrared/laser beams; packaging/grounding of electrical connections to avoid shock; etc.

6.1 Requirement Name

6.1.1 Description

Detailed requirement description...

6.1.2 Source

Source

6.1.3 Constraints

Detailed description of applicable constraints...

6.1.4 Standards

List of applicable standards

6.1.5 Priority

Priority

7 Maintenance & Support Requirements

Include a header paragraph specific to your product here. Maintenance and support requirements address items specific to the ongoing maintenance and support of your product after delivery. Think of these requirements as if you were the ones who would be responsible for caring for customers/end user after the product is delivered in its final form and in use "in the field". What would you require to do this job? Specify items such as: where, how and who must be able to maintain the product to correct errors, hardware failures, etc.; required support/troubleshooting manuals/guides; availability/documentation of source code; related technical documentation that must be available for maintainers; specific/unique tools required for maintenance; specific software/environment required for maintenance; etc.

7.1 Requirement Name

7.1.1 Description

Detailed requirement description...

7.1.2 Source

Source

7.1.3 Constraints

Detailed description of applicable constraints...

7.1.4 Standards

List of applicable standards

7.1.5 Priority

Priority

8 Other Requirements

Include a header paragraph specific to your product here. In this section specify anything else that is required for the product to be deemed complete. Include requirements related to customer setup and configuration if not specified in a previous requirement. Add any known requirements related to product architecture/design, such as modularity, extensibility (for future enhancements), or adaptation for a specific programming language. Consider requirements such as portability of your source code to various platforms (Windows, Linux, Unix Mac OS, etc.).

8.1 Requirement Name

8.1.1 Description

Detailed requirement description...

8.1.2 Source

Source

8.1.3 Constraints

Detailed description of applicable constraints...

8.1.4 Standards

List of applicable standards

8.1.5 Priority

Priority

9 Future Items

In this last section, you will reiterate all requirements that are listed as priority 5. This is repetitive, but necessary as a concise statement of features/functions that were considered/discussed and documented herein, but will NOT be addressed in the prototype version of the product due to constraints of budget, time, skills, technology, feasibility analysis, etc. Use the following format for this section.

9.1 Requirement Name

9.1.1 Description

Detailed requirement description...

9.1.2 Source

Source

9.1.3 Constraints

Detailed description of applicable constraints...

9.1.4 Standards

List of applicable standards

9.1.5 Priority

Priority