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**AC40001 Honours Project**

**BSc (Hons) Applied Computing**

**University of Dundee, 2016**

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***Abstract***

*It is becoming increasingly difficult to perceive all colours correctly in today's world; our usage of them can tie in closely with a specific meaning, signal or message, however they are mostly used for aesthetics. Designers must consider users with impaired colour vision, information can be misinterpreted or even missed because some colours cannot be distinguished. Current software and hardware solutions provide real time simulations of various spectrums of impaired colour vision. This project aims to go above and beyond current technologies to provide designers with adjustable simulations viewed with an Oculus Rift headset.*

***\*Once complete, add a section on the success of the system?\****

**1. Introduction**

Most cases of Impaired Colour Vision (ICV) are hereditary meaning it is passed on genetically from parent to offspring. They can also occasionally be acquired as a result of certain eye diseases. Failing to discriminate between red and green is the most common form of ICV (Protanopia / Deutranopia) and the gene is X- linked recessive which explains the prevalence difference between genders (8% in males and 0.5% in females). Blue-yellow ICV or Tritanopia is rare and tritanomalous symptoms are more commonly acquired from environmental factors such as age, where the eye lens becomes more transparent over time, cataracts or a hard hit to the front or the back of the head. Monochromacy is even rarer, affecting around 1 in 100,000 people. Colour vision can be said to be an illusion created by the interactions of billions of neurons in our brain [[1]](#footnote-1), we do not all perceive colours the same way and empathy is inherently difficult to achieve because of this.

There are a plethora of applications available on many different platforms which can detect and manipulate pixels to simulate ICV. For example, it

is possible to obtain a browser add-on for Google Chrome which simulates ICV for the current web page[[2]](#footnote-2). One flaw most software applications present when simulating ICV is the exclusion of environmental factors such as room brightness.

- What ICV is a why is causes problems? (layman's terms)

- What ICVGoggles is/will be

- How ICVGoggles intends to solve some problems proposed (ASK: is it *just* about designers or the whole populations problems we are trying to solve?

- Small bit on who I am and who David Flatla is

**Background:** A review of relevant literature and any similar products. The project should be placed in a wider context and this could include the scientific, technical, commercial, social and ethical context.

-Literature reviewed (ECVD papers?)

-Similar products (apps, tablets + phones, explore their weaknesses)

-social context of ICVgoggles (uses in the wild, designers, parents)

-scientific context (learning about ICV practically)

**Specification:** A specification of the problem and an explanation of how the student arrived at this specification. An initial work schedule including an overall project plan with time-scales, deliverables and resources. If using agile development, a prioritised product backlog.

-What the problem is

-Project plan

-work schedule

-deliverables (small milestones proposed in gantt chart)

**Design:** This should include the design method, design process and outcome. Design decisions and trade-offs should be described e.g. when selecting algorithms, data structures and implementation environments or when designing for usability.

-Design decisions and trade-offs (no personalised?)

-Design method

-Software and hardware used

-Design process

- Designing for usability?

-UML Diagrams

**Implementation and Testing:** A description of production, testing and debugging. A demonstration (or even a proof) that the specification has been satisfied.

-Production (use of davids app and help from that code)

-Testing - testing during production, methods used

-debugging - process of debugging during development

- proof it works (images before and after ICV applied)

**Description of the final product:** A clear description of what the final product looks like and what it does. This is vital but often neglected.

Full description of final product, well worded and should NOT be neglected

**Evaluation:** Usability should be evaluated with a description of the user-centred design methods employed to produce a usable product, including rapid prototyping, usability methods, results and re-designs as appropriate. Other relevant criteria such as accuracy and computational efficiency should also be employed for evaluation as appropriate.

-prestudy interviews, main testing (plates and exploration), questionairres

- analysis of results, methods used

-evaluation of results

-usability

-accuracy\*\* (important!)

**Discussion:** Area where I discuss reasons for the results found and how these results may benefit ICVGoggles.

**Appraisal**: A critical appraisal of the project indicating the rationale for design/implementation decisions, lessons learnt during the course of the project and an evaluation (with hindsight) of the final product and the process of its production (including a review of the plan and any deviations from it).

-Rationale for design

-Rationale for implementation decisions

-Lessons learnt

-Evaluation including hindsight

**A description of any research/hypothesis**

**Summary and Conclusions**

-Summary of project

Conclusions:

Qualitative evaluation, qualitative (IF DONE) evaluation, personal feelings on project and how it went

**Recommendations for future work**

-Mobile ICVGoggles (garreth said a battery back pack, possible?)

A copy of the mid-project progress report should be included.

1. P.Gouras, 'Colour Vision', in webvision.med.utah.edu, last update 1 July, 2009 [↑](#footnote-ref-1)
2. Spectrum, offered by Yehor Lvivski for Google Chrome [↑](#footnote-ref-2)