UNIVERSITY of GUELPH

COLLEGE of ENGINEERING AND PHYSICAL SCIENCES

SCHOOL OF COMPUTER SCIENCE

MSc Defence

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Exploring the effects of mobile device display illumination on achromatic colour perception abilities

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Abstract:

Situational vision impairments (SVIs) are temporary inabilities to complete visual tasks on a mobile device due to the device's context of use. SVIs are commonly experienced by smartphone users using a device in outdoor lighting conditions. User-interface (UI) colours are a major contributing factor to SVI occurrences, yet tools and guidelines do not exist with recommendations for SVI mitigation. This thesis approached this problem by collecting data on users' colour differentiation abilities in bright device illumination conditions. This data was used to assess the feasibility of creating a situational model of luminance perception - an SVI simulation tool for UI designers. Three participant-based studies were conducted, assessing just noticeable differences (JNDs) and JND displacement of achromatic colours using two methodologies. Results showed that bright illumination caused users' differentiation abilities to worsen significantly. A new experimental framework for future SVI studies was proposed based on improvements to the limitations of conducted studies.