



# COLLEGE of ENGINEERING AND PHYSICAL SCIENCES

SCHOOL OF COMPUTER SCIENCE

## MSc Seminar

**Wednesday October 12, 2022 at 12:30pm via Zoom**

**Jordan Evans**

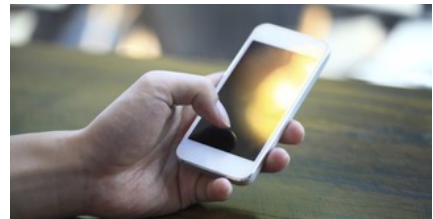
*Understanding Luminance Perception on Mobile Devices in  
Extreme Lighting Conditions*

**Advisor:** Dr. Denis Nikitenko

**Co-Advisor:** Dr. David Flatla

### Abstract:

Have you ever struggled to see your phone screen when outside on a bright sunny day? If so, you have experienced a situational vision impairment (SVI). In the field of mobile device human-computer interaction there is little to no understanding of how bright environmental lighting conditions affect a user's ability to perceive the contents of their device screen. Currently, there are no interface accessibility standards that include mitigation of SVIs. With the ever-increasing reliance on mobile devices as tools for personal and work use, SVIs pose a threat to the productivity, satisfaction and safety of the end user.



This thesis aims to understand and quantify how bright environmental lighting conditions affect a user's luminance perception on a mobile device. Two different experimental apparatuses were designed and built to gather data. The first tested a participant's closest perceptual distance between two grey-scale colours under bright lighting conditions. The second tested a participant's closest perceptual distance, as well as perceptual direction between two grey-scale colours under bright lighting conditions. We conducted three studies with environmental lighting conditions ranging from a lit room (1000 lux) to outdoors on a clear day (> 10 000 lux). We aim to use this data to generate a predictive model of luminance perception as a tool for designers to visualize these SVI occurrences and mitigate them before they occur.