Profiling Lighting on Monash Malaysia Campus - ProLiM 2022

Built with

- Microsoft Excel
- MATLAB
- Python
- Seaborn

Achievements

- Created the ProLiM lighting dataset by collecting and profiling visual and non-visual lighting data in teaching and non-teaching spaces on campus
- Benchmarked against standards and provided recommendations for future lighting design
- Accepted to the CIE Australia Lighting Research Conference 2023

Background

Teaching, learning and recreational spaces in Monash Malaysia have over the years been fitted/retrofitted with lights, mostly fluorescents and more recently LEDs. Lighting contracts are generally undertaken by different contractors over periods of time. Efforts are made to ensure that lighting standards (Malaysian and international) are met for each type of space based on whether they are classrooms, lecture theatres, labs, toilets, common areas, basketball courts, cafeteria etc). These standards are traditionally written for visual indices of light such as Illuminance, CCT and CRI. As far as non-visual indices such 'alpha-opic illuminances' and 'Melanopic Daylight Efficacy Ratio (MDER)' are concerned, there are no standards as of today, only research-based recommendations. In addition to the visual, non-visual metrics have increasingly become relevant as the impact of non-visual stimuli on the human body is becoming more established. As such, it is both timely and useful to have a profile of lighting on our campus to pave the way for 'integrative lighting' or 'human centric lighting' that considers both visual and non-visual effects of light in future.

This project aims to create a data set (ProLiM) consisting of visual and non-visual parameters of light in various teaching and non-teaching spaces on the campus. You will use a IoT-integrated mini spectral sensor to collect such data at the heart of this project, compare measured data with existing standards, perform a gap analysis and make recommendations. The future lighting at Monash Malaysia is in your hands!

Design Specification and Project Deliverables

(i) Select relevant visual and non-visual parameters to be used in profiling light on Monash Malaysia campus with justification.

(ii) Select relevant subjective measures of light quality (comfort, naturalness etc).

(iii) Select standards to be used for benchmarking lighting on our campus.

(iv) Design an experiment to (a) measure and record the chosen visual and non-visual metrics and (b) conduct a subjective evaluation of the lighting in significant spaces on the campus.

(v) Analyse the data to perform a gap analysis with respect to (a) selected standards and (b) research findings in the field.

(vi) Make recommendations for future lighting on Monash Malaysia Campus.

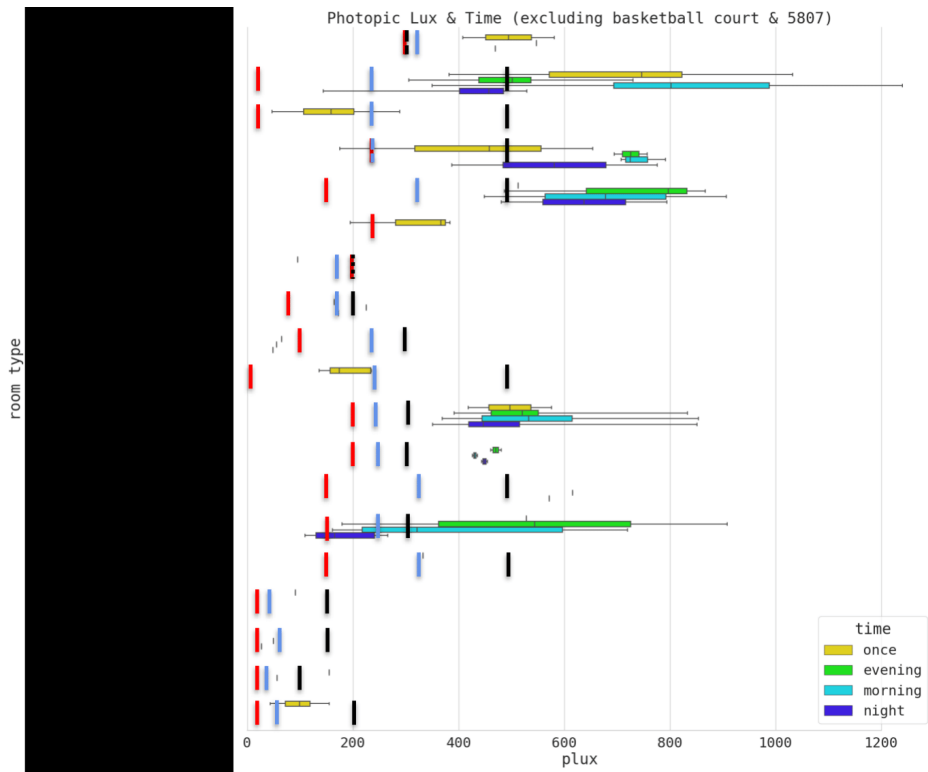(vii) Discuss the systemic challenges if any that you faced in this implementation.

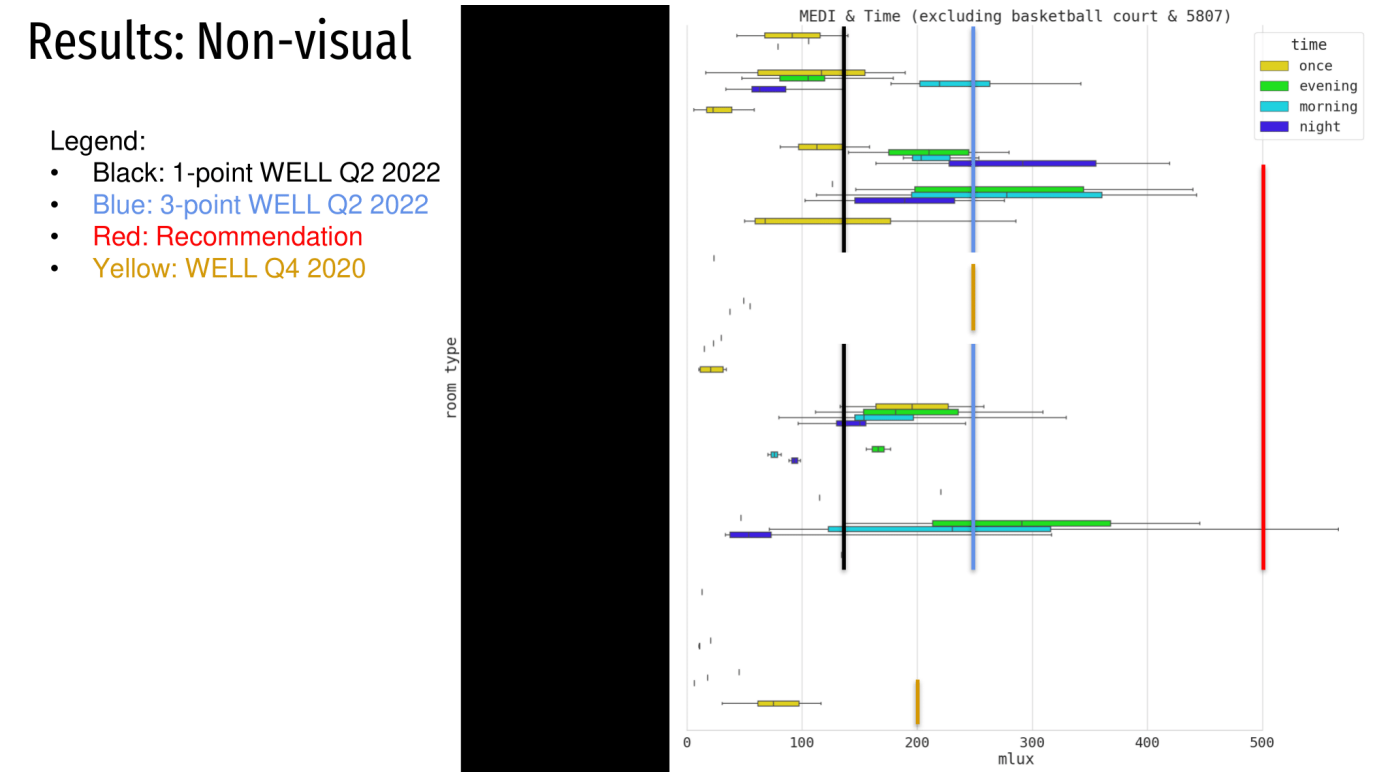## Example Results

Details may refer to the presentation slides.

Visual

Non-visual

Results: Non-visual

Legend:
- Black: 1-point WELL Q2 2022
- Blue: 3-point WELL Q2 2022
- Red: Recommendation
- Yellow: WELL Q4 2020

Subjective

Results and Recommendations - Subjective Measures