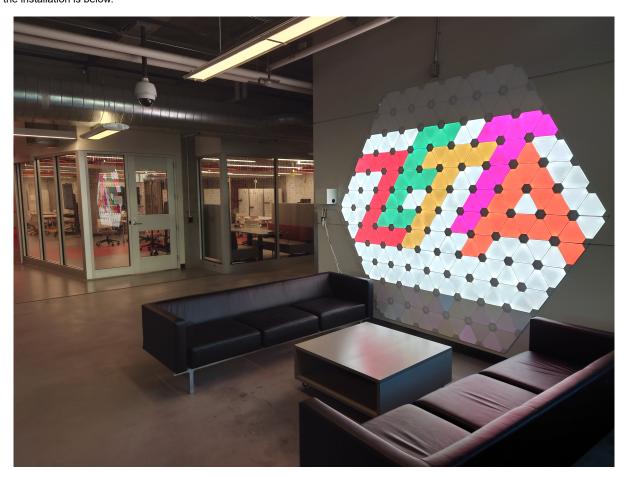LAB 4
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# ENSF 310

## Lab 4: Software Design Process

Edit this file and write your solutions to the problems in the empty markdown blocks. Once you are done, check your lab into your github repository for full marks.

# Software Design

## Problem Statement

You have been asked to develop a simulator for the Nanoleaf light panels (https://nanoleaf.me/en-CA/products/nanoleaf-light-panels/) installation outside of the the Zetta space on the 2nd floor of ICT. This simulator will be used to test possible interactive displays. A photo of the installation is below.



An example of another extensive installation can be found here (https://inhabitat.com/nanoleafs-terra-light-wall-paints-arctic-landscapes-with-1200-color-changing-leds/).

**NOTE**: You do not have to write any code as part of this lab!

### 1. Inception Phase

Spend some time brainstorming alternatives which you may consider and whether you think this simulator is technically feasibly. Things to consider include programming language, libraries, existing toolkits, existing software, etc.In the space below, describe any alternatives and the technical/economic feasiblity. You must discuss at least three alternatives.

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Addition of Voice recognition as an input medium via smart devises like Alexa and Google Assistant might be a more interactive method for the simulator. This Simulation can be made touch sensitive using Enhanced Touch Interface API than regular Nanoleaf API. During the program coding different Class modules can be made, each class depicting the theme/filer of the simulation as the user requires. For example, if the user chooses theme theme 'FIRE', we can display the colors that get along with fire and so on.

## 2. Requirement Analysis Phase

In the space below, analyze the requirements. State which ones are given by the problem statement and which are assumptions.

Your requirements must be **testable**.

The nanoleaf light panel looks to be in a limited space, while using the interactive input methods we are required to set limits for what kind of input and the size of input, so as the visual stimulation as the output is not hampered. (from the pic given at problem statement)
The method of assigning themes to the display using class modules was made assuming that the nanoleaf light panels support variation of multi-color display with no obstructions. (assumption)

## 3. Design Phase

In the space below, describe the software design and architecture. You may use Jupyter markdown to create tables to organize your thoughts. Your design should include the input and outputs of any functions.

Initially a function can be used offering a option for input method either text or voice. Classes can be set as the theme name and color combination that can be used can be provided.  For the class 'Fire', color combination might be provided as red, yellow and orange and respective parameters can be set for each class module. Functions such as Change_brightness(), Zoom_in() can be made to change brightness of the panel using the Touch Sensitive API mentioned in phase 1. A safety function namely light_safety() can be created to display 'ERROR' on the light panel or a small section of light panel during any sort of hardware damage or unexpected situations.

## 4. Construction Phase

What information is necessary to do the actual software development? **Note**: you do not have to code your design.

The basic knowledge of coding using function and classes is the base for the programming. Incase we want the voice input, the knowledge to operate and connect AI devices with the program is necessary. While operating with Enhanced Touch Interface API, the way to link touch movement command with associated functions in the code such as brightness and zoom in/out, should be well known and practiced as it will be one of the main component for enhanced interaction with the user. The basic practice and experience of work with components in Nanoleaf light panel will also be appreciated.

## 5. Testing Phase

How would you test your implementation?
If large size of data which is out of the panel dimensions is input, and if any sort of display is not possible then the program will be directed to display ' Error' on the light panel.
A Class named 'Rainbow' (theme-rainbow) can be introduced which allows for multiple color display in the code and the program can be run to observe the color limits of the nanoleaf light panel, if the display comes to be 'Error' (from the above statement), require edits can be made while setting the color parameters in the Classes accordingly.

The software design will be flexible, supporting addition of various themes in the future. The brightness feature involved will be very helpful during the hardware maintenance such as maintenance of LEDs. During unexpected situations and any sort of defect, where ouput according to input is not possible, the 'ERROR' message displayed will trigger for needed maintenance.

## 6. Maintenance

What maintenance would be necessary?