# Initial Plan - Measuring 3D Mesh Saliency using an Eye Tracker

Author: Thomas Sweetman Supervisor: Dr Yukun Lai Module Number: CM3203 Module title: One Semester Individual Project Credits: 40

### Project Description

The objective of this project is to produce a new method of measuring a model's saliency by using machine learning. The machine learning algorithm could take existing methods of detecting saliency along with the ground truth data produced using the data from the eye tracker experiments and the normalisation function. With this information the machine learning algorithm would then produce a new method of measuring a model's saliency. The machine learning algorithm would also have to have a way of determining how close a produced heat map by a method is to the ground truth, so I will produce an algorithm that outputs the difference between the two heatmaps.

### **Ethics**

Given my project will need to test volunteers using the eye tracker I have completed the ethics training course on learning central. I will also complete the ethical approval form and send it off during week 2 so that I have a response before I aim to be able to start the experiments. The biggest ethical problem is the fact the experiments need to be run on people. I have taken their anonymity into account by only referencing their data to a number so no their reference of their personal details are linked to. All participants are fully made fully aware of the experiment process and what it is for and that they can leave at any time with no repercussions.

### Project Aims and Objectives

- 3D heatmap of salient areas of a model
  - Using eye tracking data
    - Gather data from volunteers
    - Normalize data to make certain views more important than others.
- Evaluate how accurate current models of measuring saliency is to the ground truth
  - Develop algorithm for checking two heatmaps against each other and find a scalar value proportional to the difference between the two
- Develop a new and improved method of measuring saliency
  - use machine learning to develop a new method of measuring saliency

### <u>Work Plan</u>

I started this project during a CUROP project and as such I have already completed the preliminary research along with creating an algorithm that takes eye tracking input and outputs a 3D model with a heatmap that represents the normalised saliency of those

vertices. This is the point in the project at which I will pick up from, I must make sure that my normalisation function does not skew the data in anyway and produces a reliable ground truth of the saliency of the model and then I can progress onto comparing the accuracy of existing saliency models with this ground truth. Once I have an algorithm for finding the accuracy of a method I can start working on using machine learning to produce a new method of measuring the saliency of a model.

	Week1	Week2	Week3	Week4	Week5	Week6	Week7	Week8	Week9	Week10	Week11	Week12
reacustom to code base												
Verify Ground truth of normalization												
compare ground truth with other saliency models										Mile	stone 2	
use machine learning to develop a new and improved method of measuring saliency				Mile	stone 1							
Gathering more data												
Consolidate data												
Write up												

## Milestone 1

At this point I would like to know that my ground truth is valid so I can accurately and confidently produce an algorithm to compare existing methods of saliency with the ground truth. This algorithm will get a value that depicts the difference between the saliency method and the ground truth. I will need this difference value to feed into my machine learning algorithm to produce a new method that should give a smaller difference than existing methods.

### Milestone 2

after this point I should have collected all of my data and implemented my method for producing a new saliency heat map on the 3D model using machine learning. This will allow me to produce a final method of detecting saliency with my finalised dataset.