**CSM: Cognitive Engineering**

**Client: Nick Hunter (PhD Student)**

**Background**

New biological devices are currently being driven by cognitive data recorded through any number detection techniques of FMRI/MEG/EEG signal process. In recent works head devices have been used to control computer programs/robots and reconstruct images viewed through the human eye. In this project it becomes important to be able to correlate actual events to the timings/neural location of triggered activity in the brain.

**Project Goals/Requirements**

This project would best be processed through a video editor which is able to show the actual events, of the experiment, and the cognitive data associated with that event. In the video recordings of experimental event the program needs to able to add filters/effects to a scene to detect any number of computer vision aspects: timings, location, physics, etc.

Neurological signal data processing would also be of equal interest. This may include adjusting for the delay in biological processing of synaptic activity, for a particular experimental event. Creating a logging system to record which experiment was ran and the statistical results, is of great importance to the validity of the project.

The Platform/GUI will be the main aspect of this project. How the user interacts with placing filters/effects to the experimental data, the logging of statistical results, reading and writing data from a database, video editing and player development. This project is fairly open which allows for a large number of possible A.I. techniques (Kalman Filtering, Bayesian, etc.) for processing data, but will be lowest priority as compared to the interface. This project will need to processes massive amounts of data without use of a supercomputer so; GPU processing will be a definite aspect of this project. Although, most of A.I. and GPU algorithms will only need to handled not developed.

**Desired Skills order of importance**

* JAVA
* Any number of Java libraries/wrappers (FOBS4JMF/Pixelmed/OpenGL/OpenCL)
* Database handling is group choice (XML, JCDB, Oracle, etc.)
* Familiarity with Netbeans Platform
* MATLAB may be an aspect for signal processing
* GLSL (OpenGL Shading Language), also known as GLslang

### Work Environment

Location is flexible but will be working with client periodically.

BELOW ARE SOME MODELED BRAIN ACTIVITY TOMOGRAPHIES

