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READER ENGAGEMENT

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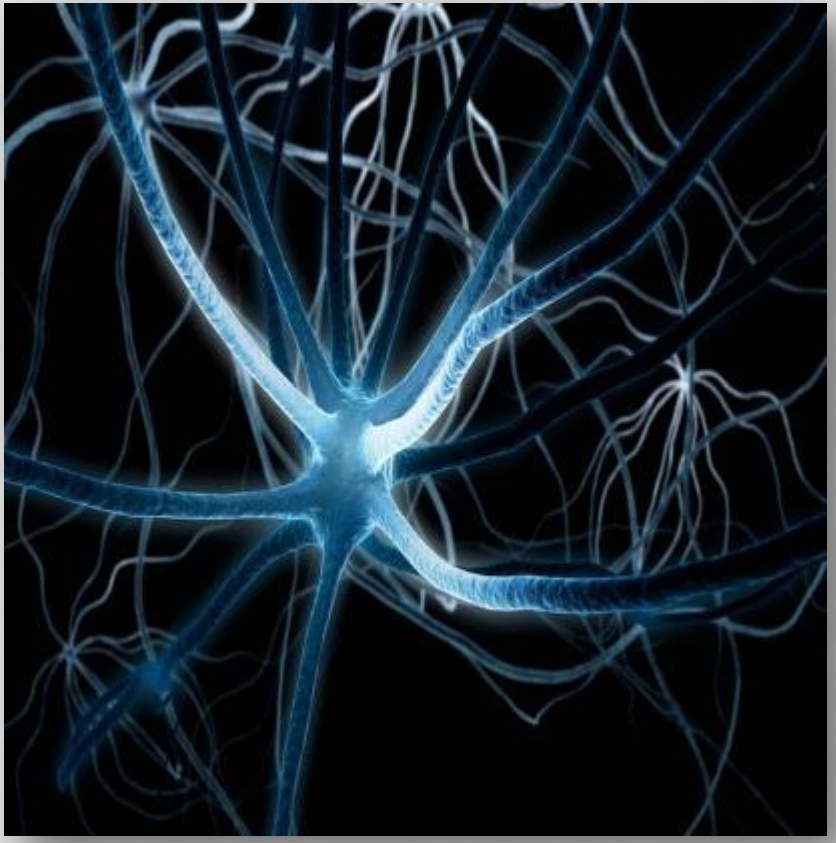


WHAT IS ACTIVE READING?

- Retain the information gained

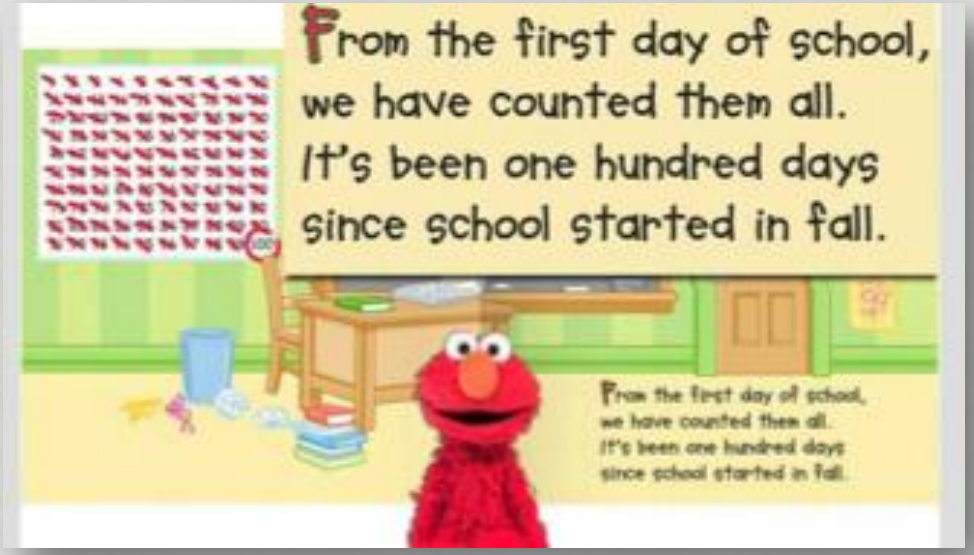
- Improve reading skills

WHY ACTIVE READING IS IMPORTANT?

- It gets the reader involved in the material
- Critical thinking skills

PREVIOUS WORK

- Reading agent
- Interactive Rich Reading



BRAIN-COMPUTER INTERFACE (BCI)

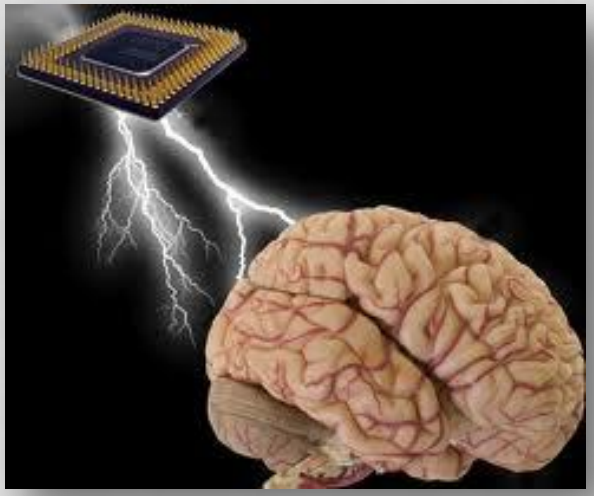
- Electroencephalograhy (EEG)
- Functional Magnetic Resonance Imaging (fMRI)
- Magnetic Resonance Image (MRI)
- Functional Near-Infrared (fNIRS)
- Among others.

WHAT IS EEG?

WHY ARE WE USING EEG?

- PORTABILITY
- IT IS NOT BULKY COMPARE TO fMRI AND fNIRS
- POPULAR NON-INVASIVE METHOD
- LOWER COST vs fMRI/fNIRS

RECORDING BRAIN WAVES



INVASIVE

PARTIAL

NON-INVASIVE

ACTIVE AND PASSIVE BCI

ACTIVE

- Use neural signals to interact with software/machines.

PASSIVE

- Observatory, gather information while performing a task.

EMOTIV EPOC HEADSET

DETECTION SUITES

- Affective/ Emotional
- Cognitive/ Controlling objects
- Expressive/ Facial expressions

CHARACTERISTICS OF THE DEVICE

- 16 electrodes and 2 references
- Wireless

LIMITATIONS

- Signal depends of the Connectivity
- Type of hair

WHY ARE WE USING THE EMOTIV EPOC HEADSET?

HYPOTHESIS

- While the readers are reading something that is not interesting for them, they do not obtain as much information as they can.

- Incrementing the level of engagement.

CURRENT APPROACH

- The Emotiv EPOC device will be used to measure the participant's level of engagement physiologically.
- If the participant's engagement level is under the baseline 0.549 the video will pop out.

VIDEO IMPLEMENTATION

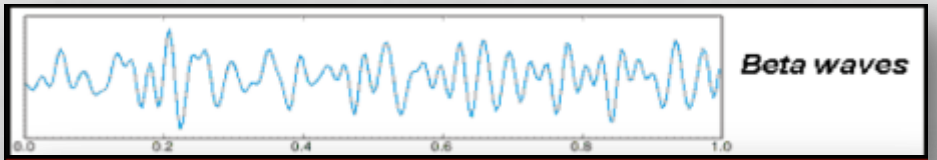
The videos will be chosen from YouTube according to the article topic. The "interesting" scale of the videos will be based on the video's ratings.

MEASUREMENT OF ENGAGEMENT

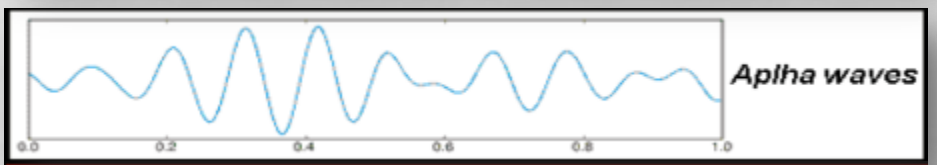
- EMOTIV ENGAGEMENT (0 - 1)
- PARTICIPANTS ENGAGEMENT.
- ENGAGEMENT FORMULA

$$E = \frac{\beta}{(\alpha + \theta)} .$$

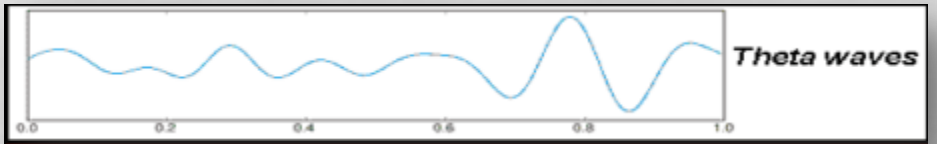
BRAIN WAVES



Brainwave Type	Frequency Range (Hz)	Mental States & Conditions
Beta	13 – 30	Relaxed but focused, integrated, thinking, aware of self & surroundings, alertness, agitation

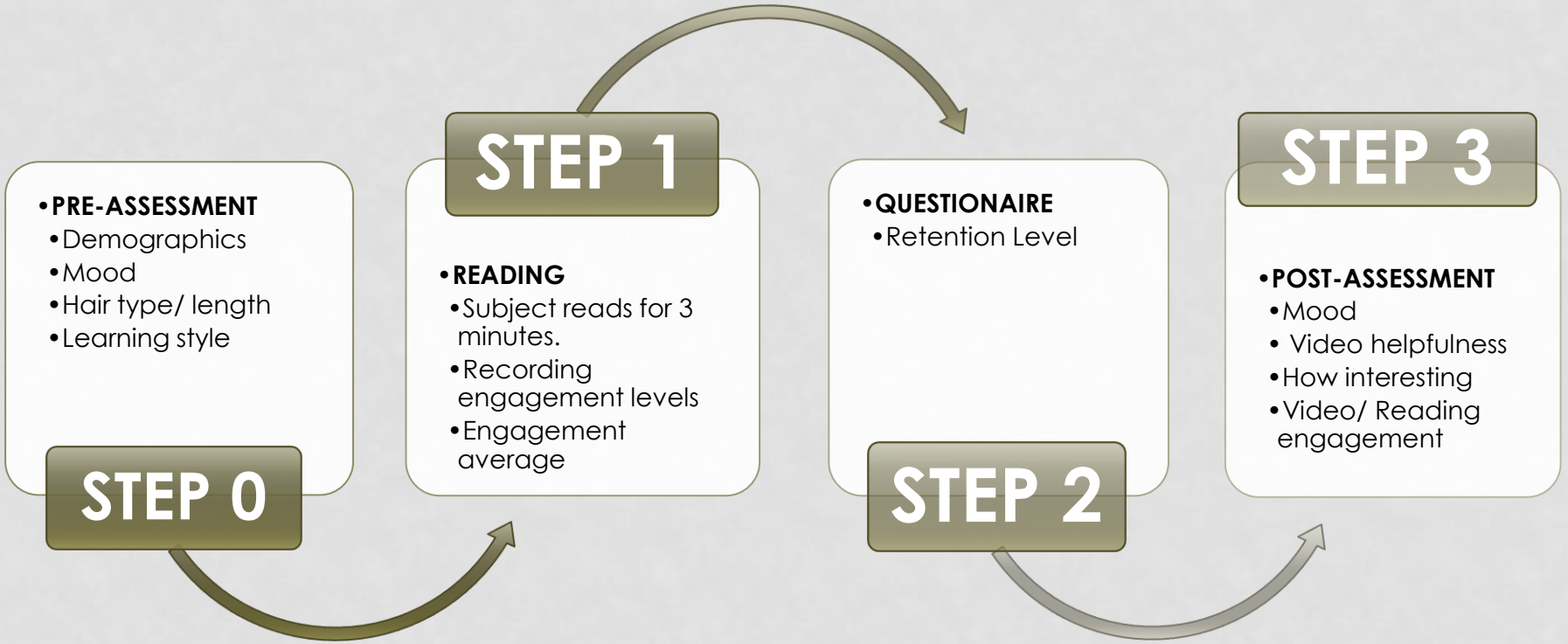


Brainwave Type	Frequency Range (Hz)	Mental States & Conditions
Alpha	7 – 13	Relaxed, tranquil, conscious

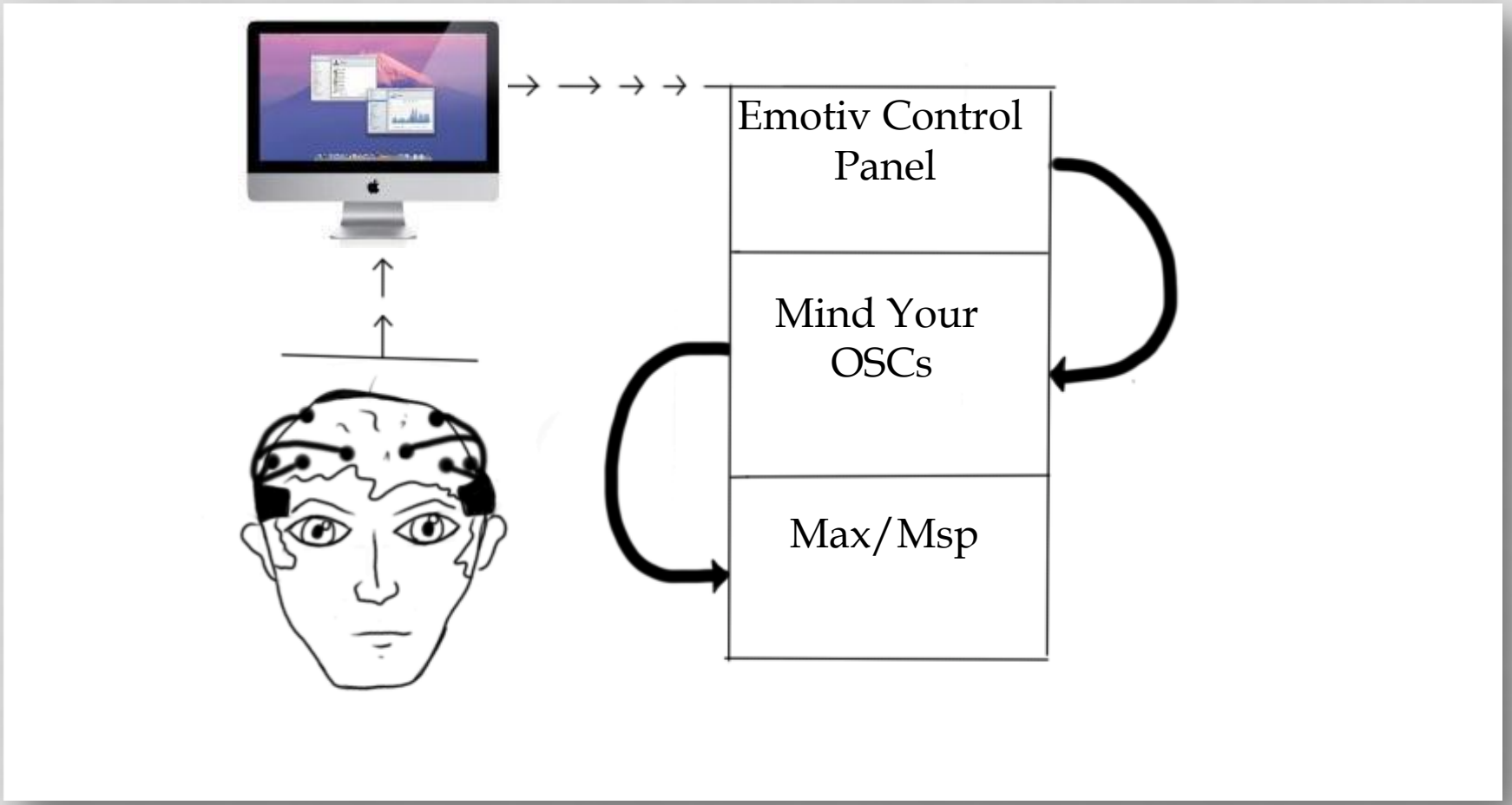


Brainwave Type	Frequency Range (Hz)	Mental States & Conditions
Theta	4 – 7	Intuitive, creative, recall, fantasy, imaginary, dream

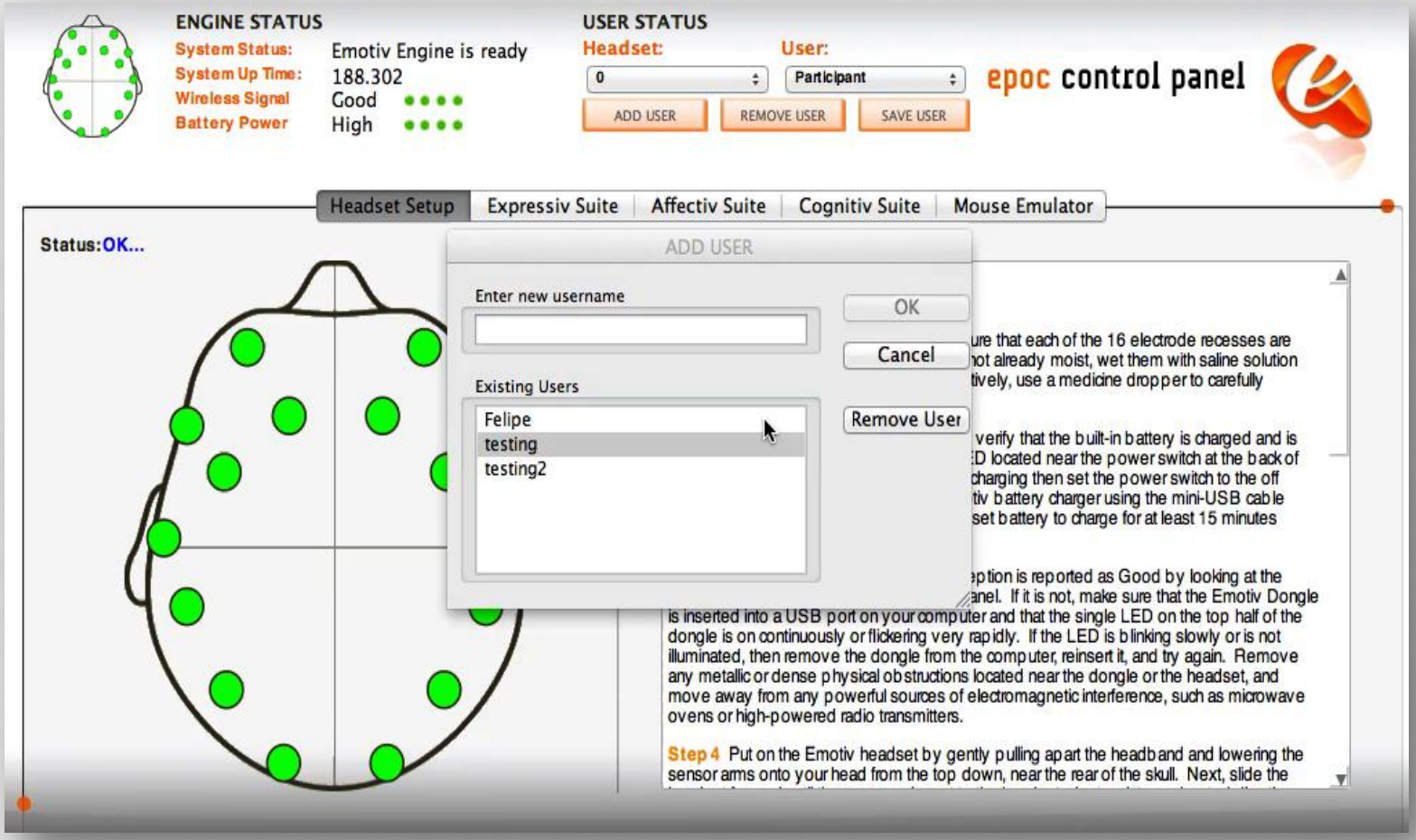
CURRENT PROCESS



SYSTEM ARCHITECTURE

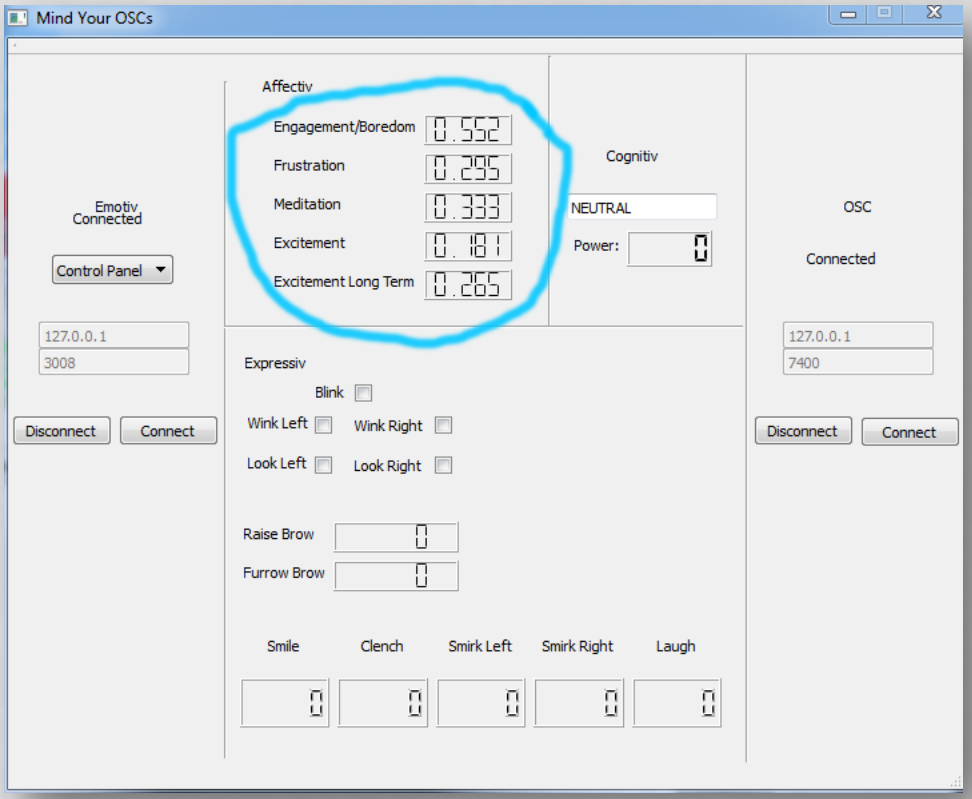


EMOTIV CONTROL PANEL



MIND YOUR OSCS

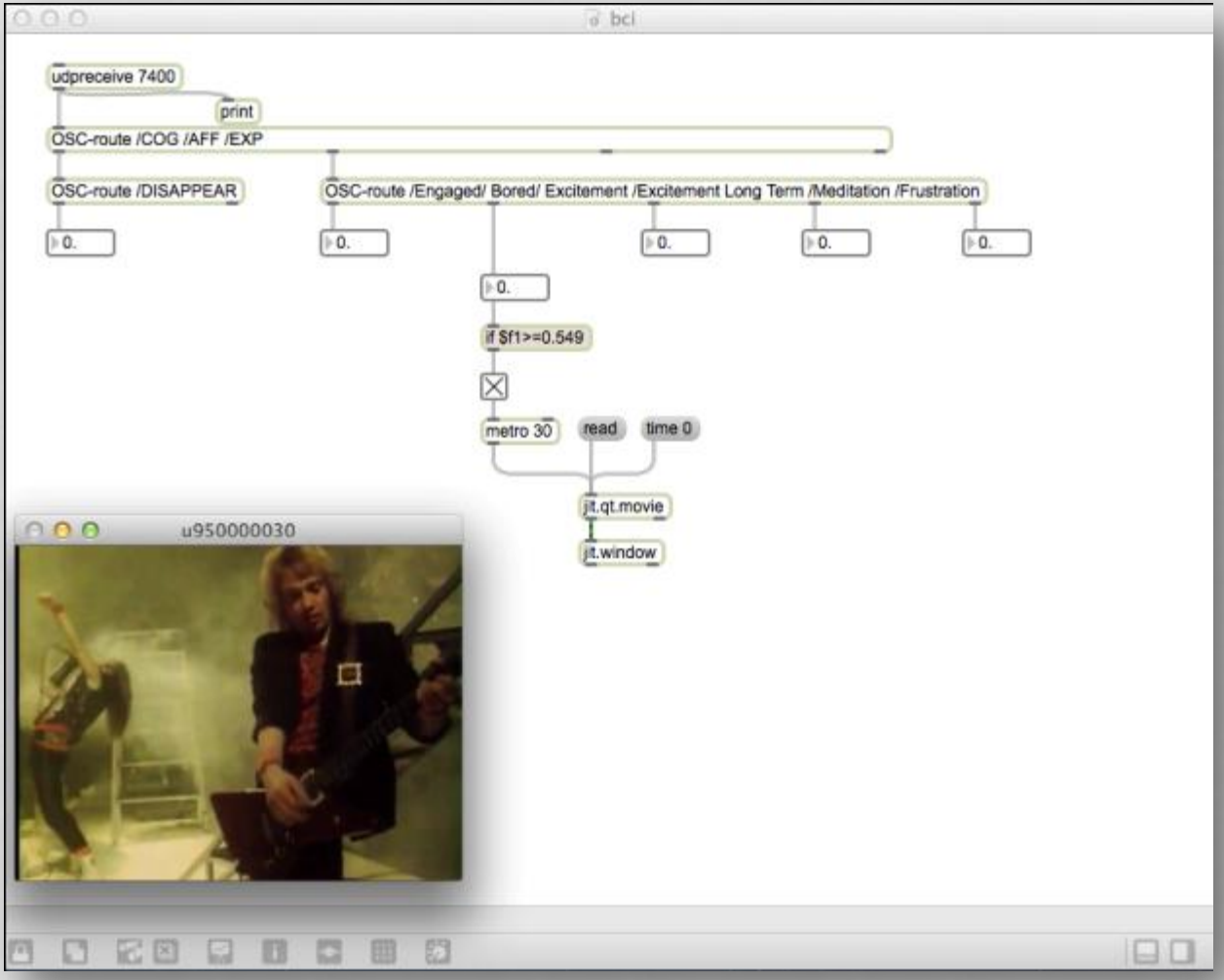
MIND YOUR OSCS



MAX/MSP

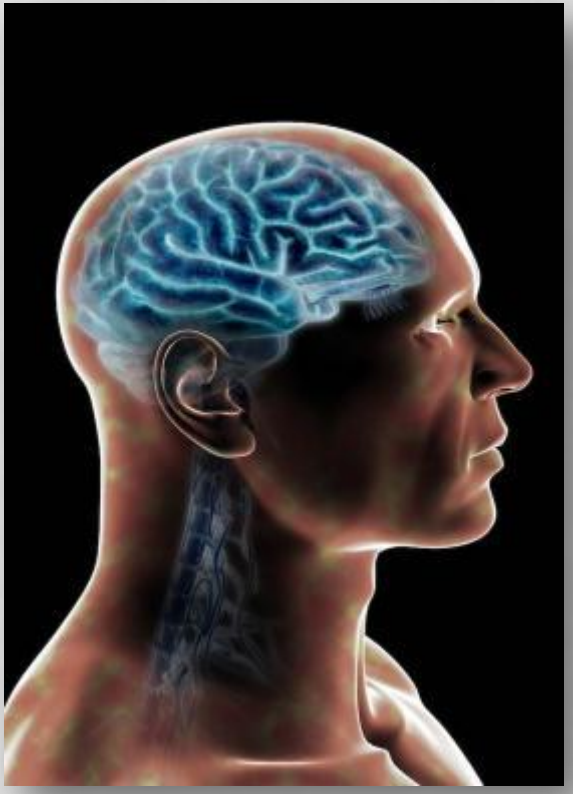
- It is a visual programming platform for music and multimedia.
- Why Max/Msp?

APPLICATION (IN PROGRESS)

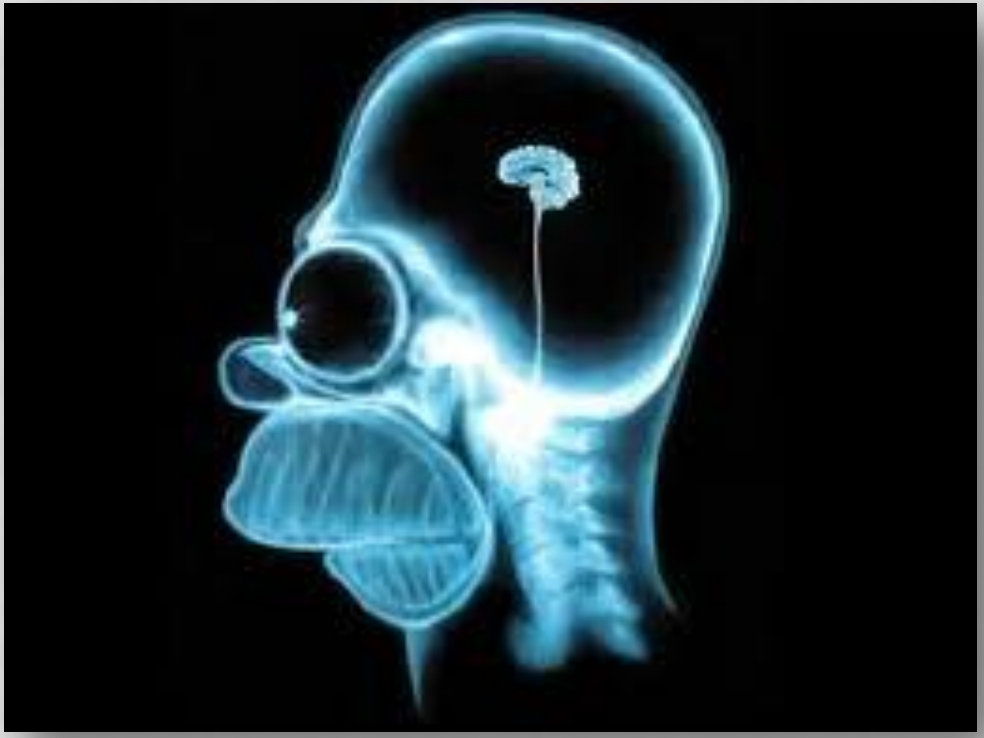


FUTURE WORK

- FINISH THE SYSTEM ARCHITECHTURE
- IMPLEMENTING THE ENGAGEMENT FORMULA
- DESIGN STUDIES
- CONDUCT STUDIES



KNOWLEDGE GAINED IN REU

- Adobe Flex
- Emotiv Control Panel
- Max/Msp
- HTML5
- Brain Computer Interface

QUESTIONS?