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PhD in Music Student,
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Developing Neuro-feedback Music Software for Academic Stress Management and Well-being

Semester 1 progress

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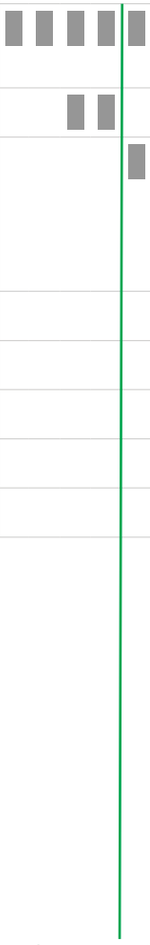
Timeline in submitted research proposal

Tasks	Academic Year I.	Academic Year II.	Academic Year III.
Reviewing the current state of literature // MT, NF, music psychology, compositional techniques;			
Trial period/training programs with (music) students			
Further development of the software // implementing new compositional techniques; // customising code for multi-channel EEG; // mobile devices (iOS with Xcode) later;			
Demonstration, concerts/installations			
Publishing journal paper on the state of the research			
Conference presentations			
Trial period with students experiencing stress			
Writing the thesis			



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Science of sound
- quantum physics (?);
- biology of the brain;
- psychoacoustics;

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Composition
- acousmatic music composition with traditional instruments; (Simmon Emmerson, Natasha Barrett);
- 3D binaural sounds ;

Miranda (2014) Guide to Brain-Comuter Music interfacing
- gives ideas for DSP, applications, etc.
- helps positioning my research and the proposed outcomes;

January 2016

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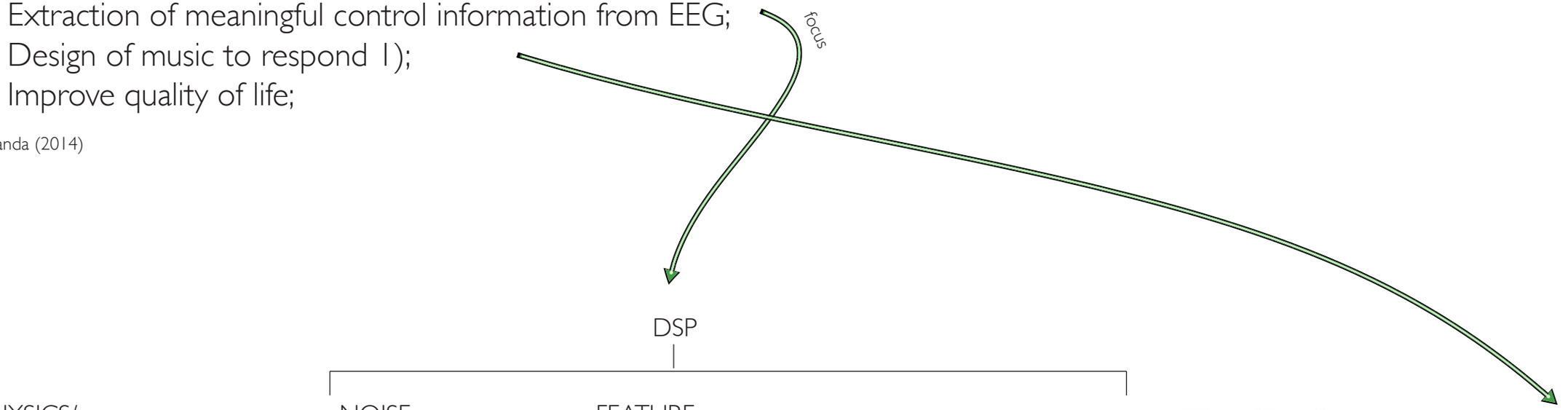
Main challenges and outcome of BCMI research:

1) Extraction of meaningful control information from EEG;
2) Design of music to respond 1);
3) Improve quality of life;

Miranda (2014)



- waves
- particles
- atom

- neurons
Na+ & K-,

- electrical field;

- EEG Aquisition;
- ADC/sampling:

Artifact removal on raw data;
(this can be done before ADC as well):

1) patient related
2) system noise

Tools to find recognisable brain wave patterns:
- machine learning; (AI);
- other algorithms: ERP, FFT, Hjorth, autoregressive, non linear, ...

Specific to application
- in this research, how do we see that the EEG patterns shows more focus/relaxation, etc...

Synthesis > depends on application;
Notation > INScore;

What sound/rhythm do we need?

"Any kind of feedback cannot be used, but only those with the desired effect on the brain and the cognitive activity."

Aramaki (2014)

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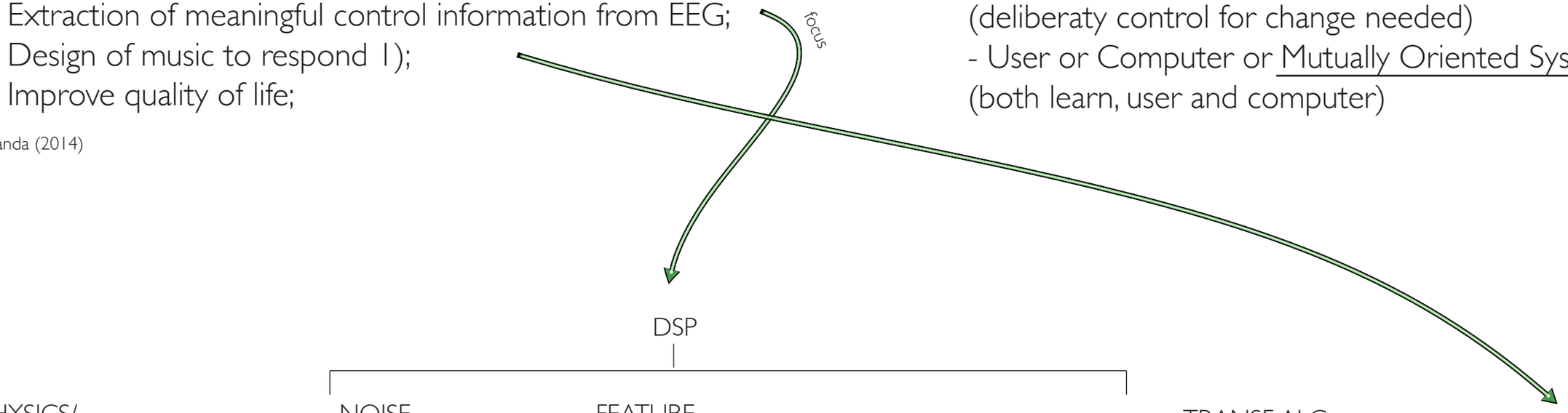
Positioning

- Active (hard) BCI vs Passive (soft) BCI
(deliberaty control for change needed)
- User or Computer or Mutually Oriented System
(both learn, user and computer)



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Did not happen - shall happen in 2nd semester.

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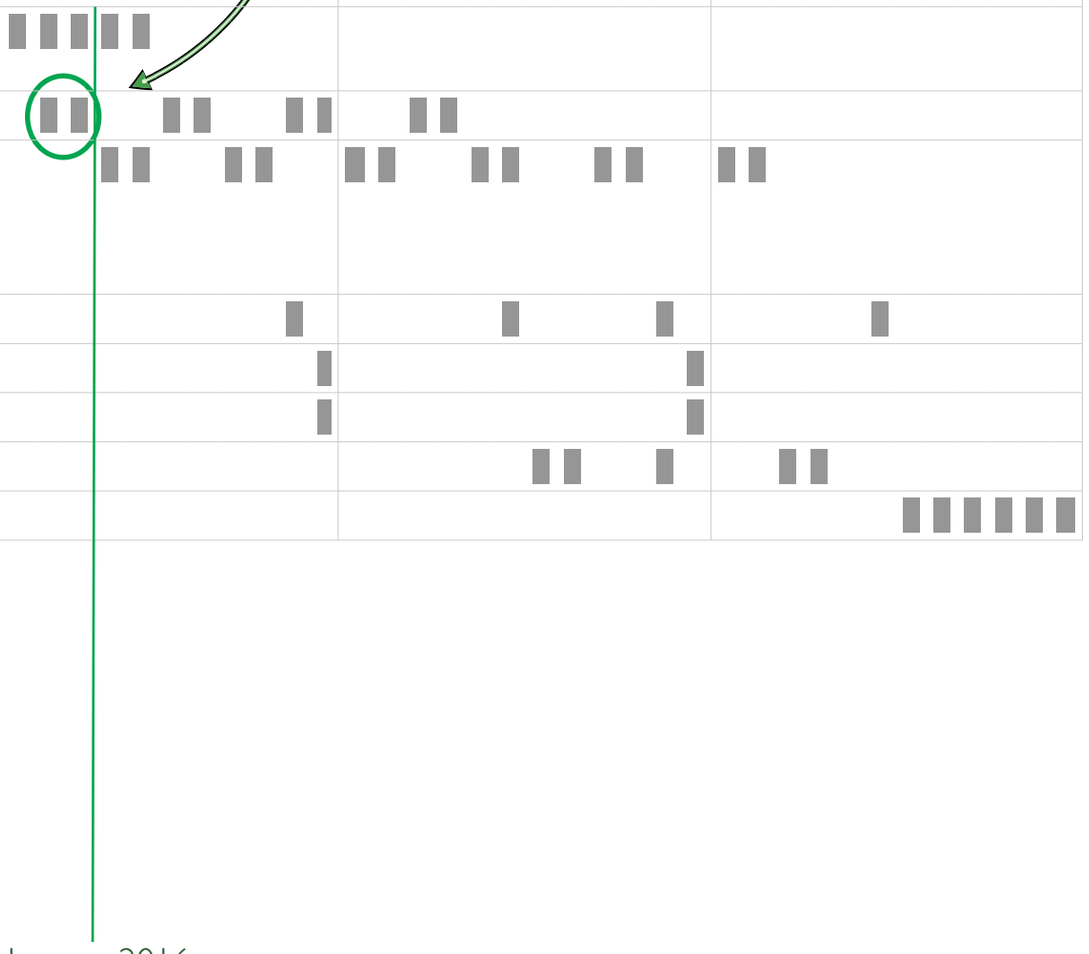

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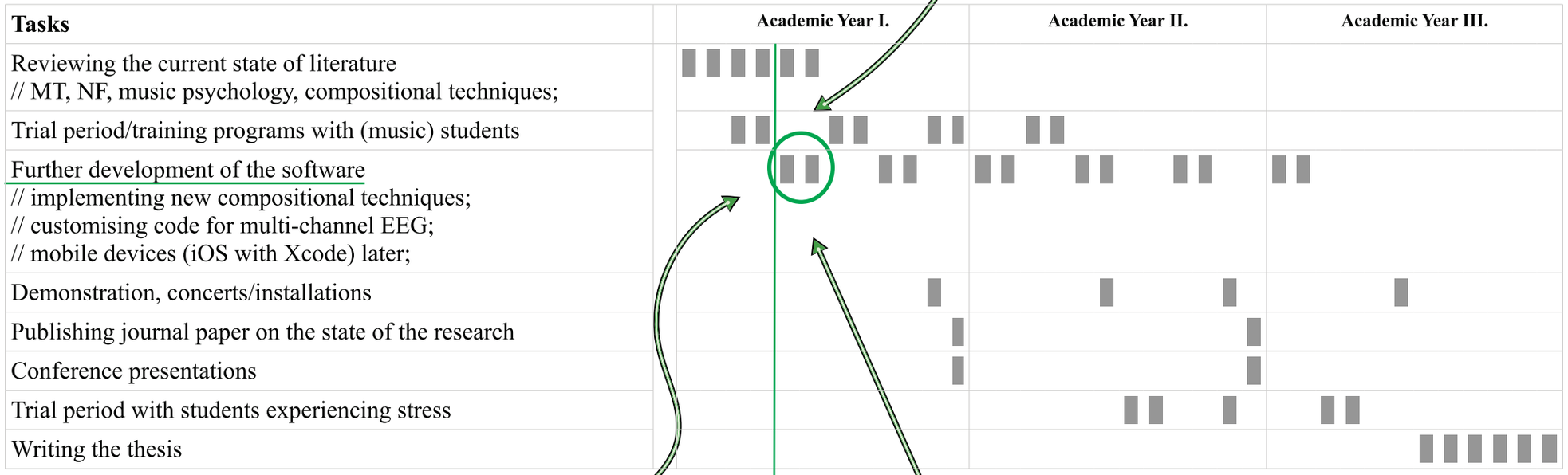
Software:
Other programming language to test:
- javaScript (very similar syntax to SC language);
- C++ with JUCE++ (crossplatform framework with audio software developemt) http://www.juce.com/;



Hardware:
Neurosky - working;
Emotiv - code from SC user needs testing;
OpenBCI - 3D headware needs printing;
- code for parsing needs to be written;

Software interfacing added for notation:
- Richard Hoadley's INSCORE class to SP;

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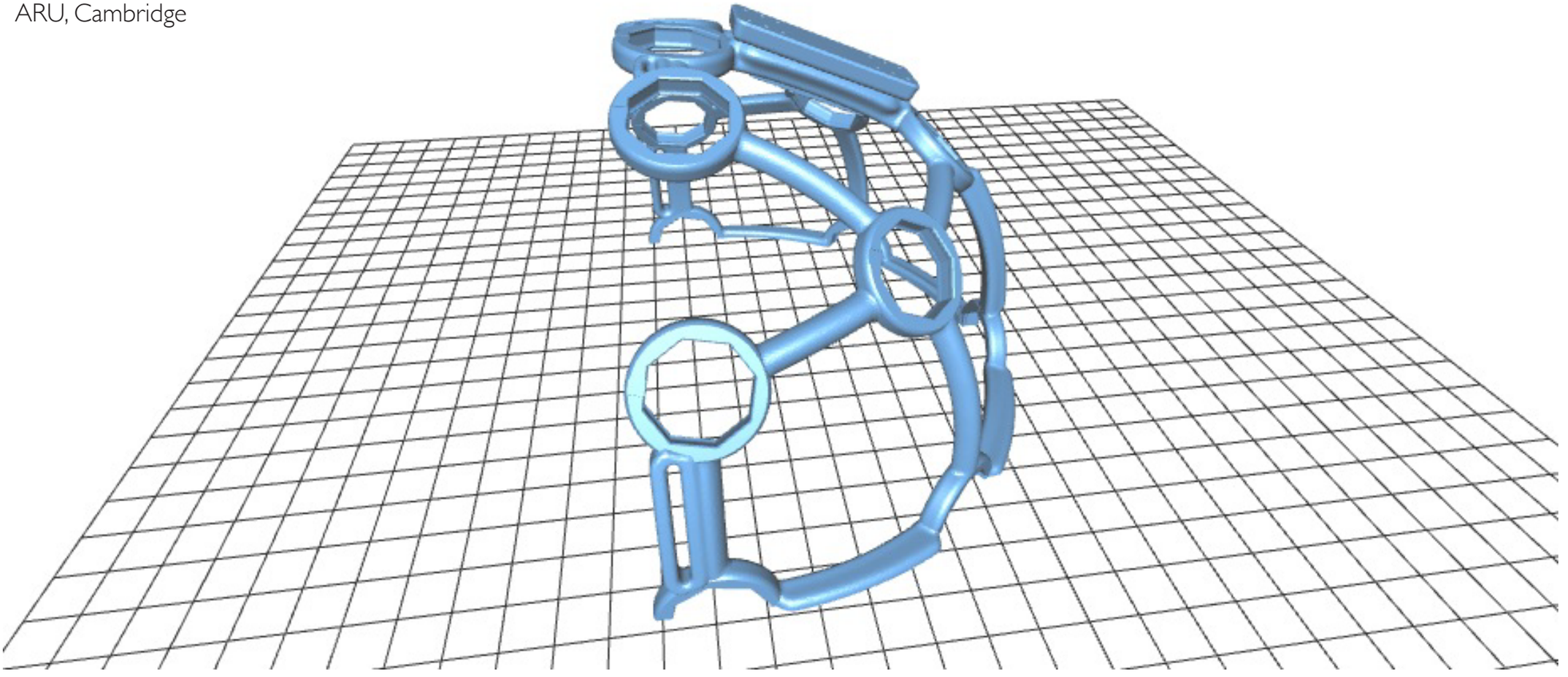

http://www.openbci.com/

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INSCORE with SC
quick demo

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PLAN:
01 Site specific ARU art student collaboration
// proposal handed in - waiting;
02 Pint of Science, May 2016
// 3 ARU students + scientist;
03 ARU, Music Department;
// CMT showcase, Workshop with Tom & Richard
04 Colchester, FirstSite Art Centre
// workwshop / demo = late spring;

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Will need to find the relevant journals.
- music technology;
- wellbeing;
- music therapy;
- ... the study is interdisciplinary;

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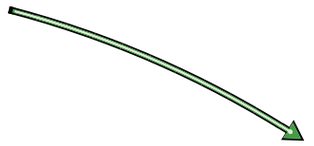
QUESTION:

- Is it easier to learn new ways of thinking to controll EEG/mind or to programm algorithms to see out thoughts?

Reference:
Miranda (2014) Brain-Computer Interfacing with Music, Springer

Progress of the research can be found



http://tedor.info/work