

Master's Thesis/ Lab immersion

[Auditory Language Group](#), University of Geneva – Prof. Anne-Lise Giraud

Title: *Decoding imagined syllables for speech neuroprosthesis*

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Student pre-requisites:

- BSc in Computer Science, Life Science or equivalent
- Strong experience with programming (Python and Matlab)
- Knowledge of biological signal processing (electroencephalography desired)

Project Description:

Aphasia is an impairment in the comprehension and formulation of language caused most commonly by stroke, traumatic brain-injuries, and other pathological conditions affecting the motor production of speech. Current neuro-rehabilitation techniques are effective only partially and in a fraction of patients, leaving the remaining in the impossibility to communicate with the external world.

The proposed internship is part of [Braincom](#), a multi-disciplinary European project, whose main goal is the development of a new generation of speech neuroprosthesis to restore communication in aphasic patients. The approach is based on the real-time decoding of inner speech from sensory and speech motor cortex through the use of non-invasive (EEG/MEG) and intracranial recordings (ECoG).

The first part of this internship will consist in characterizing the neural signatures of mental imagery of syllables - the “building blocks” of words – from electroencephalography (EEG) recordings in healthy participants. More specifically, we aim at identifying (1) the best time window around the onset of the syllable-imagery and (2) the most relevant brain regions able to optimally discriminate between two different imagined syllables.

In the second part of the project, these spatio-temporal features will be integrated into a closed-loop brain-machine interface, capable of decoding in real-time participants' imagined syllable and, according to the classifier output, provide an auditory feedback.

Tasks:

- (Paradigm implementation, TBD)
- EEG data recording
- Analysis of EEG data
- Integration into BCI framework

Application:

Please provide the following information in the e-mail:

- Which project type are you interested in (e.g. master project)?
- In which program are you enrolled and what year are you in (e.g. 3rd year bachelor student in SV)?
- How long does this type of project usually last and how many ECTS credits do you receive for it (e.g. 3 weeks full-time, 6 ECTS credits)?
- What are the deadlines and presentation modes for the project (e.g. presentation during project and written report afterwards)?
- In what period would you like to perform the project in our laboratory (e.g. 1st of September until 1st March, full-time)?

Please attach your CV and your motivation letter.