



Analysis of Sonification for EEG Classification

ISTEC General Assembly 2014

STUDENTS:

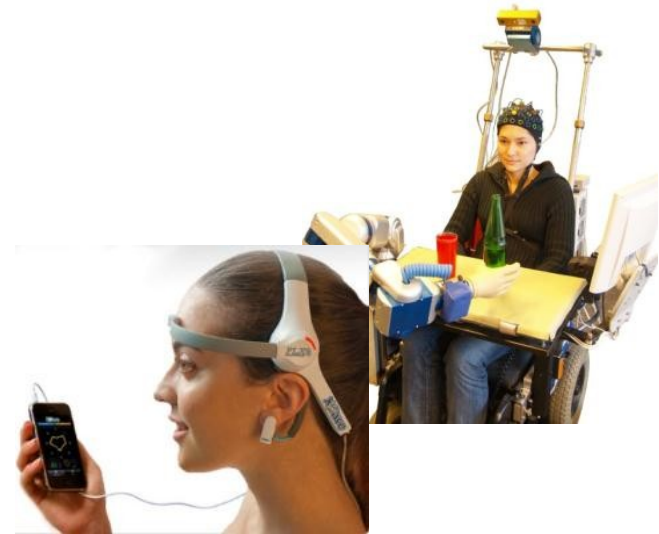
- GONZÁLEZ CASTAÑEDA ERICK FERNANDO
- MSc. TORRES GARCÍA ALEJANDRO ANTONIO

ADVISORS:

- DR. VILLASEÑOR PINEDA LUIS
- DR. REYES GARCÍA CARLOS ALBERTO

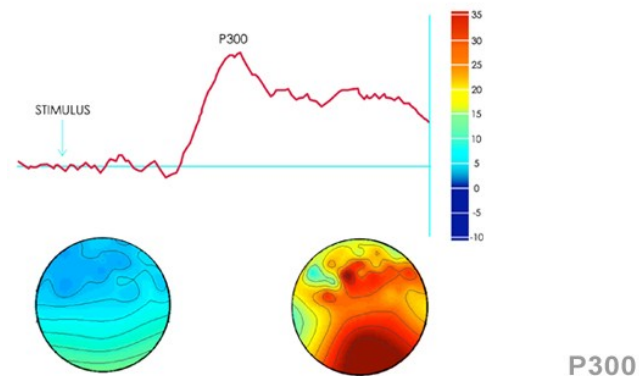
Introduction

- ▶ Nearly 200 million people experience some difficulties in motor skills.
- ▶ Brain Computer Interfaces (BCI) are an alternative for integrating this people using BCIs and provide them some autonomy.
- ▶ BCIs provide commands to a device quickly and naturally.



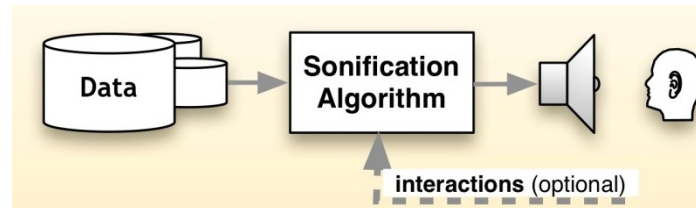
Problematic

- ▶ The electrophysiological sources like SCP, P300, VEP, Motor imagery, have a long training period and low rates of communication.
- ▶ Exploring the use of Unspoken Speech (or Imagined Speech) as source for BCIs.
- ▶ Unspoken speech is the internal pronunciation of words, without making any gesture or sound.



EEG Sonification

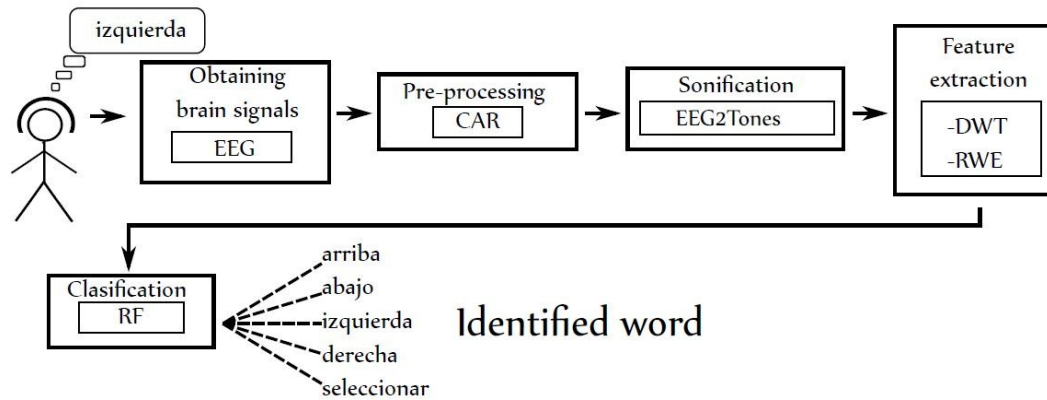
- ▶ Sonification (or Auditory display) refers to the use of non-speech audio to transmit information.
- ▶ The EEG sonification has been used to make musical compositions and to make early diagnosis of neurological diseases like Alzheimer using the audible feedback.



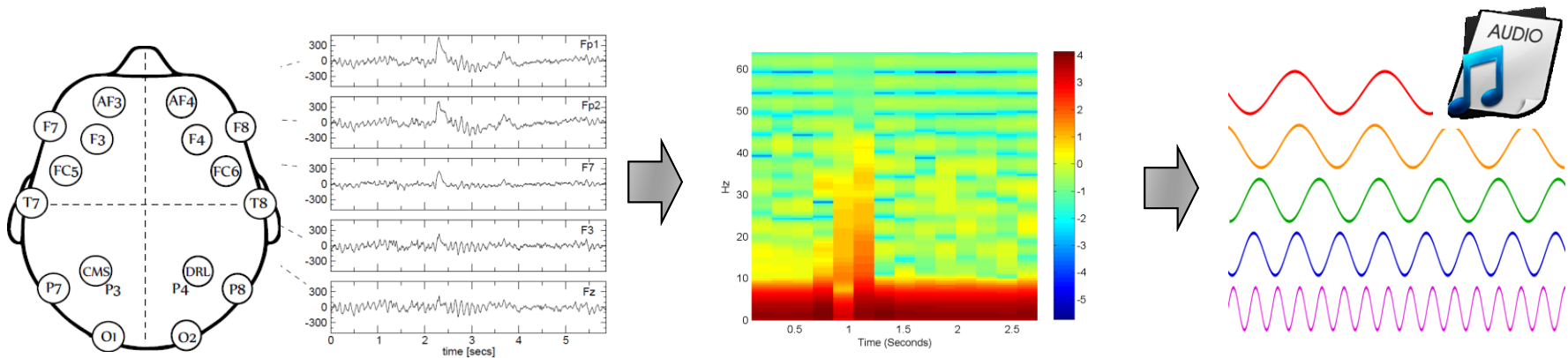
Objective

- ▶ Analyze whether the implementation of EEG sonification can discriminate or highlight patterns to improve classification of words during unspoken speech.

Methodology



Complete Methodology

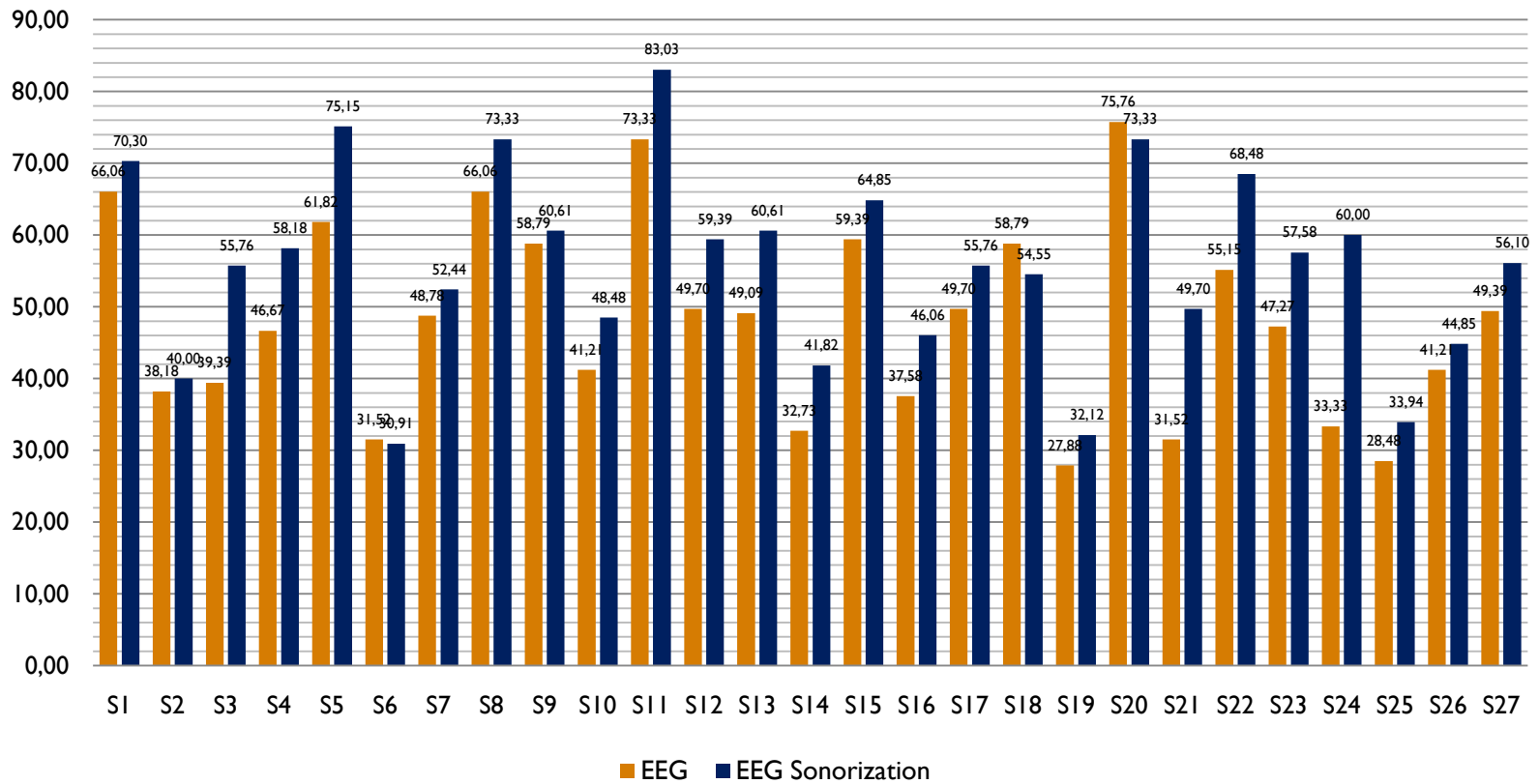


EEG Sonification Methodology



Experimentation and Results

Accuracy results using 4 channels and Random Forest



Conclusions

- ▶ Sonification was applied to transform the EEG signal to an audio signal.
- ▶ The classification accuracy was improved, by choosing dominant spectrogram frequencies from EEG signal and mapping EEG frequencies to audio frequencies.
- ▶ In future work, we will explore using 14 channels and additional feature extraction methods such as MFCC.

