HCI, Gaze Interaction (Eyetracking), Brain-Computer Interfaces

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Research Topics

Human-Computer Interaction (HCI)

- Affective Computing (Emotion Recognition)
- Brain-Computer Interfaces (BCI)
- Gaze Interaction (Eyetracking)
- Health Informatics
- Multimedia Retrieval (Images)
- Sketch Recognition & Interaction

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Proposals

- **P300.ID**
- **AutoUsability**
- **EyeTyping2**

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P300.ID: IDENTIFICADOR DA ONDA P300 EM SINAIS EEG

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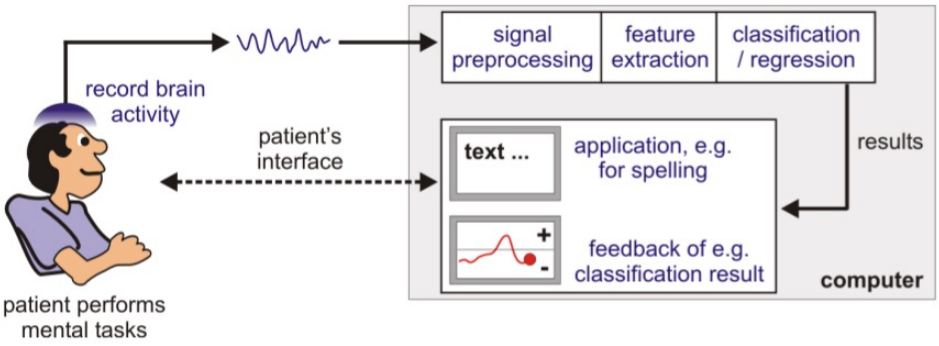
How BCI Works



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Non-invasive EEG Devices

g.tec BCI

NeuroSky MindWave

Emotiv Insight

Muse 2

Open BCI

Emotiv Epoc

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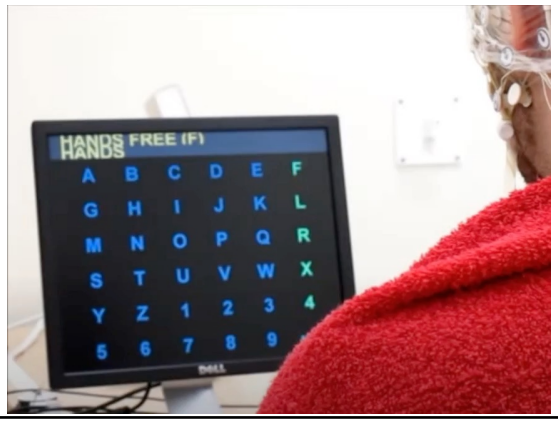
How P300 works?

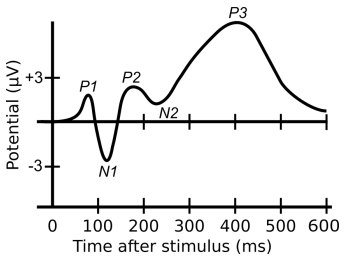
Presentation of a stimulus

Visual, auditory, motor

If identified, Brain responds

Generates a typical waveform (P300)





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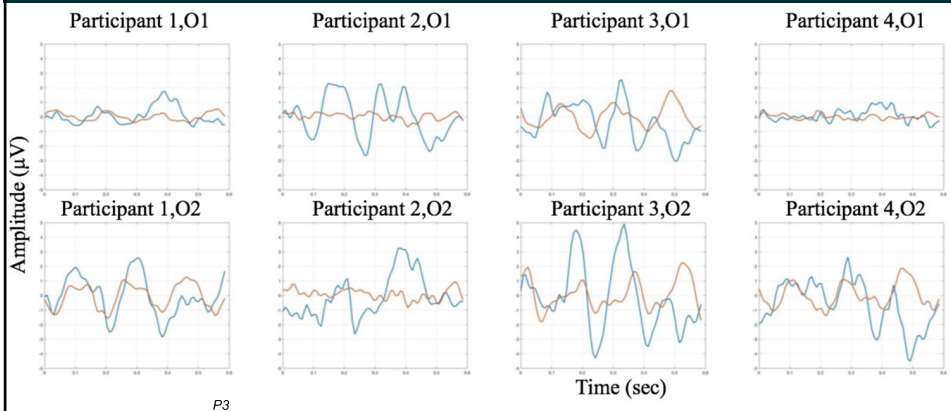
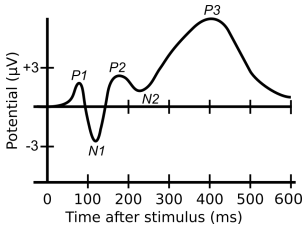
Why is a Challenge?





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Goal

Algorithm to detect P300 wave

Should be user-independent

Effective and Efficient

Algorithms | Signal Analysis| Feature Extraction| Machine Learning
Java | Python

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02

AUTOUSABILITY: RELAÇÃO ENTRE SINAIS FISIOLÓGICOS E A USABILIDADE DE SISTEMAS INTERATIVOS

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Problem

How to measure perceived Usability and User Experience?

Typically, through standard questionnaires

SUS, SEQ, ASQ, UMUX-Lite, NASA-TLX, UEQ, etc.

However

Take time to fill

Filled some time after concluding the tasks

It may not be accurate

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Goal

Measure Usability and User Experience through physiological signals

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Goal

(Existing) Dataset containing physiological signals and Scores for standard questionnaires

EEG (Brain), PPG (Heart), Accelerometer (Movement)

SUS, SEQ, ASQ, UMUX-Lite, NASA-TLX, UEQ, etc.

Investigate the relationship between users' physiological signals and their perceived usability and user experience while interacting with an application

HCI | Algorithms | Signal Analysis| Feature Extraction| Machine Learning
Java | Python

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EYETYPING2: INTRODUÇÃO DE TEXTO USANDO APENAS O OLHAR

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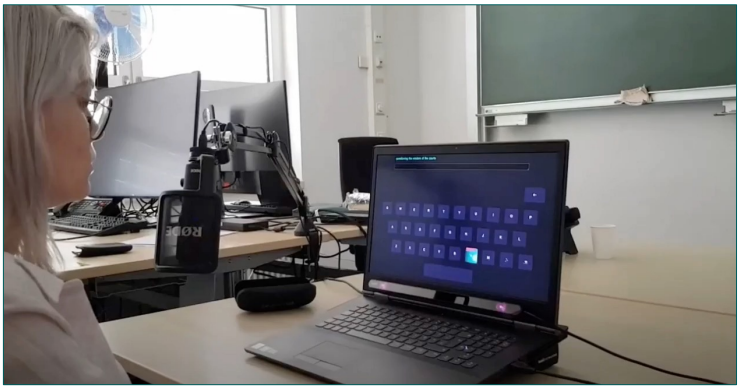
Gaze Interaction



Interaction technique based on gaze only

Uses an Eyetracker

For people with mobility restrictions (not only)

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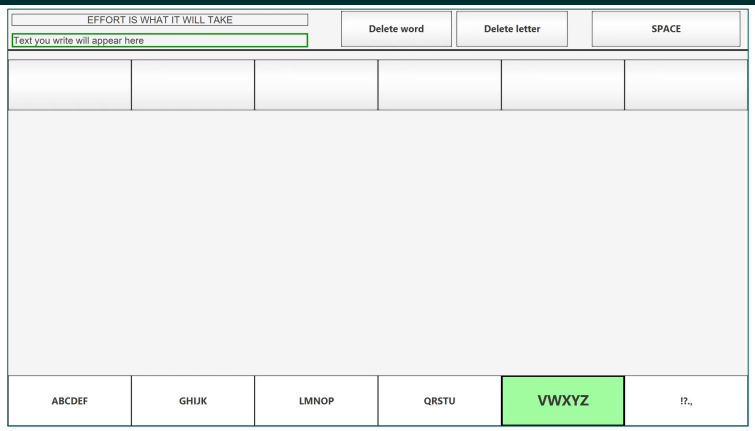
Goal



Text entry using only Gaze

Efficient and Effective (few errors)

Will use WordPop as basis (MSc 2021/22)

Algorithms | Gaze Interaction | Text Input | Java

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THANK YOU!

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