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

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Research Topics

Human-Computer Interaction (HCI)

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

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Proposals

- **AutoUsability**
- **EyeTyping**
- **P300.MM**

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01

AUTOUSABILITY: RELAÇÃO ENTRE SINAIS FISIOLÓGICOS E A USABILIDADE

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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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02

EYETYPING: TECLADO VIRTUAL PARA INTRODUÇÃO DE TEXTO USANDO O OLHAR

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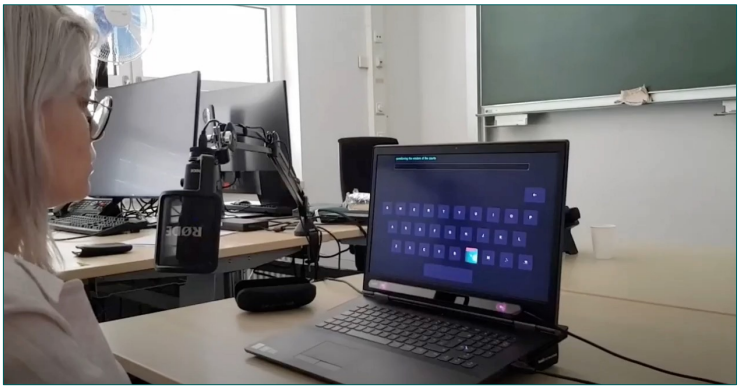
Gaze Interaction



Interaction technique based on gaze only

Uses an Eyetracker

For people with mobility restrictions (not only)

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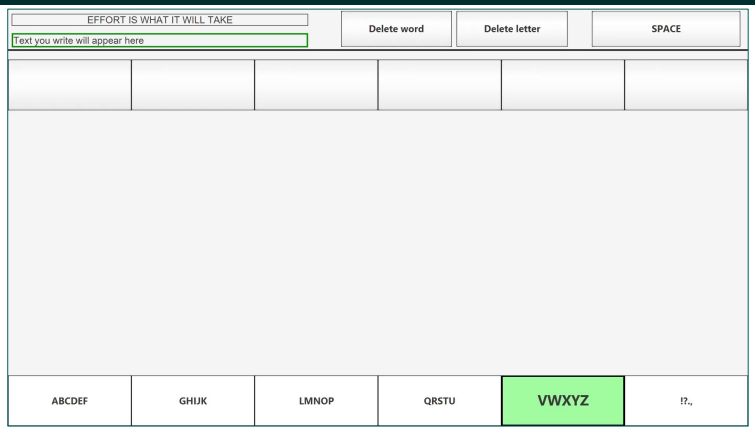
Goal



Virtual keyboard for text entry using only Gaze

Efficient and Effective (few errors)

Will use WordPop as reference (MSc 2021/22)

Algorithms | Gaze Interaction | Text Input | Java

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03

P300.MM: CRIAÇÃO DE DATASET MULTIMODAL DA ONDA P300

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How P300 works?

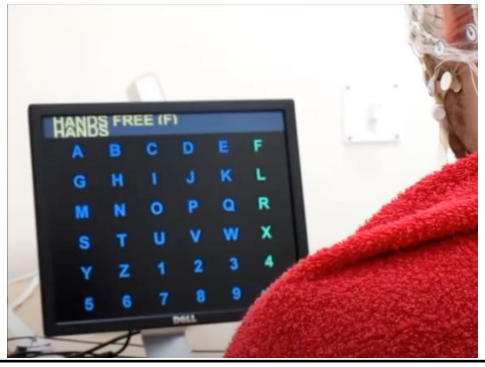
EEG Signal

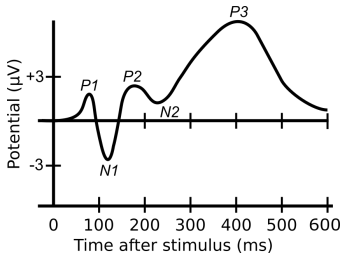
Results from the presentation of a stimulus

Visual, auditory, motor

If identified, Brain responds (EEG)

Generates a typical waveform (P300)





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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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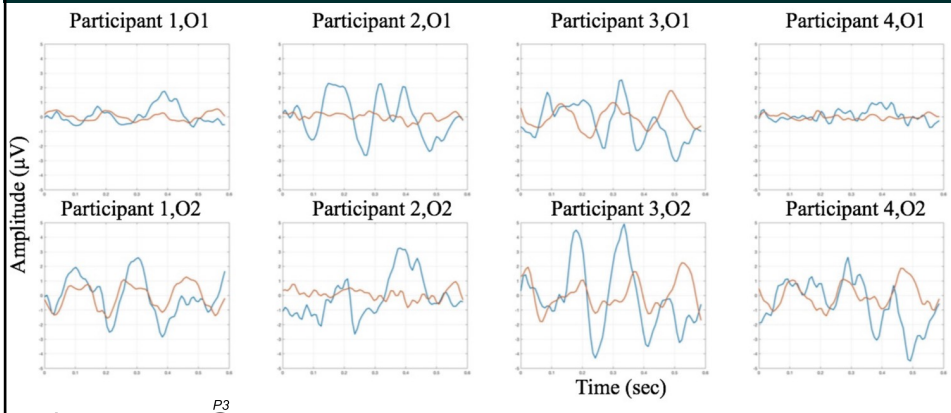
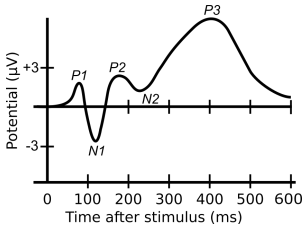
Why is it a Challenge?





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Goal

Explore the use of several signals

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

Creation of an annotated dataset

Signals + info about P300

User study to collect the data

Creation of a matrix keyboard

Software for collecting Muse2 signals

Validation of the dataset

User Studies | Signal Analysis

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THANK YOU!

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