

Brain Computer Interfaces (BCI)

Brainfingers: Computer control using the brains



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HEServis.nl

Introduction

- ☒ HEServis
 - ☒ How it started
 - ☒ Locked In Syndrome
 - ☒ SIDE
 - ☒ Brainfingers
 - What is it
 - What is it not
 - ☒ Brainfinger examples
 - ☒ BCI in the future

Locked In?

Is communicatie niet mogelijk als gevolg van een CVA, een hoge dwarslaesie, een hersenstaminfarct of ALS? Wij leveren een oplossing op maat.

HEServis

Een helpende hand bij de zoektocht naar een communicatieoplossing!

Specialist in communicatie-apparatuur voor het Locked In Syndrome en meervoelig zwaar gehandicapten.

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Adres, telefoon,
vervoer

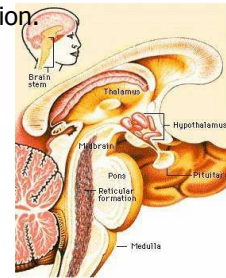
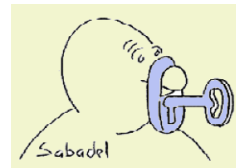
How it started

- ☒ 2002 Locked in Syndrome on TV



Locked in Syndrome

- ⌘ LIS is no disease but a physical situation!
- ⌘ Mental: Normal brain function



Locked in Syndrome

- ⌘ Physical: very limited.
 - ☒ Quadriplegic: From nose to toes.
 - ☒ No speech: Only emotional sounds 75%.
 - ☒ Normal conscience .
 - ☒ Typical:
 - ☒ Pain is felt
 - ☒ Limited facial motion: emotions are visible.
 - ☒ Limited eye movement : Vertical only.

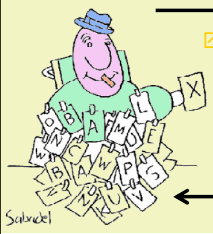
Methods for communication?

- ☒ Yes / No
- ☒ Character cards
- ☒ Computer?




1st row	2nd row	3rd row
A	J	S
B	K	T
C	L	U
D	M	V
E	N	W
F	O	X
G	P	Y
H	Q	Z
I	R	

Computer



→




- ☒ Interface:
 - ☒ Switch
 - ☒ Camera
 - ☒ Brainfingers
- ☒ Software:
 - ☒ The Grid
 - ☒ Mindexpress
 - ☒ SIDE
 - ☒




←

Sabarel


Existing solutions




- ☒ Picto: MindExpress/ GRID.
 - ☒ Only predefined words.
- ☒ Mytoby
 - ☒ Needs Stable eye movement
- ☒ Lucy
 - ☒ Needs stable Head movement.
 - ☒ Visibility of:
 - ☒ Characters
 - ☒ Light dot

SIDE (Single Input Data Entry)

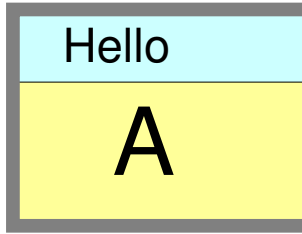


- ☒ Especially for persons with limited vision.
- ☒ Designed by LIS person
- ☒ Works with single switch or Brainfingers





SIDE briefly



- ☒ Possibilities:
 - ☒ One switch operation.
 - ☒ Good visibility
 - ☒ Scrolling sentence
 - ☒ ABC, Priority
 - ☒ E-Mail
 - ☒ SMS
 - ☒ Reading text files






Input switches



- ☒ Special:
 - ☒ EMG sensor (Muscles).
 - ☒ EEG Sensors (laboratory)
 - ☒ Combination EEG EMG EOG like Brainfingers

Brainfingers

- ☒ What is it?
- ☒ What is it not?

Brainfingers

⌘ 3 Sensors

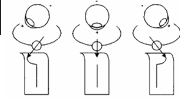


EMG EOG EEG

⌘ Electro Myo Gram



⌘ Electro Oculo Gram



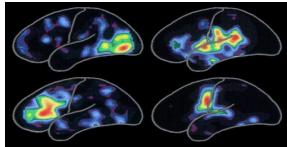
⌘ Electro Encefalo Gram



Brain activity

Reading

Listening



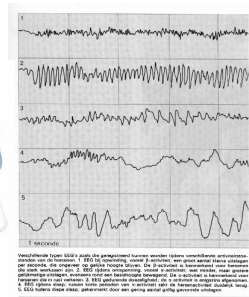
Emotions

Talking

Frontal brains

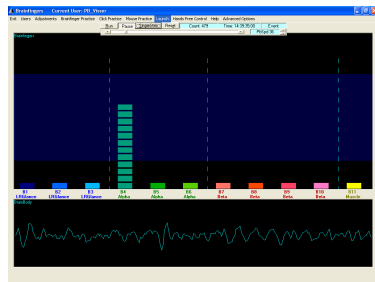
⌘ Constructive thinking

⌘ Emotions



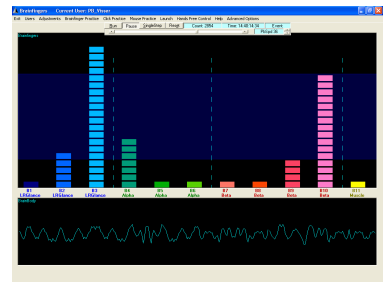
Frequencies

⌘ Relaxed



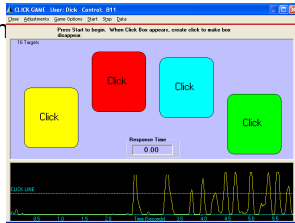
Frequencies

⌘ Busy

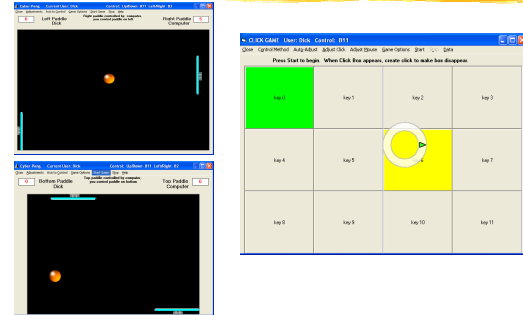


Brainwaves

⌘ Click function



Mouse control



Brainfingers in practice

⌘ Adam (ALS)
 ☑ Brainfingers

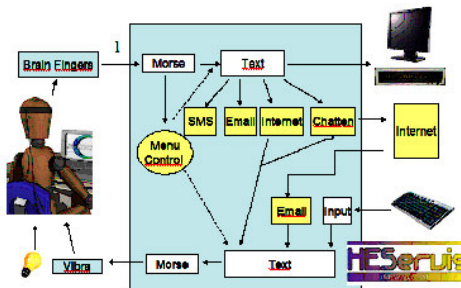


Brainfingers in practice

⌘ Sam
 ☑ (blind, deaf and Locked-in)
 ☑ SIDE Morse



Brainfingers in practice



Brainfingers in practice

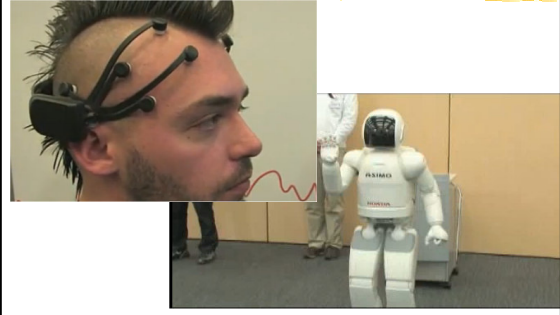
⌘ Nel
 ☑ Found capable of communicating after working with brainfingers. Now uses SIDE



Future?



Future?



Books and websites

⌘ Film: Butterfly and diving bell

⌘ Books



⌘ www.lockedin.eu (links to other LIS sites)

LIS Association



⌘ LIS Netherlands



Practice

⌘ Mustafa

☑ SIDE with Thumb switch



Thanks

⌘ Thanks for your attention

Our website www.heservis.nl

HEServis