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Winner red dot award: design concept 2010

Life Science



Mind Speller

red dot award

Design:



Artesis Hogeschool Antwerpen - Product Development



K.U.Leuven - Department of neurosciences

Designers:

Nicolas Faes

Michael Vandermergel

Frederik Van Hove

Dries Willems

Mind Speller is a diadem (a type of headgear), developed in collaboration with the team of Prof. Marc VAN HULLE (K.U.Leuven), which is used by patients who have had a stroke or who have ALS (amyotrophic lateral sclerosis). It uses the various frequencies of a person's brainwaves in combination with an interface of letters or images to 'read' the mind. The system can allow a person with no motor skills to send messages.

With a new technology called brain-computing interface, it is now possible to 'read' one's mind. Electrodes register brainwaves with certain frequencies, which could give information through a series of algorithms. Since a person's brain reacts to images it sees flickering with a certain frequency, it is possible to use this in combination with an interface where letters or images are flickering. This technology gives the ability to type simply with one's eyes and brain, even while having no motor skills whatsoever.

In order to get the best results, *Mind Speller* uses two different paradigms - P300 and Steady State Visually Evoked Potential (SSVEP). Most people have good signal results with both the paradigms, but everybody is different. In order to get the best results, one should use the paradigm that gives the purest signals. This is why the diadem is suitable for both paradigms.

The housing of the diadem consists of five parts: the PCB and battery component, the left brace, the right brace, the P300 component, and the SSVEP component. At a service point (e.g. a hospital) it is determined which component gives the most reliable results for a certain patient. As the braces have the same design but are

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mirrored, they are seen as two different pieces. So it is possible to resize the diadem. When the right size is reached on the patient's head, the brace can be locked. This system keeps the electrodes on the right place during usage.

The main goal for the interface was to obtain a model that can be implemented to test. Reading hierarchy must be respected. Blue/green flickering impulses create a comfortable contrast. High contrast could evoke discomfort. One of the four functions implemented is entertainment. This provides the opportunity to listen to music, read books, watch movies, and play games. This could improve the life quality of paralysed people. In the demo model are various examples of BCI (brain-computer interfaces). For the writing interface, a T9 input method was chosen. This is the best solution because of its low number of input instances. The impulses are not placed in rows or columns, but in a varied order. In this way, the results should be more reliable. Smileys were also added so users can put more nuances and feelings in their messages.

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Emergency Transporter Unit



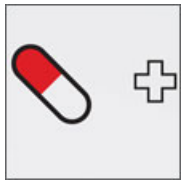
Otivio



Ablechair



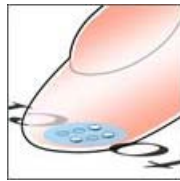
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1+1 Pill



OAED



Touch Reader



Sliding Wheelchair



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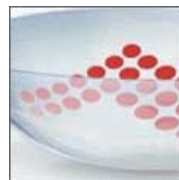
Life Sack



Germ-Free Elastic InterDental Brush



Augmented Intervention Assistant



RLens



Two Way Wheelchair



Thermoplay