An Eye Tracking Computer User Interface

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Abstract

We developed an inexpensive hardware software system for eyetracking. It is based on electro-oculography (EOG) rather than expensive reflectance based methods. We built a prototype to demonstrate the viability of EOG for human-computer communication. The system is applicable for many virtual reality systems, video games, and for the handicapped.

Hardware Components

4 EOG sensing channels
Signal filters to eliminate noise
Signal amplifiers
A/D converters

[Diagram of hardware components]

Transducer → Difference Amplifier → Opamp

Input filter → Lowpass filter → DC amplifier

A/D Converter → IBM PC bus interface
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Software Modules
Classification and filtering of EOG signal
Extraction of symbolic tokens
Graphical user interface
Experimental Results

- A 3x2 boxed menu driven by eye selections.
- Performance measures of correct selections recorded after repeated use by two experienced users.

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<tbody>
<tr>
<td>Menu Selections</td>
<td>73%</td>
</tr>
<tr>
<td>Menu Selections (4 corners only)</td>
<td>90%</td>
</tr>
<tr>
<td>Horizontal Detection</td>
<td>75%</td>
</tr>
<tr>
<td>Horizontal Detection (4 corners only)</td>
<td>99%</td>
</tr>
<tr>
<td>Vertical Detection</td>
<td>92%</td>
</tr>
<tr>
<td>Vertical Detection (4 corners only)</td>
<td>92%</td>
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