
AttentivU: a Biofeedback System for Real-time Monitoring and Improvement of Engagement

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ABSTRACT

It is increasingly hard for adults and children alike to be attentive given the increasing amounts of information and distractions surrounding us. We have developed AttentivU: a device, in a socially acceptable form factor of a pair of glasses, that a person can put on in moments when he/she wants/needs to be attentive. The AttentivU glasses use electroencephalography (EEG) as well as Electrooculography (EOG) sensors to measure attention of a person in real-time and provide either audio or haptic feedback to the user when their attention is low, thereby nudging them to become engaged again. We have tested this device in workplace and classroom settings with over 80 subjects. We have performed experiments with people studying or working by themselves, viewing online lectures as well as listening to classroom lectures. The obtained results show that our device makes a person more attentive and produces improved learning and work performance outcomes.

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KEYWORDS

EEG; EOG; glasses; attention; engagement

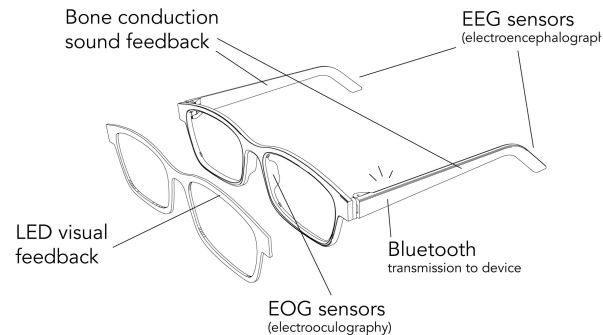


Figure 1: Overview of AttentivU glasses.



Figure 2: Use case - Learning. Using the glasses to stay focused during lectures.

INTRODUCTION

While there have been other systems that use EEG to train people to improve their ability to be attentive, those approaches have consisted of screen-based games and other exercises that are typically performed in special sessions under the weekly guidance of a therapist. While they have similarly shown to be effective [2], they are not very practical. In contrast, the novelty of our system is that it is meant to be used in the moment, that is, in the context where sustained attention and engagement are necessary. In order to make real-world use possible, we have developed a socially acceptable, inconspicuous form factor: a pair of glasses that contain EEG and EOG electrodes as well as an amplifier, Bluetooth LTE module, and a speaker for bone-conduction auditory feedback. The user can optionally receive the feedback or nudges through a wireless vibration brooch that can be attached where desired and remains invisible. We envision a future in which people can decide when they want to be more attentive and can in those moments put on their AttentivU glasses to help them be focused.

Looking at the scientific literature, very little research has focused on real-time delivery of feedback about the attention level to an individual while he/she is performing a real-life task. The few reported cases mainly consider a user manipulating a machine or interface, for example driving a car. The closest system to the one proposed is the reminder device, *Re:Vibe*, which uses tactile feedback, but which is, unlike our approach, not based on a scientifically validated method. The real-time delivery of information to a user about his/her attention level during is the primary original contribution of this project. A second novel contribution consists of using both brain activity and eye movements to infer attention level. The third novel contribution consists of providing a closed-loop feedback system, that redirects attention in real time in the actual context or situation where attention is required.

We have tested this device in workplace and classroom settings with over 100 subjects so far. We have performed experiments with people studying or working by themselves, viewing online lectures as well as listening to classroom lectures. The obtained results show that our device makes a person more attentive and produces improved learning and work performance outcomes [1].

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