Education & Training

Improving Students' Retention by Attuning Computerized Teachers to Brain Activity

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a new computer-based education method responsive to real-time measurements of learners' cognitive engagement.

Overview

Despite the growth of educational software designed to lead students through material, robotic and virtual instruction have failed to simulate the perceptive, responsive tactics of successful human teachers. When student attention lags, intervention strategies—such as direct questioning, eye contact and gestures that direct notice—are known to be effective in traditional class settings.

A method is needed to calibrate computerized instruction to the engagement levels of students, signaling the moments when these strategies may be used to regain learners' involvement and motivation. By monitoring user brain activity through an electroencephalogram (EEG) headset or other cerebral imaging technique, computerized teachers could adapt performance in real time to maximize positive learning outcomes.

The Invention

UW–Madison researchers have developed a method to trigger attention-promoting behaviors presented by robotic, virtual or video-based instruction, using brain-wave measurements indicating drops in user engagement.

User attentiveness is determined by well-accepted EEG measurement of the brain's electrical activity, like that provided by existing EEG technology. The new system produces an 'engagement threshold' to identify periods of declining user attention in real time and signal some modification of the lesson. This modification could take the form of increased audio signals, the use of more pictures, requests for student input or eye and limb movements by robotic instructors. In evaluating student responsiveness to a lesson, this method provides a more robust alternative to other computer-based educational (CBE) tools that gauge effectiveness solely by users' explicit input or post-hoc comprehension.

Applications

- Incorporation into e-learning package or robotic software for responsive CBE instruction

Key Benefits

- Unprecedented nuance of virtual/robotic instructors
- More reliable process based on user brain waves, rather than facial or behavioral cues
- Novel focus on real-time student engagement

Publications

- Szafir D. and Mutlu B. 2012. Pay Attention! Designing Adaptive Agents That Monitor and Improve User Engagement. Proc. of the 30th ACM/SigCHI Conf. on Human Factors in Comp. (CHI 2012). Austin, TX.
- Mutlu B. 2011. Designing Embodied Cues for Dialog with Robots. AI Mag. 32, 17–30.
- Mumm J. and Mutlu B. 2011. Designing Motivational Agents: The Role of Praise, Social Comparison, and Embodiment in Computer Feedback. Computers in Human Behavior. 27, 1643-1650.

Tech Fields

- Education & Training : Educational tools
- Information Technology : Computing methods, software & machine learning

For current licensing status, please contact Emily Bauer at emily@warf.org or 608-960-9842