

Animated Agents for Interactive Online and Mobile Assistance

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We present recent work to develop high-fidelity animated agents that are socially captivating and accurate enough to act as virtual coaches and buddies, yet that are scalable enough for use with online and mobile applications. The problem we tackle is to balance personalization and fidelity with cost, interoperability and accessibility. This work underlies a larger goal which is to help people across the lifespan overcome, remediate and navigate cognitive challenges, in particular as it relates to education, healthcare and the workplace. Underscoring the relevance of this work, the new animated agent will form the basis for three new flagship projects to help people with cognitive disabilities navigate procedural and soft-skills challenges under a newly awarded RERC (Bodine, PI). We will provide a general discussion and demos.

While online and mobile information systems promise far-reaching and cost-effective solutions for assistance, they don't always accommodate the millions of people who may need extra help. More than a third of the population have literacy difficulties and cannot read more than simple words in simple context and more than 20 million people have specific disabilities (NAEP, 2007; NAAL, 2003; AOA, 2007, Braddock, 2007). We posit that in certain contexts animated agents can add a "human dimension" to the computer interface that may improve, direct and encourage overall participation, communication and accessibility – much like experts do in clinical practice, especially for users with cognitive disabilities, language or learning difficulties (Van Vuuren, 2007).

In the past we have used animated agents to help people with cognitive disabilities preview jobs (NIDRR RERC-ACT: Bodine & Lighter, 2008; Emery, Sandstrum, Van Vuuren, 2008); for telerehabilitation of aphasia (NIDRR: Lee, Kaye, Cherney, 2009; Cherney et al, 2008); for students with cognitive difficulties (Schwartz et al, 2004); for assessing children's reading difficulties (IES: Wise, Van Vuuren et al, 2005); and for remediating children's reading difficulties (NIH: Wise, Van Vuuren, Byrne, 2005; Wise, Van Vuuren, et al, 2008). While successful, these systems were limited in scale in that the animated agent they used worked on personal computers only.

Recently, with a competitive innovation grant from the University of Colorado Boulder, we developed an animated agent that overcomes these difficulties with two compelling attributes: accurate visual speech based on articulatory phonetics (Ladefoged, 1993), which research colleagues with expertise in a range of fields including linguistics, education and speech therapy have commended; and the ability to run in a web browser and/or mobile device (Van Vuuren & Ngampatipatpong, 2009). To achieve accurate visual speech we model co-articulation, speech rate and expressiveness with simple linear operations on a sequence of code book indices in a novel linguistic-speech space (Van Vuuren et al, 2009). To model facial expressions we use an authoring environment and markup language that allow parametric control over mouth, tongue, eye ball, eye brow, eye blink, cheek and head layers. Agent responses and expressions can be activated through a variety of modalities and interfaces including touch, type and click, and speech where available (Van Vuuren et al, 2008).

The new agent runs on a range of web and mobile platforms, including Apple, Google, Blackberry and Microsoft platforms and devices. Fig. 1 shows screen images of the animated agent.



Images of animated agent with accurate visual speech for web and mobile use.

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