

GALA 2007 submission document

Title: Ashley, the fourth generation user interface
Track: Other
Category: Application
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Movie file submitted: *Doesburg.avi*

Reference teacher: **For student authors,** a reference teacher must be given who can be contacted with eventual questions on the authors and their submission..
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Process of development: Ashley, was developed between summer 2006 and spring 2007, as a part of a research program that supports human performance in highly technological environments. Ashley is the research platform with which human computer interaction research questions will be investigated. Ashley is a real-time interactive interface.

The 3D design studio Little Chicken have performed the 3D modeling of the body and animations.

Resources used:

1. Loquendo TTS and ASR
<http://www.loquendo.com>
2. Proprietary game engine
3. EmotionFX for realtime animation control
<http://www.mysticgd.com>
4. IMS Voice2Animation for realtime lipsynch
5. VisualC++ 7 for programming

Resources required: Ashley was developed and tested on a network of four PC's with Windows XP Prof OS, the appropriate software licenses, 1024 mb RAM, Nvidia Geforce Go 7950 GTX graphics card, a beamer, three full HD LCD screens. An external audio cards and microphones were used.

Ashley, the fourth generation user interface

1. The application and context of the work

In the research program 'pilot performance' research is performed on a new man-machine interface concept called 'Ashley'. The concept centers on the idea that an interface is an extension of man. It is a partner that you know and trust and one that you may ask to perform certain tasks for you. For instance, Ashley will recognize that you are tired and will try to relieve you by taking over tasks. The approach is to evolve Ashley's capabilities incrementally.

At present Ashley is capable of guiding visitors around the mission simulation centre facility of TNO in an interactive tour. She will ask the visitors if they want to fly in one of our F16 simulators. She is capable of recognizing a person's name and to address her visitors in a person specific manner. Ashley can adapt to her public being of civilian or military background by adjusting her appearance.

In the next increment Ashley will evolve from host to wingman in one of the F16 simulators to the human machine interface between F16 pilots and their adaptive intelligent cockpits (under development at TNO).

2. Novelty

The application of lifelike agents in military simulation environments is well established (Sandercock, 2004). Similarly the practice of human like interfaces is well-known (Cassell, J, et al., 1999) However, there has been a lack of investigation into the application of lifelike agents as interface between the fighter pilot and the systems he controls. The use of Ashley may facilitate the acceptance of drones and other unmanned systems by pilots. By interfacing with such systems through an interface that they know and trust the combined performance of the pilot and his unmanned systems may be improved.

3. The architecture

Ashley has been designed to be a real-time interactive interface between man and machine. As such the architecture behind Ashley facilitates speech recognition. The speech recognition capabilities include word spotting, context-free grammar recognition semantic analysis and speaker recognition. Additionally, speech is generated real-time through the Text-To-Speech system and on the fly analyzed to drive the lip animation synchronously. Furthermore, the nonverbal motions such as: blinks, brow raising and head yawing and tilting, is driven by the analysis of the generated speech. These animations are blended with the animations coming from the dialog management system which controls the range of interaction. These facilities form the technological base to evolve the next generation of Ashley with more intelligence. Both task related intelligence as well as social intelligence are required to gain the trust and acceptance of the F16 pilots.

4. Performance

User responses to Ashley have been very positive, especially by military personnel. Technical aspects: The animations currently are hand modeled, while we aim to move to motion capture animation. Additionally, the performance of speech recognition is somewhat reduced in noisy situations (when all F16 simulators are running).

References (optional)

- Sandercock, J.(2004) Lessons for the Construction of Military Simulators: A Comparison of Artificial Intelligence With Human-Controlled Actors, Ft. Belvoir Defense Technical Information Center, Australia.
- Cassell, J., Bickmore, T., Billinghurst, M., Campbell, L., Chang, K., Vilhjálmsón, H., & Yan, H. (1999) Embodiment in conversational interfaces: Rea, Proceedings of the SIGCHI conference on Human factors in computing systems: the CHI is the limit, p.520-527, May 15-20, Pittsburgh, Pennsylvania, United States.