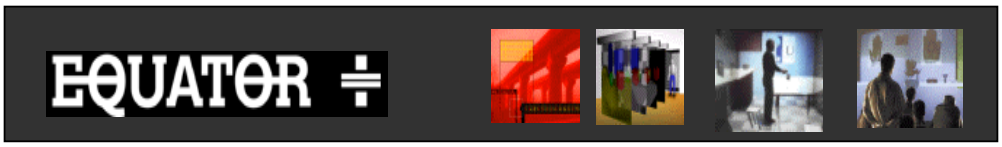

"VIRTUAL-HUMANS" AT UCL

The most long-standing virtual humans have been built as accompaniments to computer games. The similarities between these humanoids and the ones built to inhabit virtual worlds end skin deep. In the case, of computer games, the virtual humans need only convey a few traits and have little functionality. However, today's virtual beings have to be able to communicate with users in a convincing fashion. The problem is that human communication remains an immensely complicated function to model computationally. As Phil Agre [1] wrote in one of his publications (1985):

"Playing chess is easy, but making breakfast is enormously complicated.
This complexity stares us in the face every morning, yet it is invisible."

RESEARCH FACT FILE ON UCL

The Virtual Environments and Computer Graphics group at University College London (UCL) have been undertaking engrossing research in the design of *virtual humanoids*, in conjunction with our psychology departments and other universities around the globe. Most of the research at UCL focuses on making our virtual collaborators* more *realistic* and *believable*. Virtual humans at UCL can be used as an interface† to represent us while visiting virtual environments (VEs) or they can be built as a self-sufficient sentient‡ to co-inhabit with users in VEs. This involves not only designing and building physically believable virtual humanoids but also embodying them with behaviour traits to enable them to interact with other users in the virtual environments.

Fig 1 A virtual environment user interacting with an avatar in a shared immersive virtual environment in the ReaCTor at UCL for an experiment researching simulated eye-gaze behaviour realism in dyadic situations.

Some works hypothesise that behaviour realism is more important to aid believability. However, recent works at UCL into eye-gaze behaviour in avatars suggest that there is a correlation between physical and behavioural realism. In fact it was found that embodying a photo-simplistic with complex inferred behaviour was detrimental to the levels of believability and face-to-face effectiveness experienced in the shared virtual environment.

Fig 2 A user in a head mounted display interacting in the same-shared immersive virtual environment as Fig 1. Each user is represented to the other as a virtual humanoid pictured in Fig 5 in accordance to their gender.

Users of VEs expect a behaviour model consistent the physical appearance of the virtual human in order to believe that the virtual human is real and suspend their sense of disbelief.

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* Avatars and Agents
† Avatars
‡ Agent

AGENTS EMPLOYED AT UCL

Existing virtual humans at UCL vary in physical appearance. They have been built over recent years to be incorporated into various projects and are available for use in future projects.

Fig 3 The most simplistic avatars available at UCL. The avatar in was used to assess Internet2 and the theory of emotional conveyance through a network. This work was carried out in conjunction with the University of North Carolina, Chapel Hill and Massachusetts Institute of Technology in the USA.

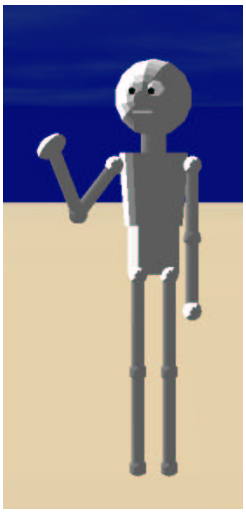

Fig 4 A photo-simplistic avatar with realistic eye-gaze behaviour and minimal limb animations.

The avatar shown in Fig 4 is photo-simplistic avatar with added features. The avatar was designed with pronounced eyes and with less emphasis laid on the other facial features.

Experiments are carried out at UCL to investigate if people in a VE react to the existing agents as they would in real life to positive, neutral or negative experiences. The results up to date are very promising and showed that their experiences were very similar to real life situations.

Fig 5 Gendered virtual humans available at UCL. These were used in the experiments dealing with behaviour realism, fear of public speaking, and social paranoia.

Research into "*better looking*" virtual humans is ongoing. With the current rate of advancements in the rendering of virtual objects, better avatars and agents are constantly emerging.

NEEDS OF A VIRTUAL HUMANOID

- ✓ Consistent photo realistic appearance
- ✓ Corresponding behaviour realism
- ✓ Emotional and Personality Identikits
- ✓ Skinning and Clothing
- ✓ Usability across various types of virtual worlds
- ✓ …

Fig 6 Agents in action in a fear of speaking study

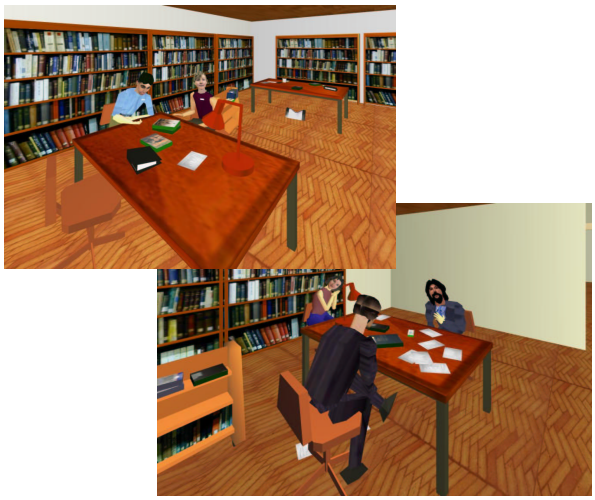

Fig 7 Agents in action in a social paranoia study

Fig 8 The simplest of the UCL agents in the Internet2 experiment

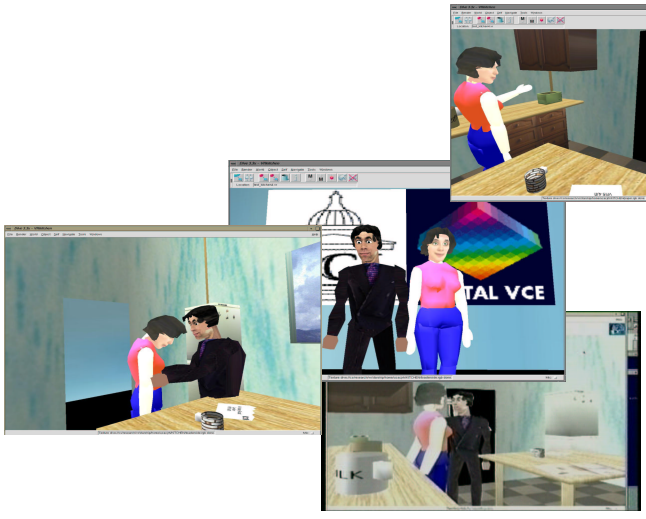

Fig 9 Agents in Acting

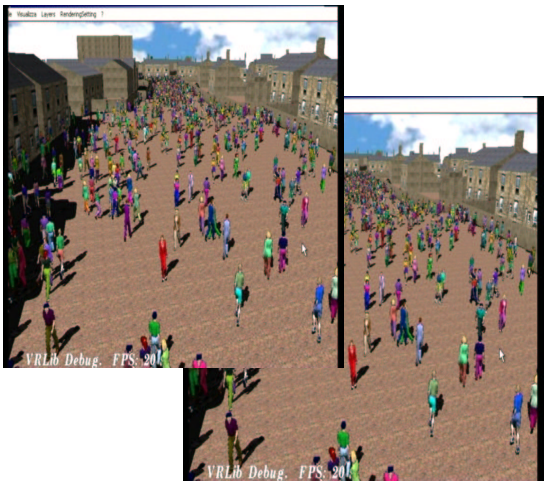

Fig 11 Crowds of virtual humans in a city

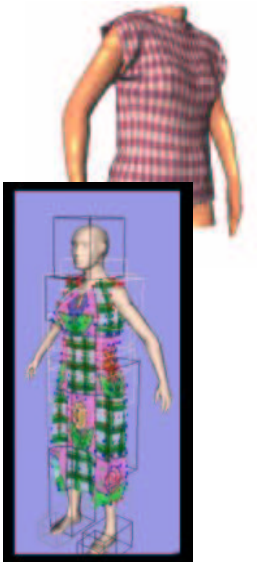

Fig 10 Clothing a virtual human

CONTACT DETAILS

For further details on any of the research on avatars or other works carried out at the Virtual environments and Computer graphics Laboratory at University College London please visit:
Our group website at www.cs.ucl.ac.uk/research/vr
Our project website at www.cs.ucl.ac.uk/research/equator.

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