Research Progress

The Representation of Shyness in Virtual Human Characters with an Application to Social Phobia

In 2007, I have accomplished my main experimental study on the interaction between male participants and a virtual female. I have also designed and implemented a facial animation system for expressing complex mental states, and a new experiment investigating how human participants respond to a blushing avatar. Meanwhile, I have successfully passed my PhD transfer viva in July.

Many people have experienced anxiety while in front of the opposite sex, authority figures, strangers, or just when interacting with people in general. However, will they have a similar anxiety when interacting with a virtual character in Virtual Reality (VR)? Will it make it easier if the virtual character behaves very shyly, as the participant himself? Will it help shy people in building their confidence by talking with a 'shy' virtual character? With these research questions, my thesis is concerned with representation of shyness in avatars within VR, with the goal of building avatars with different degrees of shyness.

My research started with a literature review on existing facial expressions and facial animation systems, followed by experimental studies on the interaction between a human participant and an avatar. The experimental setup includes a one-to-one conversation between the human participant and a virtual character in a social encounter. There are 28 participants attended our preliminary experiments. The results suggest that participants had responses to the virtual female as if the encounter had been a real one.

In the beginning of last year, from the preliminary results of this experiment, I have produced a poster on this experiment which has won the First Prize of the UCL Poster Competition. I have also published a conference paper and gave a presentation for The 10th Annual International Workshop on Presence Barcelona, Spain [1].

To investigate this interaction more thoroughly, a final experiment has been carried out with 36 participants in the end of 2007. A journal paper is under preparation. Apart from that, we have analysed the body movements of each participant which indicate that they are responding towards the virtual female at a behavioural level. I have submitted an abstract to a workshop on the results of body movement analysis.

At the same time, to prepare for the final experiment where an expressive avatar has to be implemented, I have researched facial animation systems. I have designed and implemented a method for expressing complex mental states through facial expressions by first, extracting real facial expressions data from video clips, second, applying those data on the Virtual Character and finally animating complex mental states with motion graphs. This work has been published as an extended abstract in the Second International Conference on Affective Computing and Intelligent Interaction, Lisbon, Portugal [2].

Meanwhile, with the research goal of building shyness onto avatars in VR, I have studied the psychological literature related with shyness. In the literature I found that, as a particular human behavioural response that is tightly associated with shyness, blushing serves important functions in interpersonal communications. However, as an additional facial feature, blushing has not been mentioned much in the computer animation literature. Therefore, we have designed and implemented this experiment to investigate how human participants react to a blushing avatar. The results will provide us with more information about the interaction between the human participants and an avatar, especially, when the avatar shows behaviours related with shyness.

In the experiment we show the participant an avatar who blushes after a small 'incident'. Our hypothesis is that in the presence of blushing the participants will attribute higher levels of trustworthiness to the avatar, compared to the no blushing condition. The blushing has been simulated with two difference approaches: one is realistic blushing where the whole face (including ears and neck) of the avatar goes red; the other one is the cartoon blushing where only the cheeks of the avatar turn red. This is because we are interested in which one of these two blushing effects creates a more efficient emotion bonds with human receivers, i.e., with which effect the participants trust the avatar more. This experiment has been proved by the UCL Research Ethics Committee and it is currently undergoing.

With the results from the two experiments as introduced above, the final design of the shy avatar will then be implemented. Shyness will be expressed through the avatar's facial expressions, facial colour changes, and body movements, with different degrees. Finally, an experiment will be carried out in the CAVE-like system to investigate how human participants react towards this shy avatar. Our hypothesis is that shy participants will be more comfortable in interacting with shy avatars than with socially confident ones, and that this could be the basis of retraining and therapy for social phobics.

References:

[1] Pan, X. & Slater, M. (2007). **A Preliminary Study Of Shy Males Interacting With A Virtual Female**. In Presence 2007: The 10th Annual International Workshop on Presence, Pp. 101-108, Barcelona, Spain.

[2] Pan, X., Gillies, M., Sezgin, T. M. & Loscos, C. (2007) **Expressing Complex Mental States Through Facial Expressions**. In the Second International Conference on Affective Computing and Intelligent Interaction, Lisbon, Portugal