Live Video and Augmented Reality over Internet as Entertainment for Dogs

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ABSTRACT
In this paper, we investigate if video conferencing software, proposedly enhanced with augmented reality games, could be used for remote interaction between dogs and their owners so they could communicate over internet during the master’s absence.

Categories and Subject Descriptors
H.4.3 [Information System Applications]: Communications Applications – computer conferencing, teleconferencing, and videoconferencing; H.5.1 [Information Interfaces and Presentation]: Multimedia Information Systems – artificial, augmented and virtual realities.

General Terms
Experimentation.

Keywords
Augmented reality, internet, animal behaviour.

1. INTRODUCTION
Worldwide millions of dogs suffer from more or less severe separation anxiety and these animals might benefit from being entertained interactively during their master’s absence. The aim of the present study is to investigate if video conferencing could be used for communication between dogs and their owners, not only to watch what their dogs do when alone at home, but also to entertain the dog during the master’s absence. Furthermore we propose augmented reality games as means to enrich the networked interaction between the dogs and their masters.

2. VIDEO STIMULI FOR DOGS
Many dog owners say that their dogs (Canis familiaris) watch TV, and there are already commercial DVDs available for entertaining dogs (see e.g. http://www.bowwowtv.com). However, as stated by Graham et al. [1], surprisingly little is known of dogs’ ability to understand or respond to video images and sound. D’Eath [2] reviewed the limitations of video images in animal behaviour experiments. These limitations deal in the first place with mismatch between TV image and animal’s colour vision, flicker frequency, depth perception and visual acuity; TV and video systems are designed for humans with vision and perception abilities different from those of animals.

Besides the technical issues related to differences in vision between species, D’Eath [2] emphasises the lack of interactive properties as a source of error in video studies. The humans and animals on a video do not respond to the behaviour of the observing animal. This may at least partially explain the observed gradual loss of interest towards the videos [1].

3. EXPERIMENTS AND RESULTS
We carried out experiments with ten intact (except one) male dogs of nine breeds. The dogs were tested one at a time during two days in random order in a puppy room of the experimental kennel. All dogs were familiar with the room. The owner brought his/her dog to the cage, and left it there as they normally did when leaving the dog. The owner went then to a stimulus room in another building locating 150 m from the kennel.

An intranet connection between the stimulus room and the dog room enabled the owner and the experimenters see and hear the dogs and to give visual and auditory stimuli to the dogs. We used the NetMeeting software with 352x288 video image resolution, which would be easy to handle also with broadband internet. The visual stimuli were projected to the back wall of the cage, and there was a loudspeaker just above the projection to convey the auditory stimuli. We chose to use projector screen in order to have the human appear in real size to the animal. The projector also reduces flicker compared to standard PC display; in fact plasma display would perform even better. Use of data glasses for the dogs was not seriously considered although they would bring the benefit of stereo vision with augmented reality application.

The dogs had 25 min habituation time in the cage before they were exposed to six stimuli, each lasting for 5 min: picture of the control room (CTRL1), picture and voice of the owner (PICVOI), picture of the owner (PIC), voice of the owner (VOI), picture and voice of a person unknown to the dogs reading a book (UNKN), and picture of the control room (CTRL2). During PICVOI, PIC and VOI the owner tried to make contact with her/his dog as intensively as possible and respond to their dog’s responses, whereas the unknown person did not respond to dogs’ behaviour. The picture during habituation, CTRL1, VOI and CTRL2 was picture of the stimulus room without any movement or sound. CTRL1 was the first and CTRL2 the last stimulus. The remaining four stimuli were provided in random order and the order was different for each dog.
Behavioural categories analysed from video-recordings were resting or active (sitting, standing and moving). In addition the direction of dogs’ snout was recorded in order to record whether the dog was looking at the picture on the wall. The differences between the dogs’ responses to the different stimuli were analysed with the Linear Mixed Model. Further details of our experiment are presented in [3].

Figure 1 summarises some of the main results. On average the control stimuli were clearly least interesting to the dogs, and the augmented reality component for the human user to see the virtual game elements. As model for similar networked augmented reality system for human–poultry interaction through the internet. Personal and Ubiquitous Computing 10(5), Springer, London (July 2006), 301-317.

5. CONCLUSIONS
Networked live video shows clear potential for providing means for remote communication between a dog and the master. Augmented reality offers possibilities to enhance the interaction, keep it interesting repeatedly and for longer periods of time. However it appears that only a small percentage of dogs react to live video stimuli. Further tests are required to confirm whether augmented reality games really work with dogs. We hope this article provides some ideas and a starting point for future work.

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7. REFERENCES
Augmented Reality (AR) is the digital creation of a fabricated set of objects that can be interspersed with real world elements, usually through a headset that overlays the objects on the lens, as the user also views their real surroundings. A third variant has been defined by several new players to the market as... It’s time to review the potential opportunities for virtual reality and augmented reality applications in the MSO provided home user experience. The assumption here is that the solutions proposed will be made to work and the issues of the experience and quality will improve particularly, with symbiotic relationships between content creators, VR solution providers, and the service providers. Worlds Collide with the introduction of Augmented Reality. Now the latest craze for smartphones, PCs, camera, GPS systems and even eye-wear, AR merges our virtual and real worlds. Its initiated by technology that takes your existing environment and provides an overlay of extra data and information about the things you are viewing. Now us mere mortals can have some of the superpowers we thought were exclusive to the Bionic Man and the Terminator!