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Feeling Communication: Social and Physical Interactive Communication and Entertainment

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Communication is one of the most fundamental needs and desires of most organisms, especially humans. Media has made advances in many ways, for example allowing communication over long distances including sound, voice, and text. The advent of the Internet, broadband, virtual worlds, and mobile devices allows remote communication through screens (providing audio/visual communication), even while on the move, however we can have a lack of understanding of real feelings between the sender and receiver. As described in previous research[1], the metaphor of communicating through a screen or window limits the sense of immersion and limits the ability for humans to communicate effectively. In traditional human communications, body gestures and touch[2] can sometimes more deeply explain the intended mind and provide intrinsic information, which makes for a more rich communication exchange. Furthermore, we often communicate emotionally using all the senses simultaneously, including sight, touch, sound, but also through taste and smell, such as sharing a meal together or cooking for a partner. We thus need to create fundamentally new forms of media to connect humans in the physical world and through the virtual world co-space, not just in the transmission of information and verbal communication, but through meaning and nonverbal communication to increase the sense of telepresence using all the senses. We believe this will allow more opportunities for people to make meaningful exchanges using media in the co-space. As a fundamental aim of this research, we also want to use these new communication media to enhance positive and happy communication through a novel cute filter for co-space communication which helps bring interesting content and increases happiness through humor, unexpected delights and meaningful exchanges. This research will strive towards those aims through a combination of fundamental technology and human computer interaction research.

Feeling communication focuses on emotional communication that can deeply send our feelings and emotions to others. In other words, feeling communication does not only convey raw data or information, but also our deep feelings, intentions, expressions and culture. This will revolutionize the present digital communications and enhance social, business, and entertainment communication.

At the fundamental level, we need to develop new theoretical models of communication that unleash the potential for innovation in co-space communication from physical media through the virtual world. Human communication habits and preferences are continuously changing and evolving. A contemporary model includes the role of media and user context and provides for a model that recognizes the more complex context of the communication process and the possibilities of new media being truly extensions of man. Our model goes beyond this approach and focuses on human emotions, feelings, and nonverbal language as key components in the communication process. Recent studies have helped to illustrate that human senses are more acute and versatile than expected. For example, the studies show subjects using the sense of smell to determine the emotions of another person in much the same way as ants use pheromones[3]. This type of research is just beginning to unfold new mysteries of human perception and mind, which shows the potential for a new and more meaningful sense of presence with these new media technologies. Aside from the need for a new model of communication, we also look to improve the nature of human-to-human communication, particularly through the co-space of physical and virtual world. The highly connected nature of people using the Internet also leads to our disconnectedness in physical social spaces, providing weaker links to general society and in some cases reducing the community and social aspects of life. This research will examine a new trend of applying positive or cute real-time communication filters in co-space communication.

[1] Raskar, R., Welch, G., Cutts, M., Lake, A., Stesin, L., and Fuchs, H. (1998). The office of the future: a unified approach to image-based modeling and spatially immersive displays. In Proceedings of the 25th Annual Conference on Computer Graphics and interactive Techniques SIGGRAPH '98. ACM, New York, NY, 179-188.
[2] J. Cassell and K. R. Thorisson. (1999). The power of a nod and a glance: Envelope vs. emotional feedback in animated conversational agents. Applied Artificial Intelligence, 13(4-5):519-539.
[3] Chen, D. & Haviland-Jones, J. (2000). Human olfactory communication of emotion. Perceptual and Motor Skills, 91, 771-781.
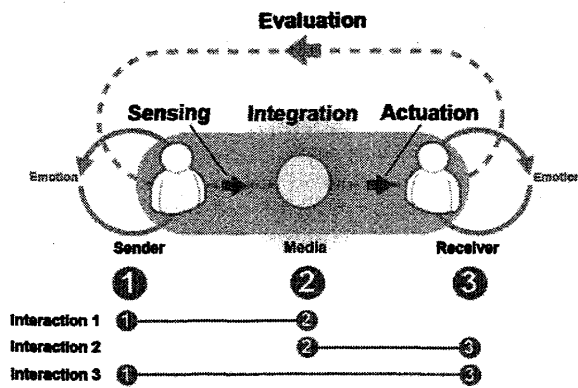
Figure 1: Architecture of our research

In our approach we design four main components in our defined feeling communication as described below and summarized above in Figure 1.

Interaction 1: Sensing – This interaction is between the sender, the sender's environment and the media. The sensors can detect five sensory cues from the sender and her environment. An example is that the various sensors in the smart media can measure the sender's behaviors, intentions, and emotional changes.

Interaction 2: Actuation – This interaction is between the media and the receiver. The actuator can actuate certain sensory cues, which can represent the emotion or feeling of the sender, according the transmitted parameters. Following the example above, the smart media can make various visual, auditory, tangible, smell and taste expressions on it such that the receiver could also understand the meaning of those expressions.

Interaction 3: Integration – This interaction is between the sender and the receiver. This interaction needs the integration of human emotions and various expressions to understand the sender's and receiver's messages and emotional state.

Evaluation: The blurring of the virtual and the real world is a phenomenon of the present day. There are new communication technologies that are now enabled by advances in the sciences and computing which were not possible a decade ago. It is possible to now create situations in which the real world and virtual world can be connected such that new forms of expression and understanding are uncovered. Some communication theory can help to understand this interaction, but this type of large-scale immersion using all five senses simultaneously for remote communication in the shared virtual and physical space has not been explored. We are in the search to evaluate and uncover these connections and provide thought leadership in the understanding of human communication.

To develop such a feeling communication system, there are fundamental, theoretical issues that must be addressed, and a there is a need to refine the theory and provide insightful experimental results, user experience, and usability studies. Hence, the research issues which we will address through a combination of engineering, social science, and human computer interface studies include the following:

Emotional communication using multi-sensory media: In the world of co-space, physical presence takes a major role and it should dive into a new dimension of cutting edge technologies offering improvements to ordinary day-to-day feelings and experiences. We can use new technologies related to multimodal sensing and actuation to give the user more definition in their experience in the co-space environment. Visual, Auditory, Haptic, (Olfactory) Smell, and (Gustatory) Taste are the five sensors that humans use for environmental sensing, and emotional feeling communication. In addition to traditional communication through telephone and videoconferencing, the use of haptics, smell, and taste communication will enable a new paradigm of communication and have great research potential. Research into taste and smell communication has just begun to be explored in the field of human computer interaction.[4] It is a field, which still presents great technical challenges leading to early technical breakthrough results. We will make use of these two senses for feeling communication media in combination with touch, sight, and sound, and enable users to utilize new media for conveying a sense of emotion. Here we identify two main components in taste and smell communication: sensing and actuation.

Positive communication in co-spaces through cuteness: One of the main negative effects that have been seen in virtual and on-line communication is an increase of negative and sometimes even violent or dangerous communication. This could be even more fearsome if in co-spaces the negative effects are transferred from the virtual world to the physical world. To address this issue this research also focuses on providing a communication filtering method that we will improve positive and happy communications among humans in both the real and virtual worlds. This takes advantage of the cuteness factor in designing innovative interactive devices and systems, which we can use to transform user inputs and system inputs into cute outputs in real time. Under this multi-disciplinary methodology, next generation user interfaces can be built to increase happiness and provide more positive experiences in feeling communication. To achieve this our research will proceed to an invention that we term a cute filter, as described below:

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[4] Brewster, S., McGookin, D., and Miller, C. (2006). Olfoto: designing a smell-based interaction. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (Montréal, Québec, Canada, April 22 - 27, 2006). R. Grinter, T. Rodden, P. Aoki, E. Cutrell, R. Jeffries, and G. Olson, Eds. CHI '06. ACM, New York, NY, 653-662.

Cute filter of communication: The shift to user experience design focus emphasizes the importance of aesthetics and form over function. Consider as an example the iMac, which was virtually the same computer as previous versions but with an added stylish cover, which persuaded traditionally non-computer users to buy into the world of computing and hence, sold more units. We propose a series of cute filters that take advantage of the 'cuteness' factor and transform inputs from the user or environment and provide a digitally calculated output, which appeals to the user. Using a cute filter, users can freely choose the cuteness parameters such as color, size, motion, smell, and taste to adjust their desired cute output. The cute filter converts the sensor input and sends it for actuation. We propose five filters, which are based on the five human senses. We aim to decompose each sensory cue (visual, audio, tactile, smell and taste) into individual streams of digital values. Similar to the way in which a sound equalizer adjusts the components of audio, the cute filter can boost the color, texture, shape, taste, smell, or motion in the output via the automatic processing and deliver happiness with individualized precision. Our research seeks to uncover the meaningful aspects of sensory perception, which can be manipulated to increase the cuteness factor. Our vision extends to building novel modules such as tactile sensors and actuators for texture processing. Present research addresses the texture sensing for only a selected amount of textures. But our research will mainly focus on feeling the different kinds of textures. It also widen our research areas in to developing a tactile glow such that when you wear it and use the glow to touch textures, you can feel different touch feelings (ranging from hard and cool, to soft and furry). Such research of texture sensing and actuation presents immense technical challenges, which may include even some degree of bioengineering or a fusion of miniature cameras and pressure sensors for a clearer sensing and actuating. This also broadens our research in to the areas tapping the physiological aspects of the human brain that controls the touch senses of human anatomy, smell and taste. In addition to the challenges presented above, the devices are required to be of high speed in regards to performance especially when combined with cute filtering. Our research on smell and taste filter will develop a real-time cute smell/taste changing device which can be used to create a cute fragrance automatically to replace uncomfortable bad smells. The research will aim to conclude what are "opposite" smells to produce for smell the technique similar to noise cancellation headphones for sound. In the research we will address the taste-reconstructing device which used to reconstruct the perception of a taste by stimulating the taste buds using actuating mechanism. Also we propose empathetic media, using elements of cuteness to appeal and motivate users, present surprising elements, build relationships with them, and leave them with positive feelings.