

Petimo: Sharing Experiences through Physically Extended Social Networking

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Abstract. This paper presents an experience-sharing platform, Petimo, which consists of two modules, Petimo-World and Petimo-Robot. This system extends the traditional social networking concept into the physical world by incorporating a child friendly soft robotic toy for easy and safe social experience. It adds a new physical dimension to social computing and provides extra safety in making friends by physically touching each other's robots. Petimo system can be connected to any social network and it provides safety and security for children. Petimo-World demonstrates many basic features with traditional online social networks in order to share personal experiences. Petimo-World stands out from all other virtual worlds with its interesting and sophisticated interactions such as the visualization of friends' relationships through spatial distribution in the 3D space to clearly understand the closeness of the friendship, personalized avatars and sending of special gifts/emoticons.

1 Introduction

Most of the times people are able to use full range of expressions in face to face communications: language, expressions, gestures, all the senses (hearing, sight, touch, smell, and taste), and interaction with the artifacts and space. However, remote communication has to rely on a more limited range at present: text, sound, image, and video alone or in any combinations [1]. Thus the main motivation of proposed research is to share the experience in remote communication. However, we have a little understanding and knowledge on feeling, emotion, or mood provoked in users, though it is a basic element in the human-mind [6]. The most common definition for Experience is "the knowledge or skill which comes from practice rather than from books or something that happens to one and has an effect on the mind and feelings" as explained [3]. Noticeably, in Japanese culture there is a field of study known as 'Kansei'. It is a process, which expresses the feelings gathered through all the senses (i.e. hearing, sight, touch, smell, and taste). This process has a broad interpretation including sense, sensibility, emotion, feeling, and experience. Furthermore, when developing the prototype system we have incorporated several steps to address the main motivation defined as in Kansei process [4, 5].

In the present society, social networks have become the latest trend for online experience sharing and online communications especially among young children.

Social networks facilitate for making new friends while keeping old friends in close contact as well as for expressing its users themselves or their personal experiences to friends. The users in social networks such as facebook, myspace, and twitter are using one or more means of communication such as texts, images, audios, or videos to communicate their experiences. Especially, with the expansion of digital media, the attraction of teenagers and younger children to social networks and other activities in the cyber-world is growing. Among many of the related issues in current social networking services two main problems have identified to answer through this research.

Firstly, although the social networking services greatly improved during the last couple of years, the traditional methods of using social networking services have not changed. The users still have to use social networking services through either a computer or a mobile phone interface. There have been many researches conducted on the importance of touch for children as well as adults, especially for childhood developments and infants' developments [2, 7]. Because of this reason people are more physically isolated though they have enough tools to connect remotely [8]. The lack of physicality in these modes of communications is one of the main reasons and that is one motivation for this research.

Secondly, cyberspace is increasingly becoming an unsafe and more victimized environment, especially for children [9]. This results in conflicting messages between parent and child, social isolation, cyber connectivity with unknown people with unverified identities. Psychologists have theorized about the meaning of online relationships during adolescence and warned about the dangers of sexually exploitative online relationships [10].

With these motivations we introduced “Petimo”, which is aimed towards providing a novel means of physical interaction to social networks as well as a novel platform for children family interactions. As finer inspirations to the described research theme, Petimo provides an experience communication platform through social networking and physically extending the social networking concepts towards children and family communications. “Petimo” and the “Petimo-World” are two main components in this research where Petimo is a soft robotic companion and Petimo-World is a 3D representation of a virtual world designed for children. Both the Petimo and Petimo-World are influenced by the popular Japanese “Kawaii” (cute) culture [11], as shown in Figure 1. The Petimo-World is a 3D virtual world with added social networking capabilities along with the soft robotic toy named Petimo. Petimo extends the virtual social network into the real world and provides physical interactions and direct communication with the characters in Petimo-World. When children play with their friends using Petimo, the virtual characters in Petimo-World interact with each other accordingly.

This research is also motivated by Japanese “Kawaii” values and aiming for designing an experience-sharing platform with this insight of cuteness. From this perspective, we decided to focus on designing a robot with a warm feeling and a tender image of personality. By using feminine colors and a smooth surface, we aim to reduce mechanical feeling and increase human kind sensation into Petimo robot. With a spherical outer and a curve shaped display, it will be more like a pet, which could play with the children with its lovely cute eyes. In addition, based on Japanese manga (comic) [12] culture, characters are designed with big eyes and egg-shaped

faces that bring a soft feeling to children and the ‘chubby cheeks’ are similar to a baby face [13].

Without limiting to just online interaction, Petimo is expected to further the social interaction into the real physical world by providing such similar features in the typical social networking services. We embed interaction modes such as shaking, touching, squeezing etc. in the robot with the objective of allowing natural human communication through the device. By introducing physical face-to-face friend adding in social networks, it was aimed to provide more close coherence between online and real worlds in addition to providing security. Finally, we believe that this approach will introduce a new paradigm for remote communication by introducing experience communication to the existing social networking concept thus increasing the natural qualities of lives.



Fig. 1. Petimo Robot and Petimo-World

2 Related Works

Modern online social networks have been enhanced with lots of interesting features as the worldwide user attractions are expected to rise boundlessly. MySpace and Facebook can be considered as some of the common online social networks for adults. Safe social networking cannot be expected through these networks, especially for children as they may provide unsafe methodologies in socializing. Conversely, social networks, which are specially designed for children like Hello Kitty Online [15] and Club Penguin [14], could be categorized as similar social networks to Petimo-World. They provide messaging and social networking services like email, emoticons (emotion icons), actions such as waving or dancing, discussion boards, online video sharing etc. This may create certain security lapse for child-safety, especially by exposing children to abuse by strangers. More importantly these are purely virtual worlds that do not have the advantage of having physical interaction and safe friend making features like Petimo.

Poken [16] allows users to connect through a small tangible device in the shape of a palm with four fingers. In this way, users make friends and exchange social information based on the time and place that they meet. While this may be effective for adults to interact and socialize with one another, there are potential problems for young children in using Poken. The physical device itself is relatively small, enclosed in a hard casing. Currently, as the Poken user interface has a quite simple contact adding mechanism, emotional and experience based communication is difficult to

articulate among users. Petimo is designed for children, with a soft, squeezable enclosure, cute design, and color display integrated to allow children to perform bi-directional emotional communication such as sending emoticons and gifts.

Tangible and physical objects have rich affordances which users can learn simply by grasping and manipulating them [17]. Previous generation of children before the explosive growth of computers and the Internet learn by exploring and manipulating physical objects. The power of information and the Internet mean that computers have taken over any other toys or natural physical environment as the tool for learning. It is hard to deny that computer hold immense power for children to learn from it. However, there still exist a gap between the digital computer and the physical world. Learning using the computer as a tool neglects the lessons we can learn from interacting with real physical objects. Therefore, this approach supports traditional exploratory play with physical objects, extend, and enhance by the interactive power of digital technology.

3 System Description

The software architecture of the system is depicted in Figure 2. The Petimo-World client side comprises of two software components, Petimo-World Client and Petimo-Interface Client. Petimo-World Client is an extension to Multiverse Client. Petimo-Interface is the software component that implements the communication between the Petimos. Petimo-Interface connects directly with the Petimo-World server while the communication between two Petimo-World browsers is done through Multiverse online gaming platform. Petimo-World server is a centralized server that stores the data related to Petimo-World users and coordinates the communication in Petimo-World.

3.1 Petimo-World Features

This section presents a detailed technical description of the two levels in the Petimo-World, known as the Macro and Micro worlds. Petimo-World has designed as two levels named macro world and micro world. Macro world has a novel 3D friend list arrangement while micro world is a garden like environment where other friends can visit and play.

As explained, Macro level was developed to provide the user management functionality on the Petimo-World. The main user is represented as a character named Seedar that has a shape very similar to the Petimo robot. The friends are arranged around the seedar in Spherical orbits where the whole set of Seedars are immersed in a pink color galaxy.

When the user logs in to the Petimo-World, he or she is directed to the Macro level. The user's seedar appears on the screen with friends arranged in spherical orbits in the galaxy. The user can navigate through the galaxy and reach the friend seeders. Macro level provides interactions such as visiting a friend's micro level, removing a friend through right clicking on the seedar character.

As the arrangement of the friends in the Macro world is based on the concept of spherical orbits, the Perlin noise [18] based approach was chosen for the algorithmic

base because it renders a more natural arrangement of friends in a spherical orbit. The friends are scattered into spheres based on the grouping created by a grouping algorithm as shown in Figure 3.

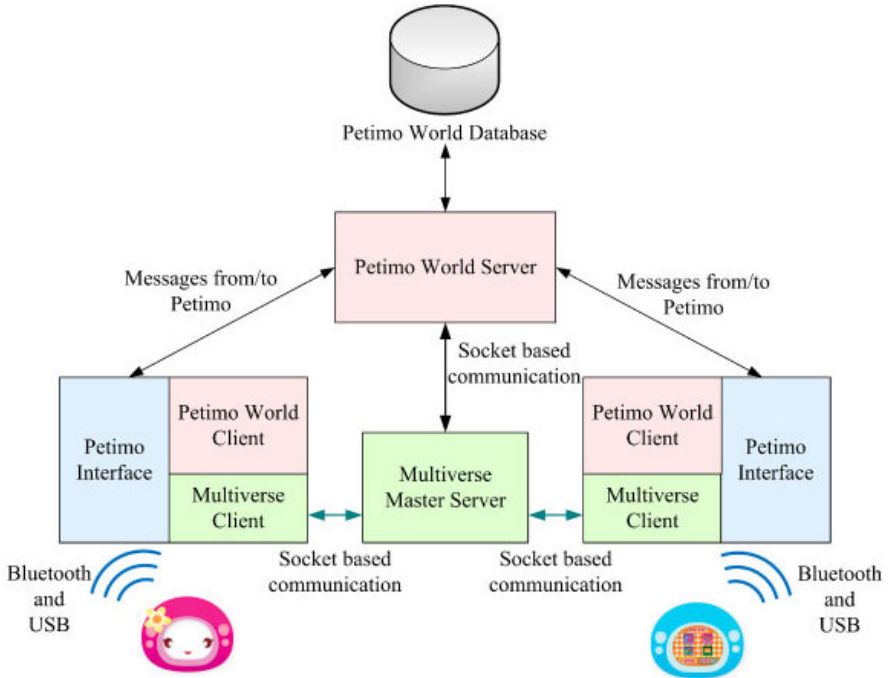


Fig. 2. Software architecture of Petimo

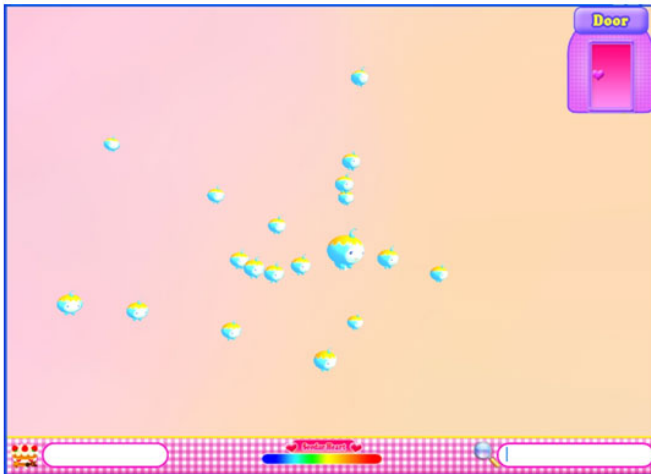


Fig. 3. Spatial arrangement in macro world

By clicking on friends' Petimo characters, users can visit their friends' micro world, which lies below the macro world. Micro world is a garden like environment, as shown in Figure 4, representing the world inside the Petimo planet.



Fig. 4. Overview of micro world

3.2 Petimo-Robot Features

Petimo includes a friend adding function using close proximity radio frequency identification (RFID) technology. As shown in Figure 5 children can add friends by

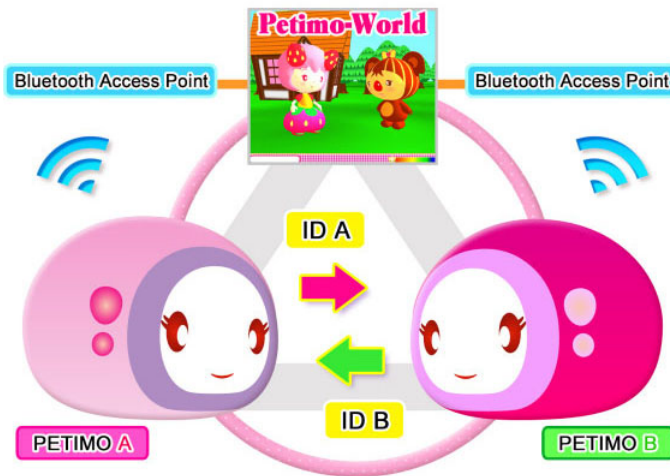


Fig. 5. Friend adding function

activating the “Add Friend” option on the Petimo menu and physically touching their friends' Petimo. This internally results in exchanging of unique 64-bit identification keys between two Petimos and sending this event to the online user verification system for authentication, after which the relationship is created. The user input sensing includes a smooth scrolling enabled resistive touch-sensing pad primarily for child-friendly menu navigation. Pressure activated squeeze areas of the robot surface facilitates exchange of special gifts and emoticons online.

To ensure the rich content and personal experience sharing, a vibrotactile effect generator, sound output module, and a display module have also been used for actuation. A mini, low cost, energy saving color Organic Light Emitting Diode (OLED) [19] display has been used in Petimo as the primary media for interactive feedback as in Figure 6. The unique RFID key exchanging mechanism extends the communication bandwidth comprehensively without additional complexity associated with tangible interfaces.



Fig. 6. Petimo Robots and OLED display (Emoticon and Gift sending)

4 Communication Module

Communication module is the heart of the Petimo platform and the communication module bundled with the Petimo-World. However, it has the ability of performing tasks independently with the Petimo server. This allows Petimo users to use robot and interact with the system without interacting with the Petimo world. The ability to configure more than one communication module in one PC provides the ability to configure several Petimo robots for one user thus to map different characters in virtual world. This module has two sub modules: Robot to PC- and PC to server-communication. Robot to PC communication is implemented through Bluetooth protocol while PC to server communication is implemented through TCP/IP sockets.

5 Conclusion

In this paper, the importance of the multi-sensory communication mediums along with social networking as well as the importance of sharing personal experiences is

considered. We have extensively described Petimo as a revolutionary, interactive, and friendly soft robotic device, extending its capabilities to change social networks fundamentally providing a novel approach for children to make friends easily in a more protected and safe social networking environment. Petimo together with Petimo-World, encourages the building of real social networks through interactions as they interact by squeezing, touching and sending gifts or emoticons to their friends, family, and parents. This will dramatically change the younger generation's tendency of being disconnected from family and loved ones by bridging the gaps of existing social network security issues and acting as a powerful means to support a child's safe path toward a secured and personally enriching social networking experience. The individual concepts gleaned from this can be widely used future works with new interfaces which could not have been imagined before extending its capabilities to fundamentally change social networks and providing a novel approach to helping children make friends easily in a more protected and safe social networking environment.

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