A Shared-Agent System for Encouraging Remote Communication over Three Generations: The First Prototype

Yohei Noguchi University of Tsukuba Tsukuba, Japan noguchi@ftl.iit.tsukuba.ac.jp

ABSTRACT

Generation gaps can hinder communication even within families. Each family member has his/her preferences or styles of communication. We propose a shared-agent system, in which family members share an agent through different interfaces that are designed specifically for each generation. Herein, we describe its basic component and report the current progress in its development.

Keywords

Shared-agent system; remote communication; telepresence; generation gap

1. INTRODUCTION

Nuclear families and one-person household are increasing in some countries (Japan, for example) [1]. The country is also facing the aging society problem, which causes social isolation of the elderly and affects the education of children. This is mainly caused due to the independent living style and generation gaps. Sometimes, face-to-face communication becomes difficult because each generation has his/her preferences or styles of communication. Herein, we define a generation gap as the difference in daily life communication requirements between three generations. The goal of this study is to develop a remote communication system that will help bring family members closer to each other despite the generation gaps.

Telepresence robots have been used in the past to connect dispersed families [2][3]. A two-way telepresence robot system was also proposed for supporting remote teaching between children and senior people [4]. From the viewpoint of an interface for remote communication, these studies successfully demonstrated the possibility of encouraging communication between people with generation gaps. However, these studies dealt with just one or two generations. In order to address the aging society issues, we need to consider more than three generations.

HRI '17 Companion March 06-09, 2017, Vienna, Austria © 2017 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-4885-0/17/03.

DOI: http://dx.doi.org/10.1145/3029798.3038338

Fumihide Tanaka University of Tsukuba Tsukuba, Japan tanaka@iit.tsukuba.ac.jp



Figure 1: Shared-Agent System.

In this study, we propose a shared-agent system that helps build communication within three generations so that each family member can connect with the other members. In this system, an agent is shared by three family members from remote locations. Each member has an access to the agent through a different interface that is designed specifically for each generation (Figure 1).

2. REQUIREMENTS FOR THE SHARED-AGENT SYSTEM

In this section, we define the communication requirements of each generation in a family. Furthermore, we propose the functions and interfaces needed to fulfill their requirements.

2.1 Agent interface for grandparents

In general, social isolation and digital divide are the most serious issues faced by the elderly. The death of intimate people makes elderly people feel lonely. In addition, they are uncomfortable using portable devices for communicating with their family from a remote location.

Considering the abovementioned condition, we hypothesize that grandparents need the physical presence of their family members and are not accustomed to using technological means for communication. In addition, there are studies which demonstrated the effects of robots for senior people [5]. Therefore, it is preferable for an embodiment agent to appear in front of grandparents. Voice recognition and

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

speaking natural languages are required for the agent interface. The agent acts not only as a communication tool but also as their conversation partner by using different robot modes.

2.2 Agent interface for parents

The most important characteristic of the generation of parents who support their families is that they form as the core of the labor force. In fact, the Japanese government is promoting dual-income households [6]. Therefore, the number of dual-income households is expected to increase. Consequently, parents will have even less time to devote to their family. Nevertheless, parents are concerned about their children and their parents.

Thus, the most important communication requirements for this generation are efficiency and ease. Therefore, the proposed shared-agent for parents appears as a chatting bot type agent. It is displayed on their smartphones by installing an application. Parents can obtain information about their family activities through text base interaction with the agent.

2.3 Agent interface for children

Usually parents are busy and many children spend their time playing video games instead of communicating with their parents or playing outdoor games due to security problems. Moreover, in many cases, the children are not mature enough to choose their playing content appropriately. Relationships with other players in internet game playing activities should be formed very carefully. Although the children mainly want to have fun, it is quite important for them to manage themselves. Indeed, this is something they must learn from their parents.

Consequently, it is important that children are supervised during such activities. Therefore, in this case, the agent appears as a virtual agent on the game screen used by the children. The agent acts as a companion for the children by participating in their game and, also notifies the children on receiving voice messages from their parents and grandparents. In addition, it advises children to record their voices to reply to these messages.

3. FIRST PROTOTYPE

In this section, the current development is reported. The function of posting and receiving messages between family members was implemented by building a web server. Thus, an asynchronous interaction within families could be achieved. Figure 2 (left) shows the design of the first prototype. This 3D model was used as a virtual agent for children and the image for the chatting bot for parents. Based on this 3D model, a real robot was constructed Figure 2 (right) for the grandparents. The robot was implemented with a function that would allow it to talk autonomously. Figure 3 shows the example of an interaction that occurred between a chatting bot and parents. Parents can send messages for all family members through the agent. In addition, there are functions for greeting and displaying notifications for received messages.

4. COCLUSIONS

We proposed a shared-agent system for communicating within family members over a remote distance. The agent



Figure 2: (left) The 2D image of the shared-agent (right) First prototype of the shared-agent



Figure 3: The example of an interaction between parent and the agent

interfaces are designed specifically for each generation of the family. There is a need for studying how the agent presence and behaviors affect family communication. Based on the results, we are going to promote the further development and improvement of the system.

Acknowledgments

The work was supported by JSPS KAKENHI Grant Number $15\mathrm{H}01708.$

5. REFERENCES

- [1] Graphical Review of Japanese Household. http://www. mhlw.go.jp/english/database/db-hss/grjh-index.html.
- [2] J. K. Lee, R. L. Toscano, W. D. Stiehl, and C. Breazeal. The design of a semi-autonomous robot avatar for family communication and education. In *RO-MAN 2008-The 17th IEEE International Symposium on Robot and Human Interactive Communication*, pages 166–173. IEEE, 2008.
- [3] BOCCO. http://www.ux-xu.com/product/bocco.
- [4] E. Okamura and F. Tanaka. A pilot study about remote teaching by elderly people to children over a two-way telepresence robot system. In 2016 11th ACM/IEEE International Conference on Human-Robot Interaction (HRI), pages 489–490. IEEE, 2016.
- [5] Y. Iwamura, M. Shiomi, T. Kanda, H. Ishiguro, and N. Hagita. Do elderly people prefer a conversational humanoid as a shopping assistant partner in supermarkets? In 2011 6th ACM/IEEE International Conference on Human-Robot Interaction (HRI), pages 449–457. IEEE, 2011.
- [6] Basic Plan for Gender Equality. http://www.gender.go. jp/english_contents/about_danjo/lbp/basic/index.html.