Chapter 78
VirtualCareGiver:
Personalized Smart Elderly Care

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ABSTRACT

Many care robots have received a lot of attention to help elderly people, however existing care robots have difficult to adapt personalization. For instance, some programmers have to customize robot program to meet needs of individual. In this paper, the authors' goal is design and develop care robot which provides personalization for an individual elderly people with an efficient and reasonable way. Their proposed service consists of three essential components; VirtualCareGiver (VCG), VirtualCarePersonalizer (VCP) and CareTemplate. VCG is a robot agent, which provides a personalization and integration for each elderly people. The VCG is offered care tasks based on care template which VCP generates. VCP provides adaptation for individual elderly on the cloud. The authors also conduct an experimental evaluation to demonstrate the feasibility with actual 11 subjects in a day care center. As a result, both font size and voice volume are especially contributed for the subjects.

DOI: 10.4018/978-1-7998-1754-3.ch078

INTRODUCTION

We are facing a hyper-aging society, and Japan is forecast to become a society with 39.9% of aged people in 2060. In addition to this, many facilities of welfare and nursing care suffer from a chronic shortage of workers. The job opening ratio is as high as 2.68 (as of Dec. 2014). The number of a nursing home is not sufficient for the number of applicants, who are over 524,000 elderly people. Japanese government starts to support and encourage home care rather than building new facilities. To provide the home care, it is important that each family executes the care based on elderly's personality. However, caregivers' burden is still too heavy to provide the personalized care at home. Under these circumstances, the assistive technologies, which support elderly people using technologies, attract great attention.

Care robot is one of the hot assistive technologies to help the independent living for elderly people. Care robot is a robot which aims to support or assist elderly people in his/her daily life. Our research group has also tried to adapt a Virtual Agent (VA) for a care robot. Virtual agent is an animated, human-like graphical chat bot robot program. Using VA would support some simple cares such as greeting with elderly; remind schedules to provide instead of human caregivers. Then, the human caregivers can do tasks, which the caregivers cannot do ever because of the lack of human resources. To provide the care by robots including VA, the robots have to execute tasks based on every elderly's preference. Because the requirement for cares has variety for each elderly people. Hence, using care robot may ease the burden of caregivers, as a result, that provides personalized care for individual elderly at home.

Although, we think that the existing care robots have three problems to adapt for personalization:

Problem P1: Development cost for personalization becomes larger
Problem P2: Adapting the care robot to individual lifestyle is challenging
Problem P3: Deploying a care robot at general home is quite expensive

The problem P1 means that the developer has to develop the personalized care robot in order to adapt for personalization. To adapt to the growing number of elderly people, we have to develop care robots with an efficient way.

Secondly, the P2 reflects that the care robot automatically learns the individual lifestyle is also challenging topic. Moreover, it requires long-term machine learning as well as costly robot operation and maintenance.

The problem P3 represents that the deploying care robot at general home is quite expensive. We think P3 reduces the motivation to use for elderly people.

The above three problems motivated us to develop a next-generation care system, which considers elderly's preference with sympathetic interactions, and flexible personalization.

To actualize the above goal, we consider the personalized care architecture that provides automatically personalization for individual elderly people. Our architecture consists of three components; CareTemplate, VirtualCareGiver, and VirtualCarePersonalizer. CareTemplate is a skeleton of care program that defines what should be executed by the virtual agent. For example, when a care program plays a music, CareTemplate just involves an operation playMusic(). If a program greets to elderly, CareTemplate involves greet(). Then, VirtualCarePersonalizer (VCP) implements an actual care by customizing the CareTemplate based on personal profile and contexts of elderly. For instance, if an elderly likes fork songs, VCP chooses a famous fork song for playMusic().If the elderly has hard of hearing, VCP produces loud and slow voice for greet(). We assume that such personal information is provided by a care