Development of RoboCup@Home Simulation towards Long-term Large Scale HRI

Tetsunari Inamura[1,2], Jeffrey Too Chuan TAN[1], Komei Sugiura[3], Takayuki Nagai[4], and Hiroyuki Okada[5]

[1] National Institute of Informatics, Japan
[2] The Graduate University for Advanced Studies, Japan
[3] National Institute of Information and Communication Technology, Japan
[4] The Univ. of Electro-communications, Japan
[5] Tmagawa Univ., Japan

Abstract. Research on high level human-robot interaction systems that aims skill acquisition, concept learning, modification of dialogue strategy and so on requires large-scaled experience database based on social and embodied interaction experiments. However, if we use real robot systems, costs for development of robots and performing many experiments will be too huge. If we choose virtual robot simulator, limitation arises on embodied interaction between virtual robots and real users. We thus propose an enhanced robot simulator that enables multiuser to connect to central simulation world, and enables users to join the virtual world through immersive user interface. As an example task, we propose an application to RoboCup@Home tasks. In this paper we explain configuration of our simulator platform and feasibility of the system in RoboCup@Home.

1 Introduction

An important task in the field of human-robot interaction (HRI) is elucidating the mechanisms of social and physical interactions and then embodying them into the design of robots. Completing this task requires the evaluation and modification of a hypothetical interaction model based on long-term and large-scale social interaction between people and robots. However, conventional HRI experiments are limited due to their laboratory setting, while large-scale experiments are quite costly in terms of people and time, especially if the aim of HRI is learning from demonstration or instruction such as was investigated by Sugiura et al. [1].

One of the purposes of the RoboCup@Home laps over the above goal. Typical tasks in the competition are designed on the basis of the assumption that robots must possess advanced social and embodied interaction functions. However, due to huge cost of developing robot hardware and executing experiments, benchmark tasks tend to focus on basic recognition functions and physical functions such as grasping, navigation, object recognition, and face recognition. The RoboCup@Home tasks are performed in a kitchen or living room environment, where a higher level of natural interaction is required. Such interaction includes