Integrating multiple dialogue agents using WebRTC for facilitating elderly mutual-aid at home

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Purpose As the number of older people undergoing in-home long-term care increases due to the aging population worldwide, creating a novel communication between the elderly in different houses (called mutual-aid) has become a significant challenge to reduce the burden on family caregivers. From traditional Internet of Things (IoT) and Internet Communication Technology (ICT) to Artificial Intelligence (AI), although they have been progressing rapidly in smart homes and healthcare, there are still many technical tasks to truly realize the elderly mutual-aid at home, such as system operability, acceptability, and affordability. Our interest is to regard the spoken dialogue agent (an animated chat-bot program with voice interactions) as a virtual caregiver, to make full use of it on a general-purpose computer to study the assistive technology for older people at home. This study aims to implement an operable and acceptable agent-based communication system that facilitates mutual aid for older people at home. **Method** Figure 1 shows the system architecture based on the agent communications. Our key idea is to integrate multiple dialogue agents using Web Real-Time Communication (WebRTC) technology. The proposed system allows one older person to video call another specific older person by voice interaction with the dialogue agent. The proposed system consists of the following five services, and the key steps include (S4) and (S5) with WebRTC technology. More specifically, (S1) Agent-ID Management Service: Managing relationships between different agent IDs, such as friends or family, while ensuring each agent has only one unique ID. (S2) Video-Call Dialogue Scenario: Embedding video calls into the scenario script of the dialogue agent and allowing older people to call Video-Call Service with personalized specific voices. (S3) Video-Call Book Service: Allowing older people to add or remove contacts for video-call service by voice interaction with dialogue agent using agent-ID (see S1). (S4) Chat Room Application Programming Interface (API): Extending a Chat Room API that transfers video and audio streams from the partner for embedding dialogue scenarios using WebRTC. (S5) Chat Room Management Service: Monitoring the activity status (i.e., call free, on a call, or offline) of every agent-ID. **Results and Discussion** As preliminary studies, we presented our latest technologies for designing an elderly virtual caregiver (Chen et al., 2021) and the microservice execution framework (Ozono et al., 2021). We are currently implementing the agent-based communication system and planning to conduct an experimental evaluation with multiple elderly subjects from viewpoints of operability and acceptability. In the beginning findings, elderly subjects need time to get used to the dialogue agent different from the existing phones or smart speakers. Meanwhile, to encourage the elderly to join the dialogue agent, specific personal habits (e.g., favorite foods, someone often kept in touch with) should be collected as behavior inducements. In future work, we will introduce the dialogue agent to the welfare facility or hospital to build and extend the lightweight and convenient remote nursing care networks for individual elders at home.

References

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Keywords: in-home long-term care, spoken dialogue agent, virtual caregiver, WebRTC, mutual aid
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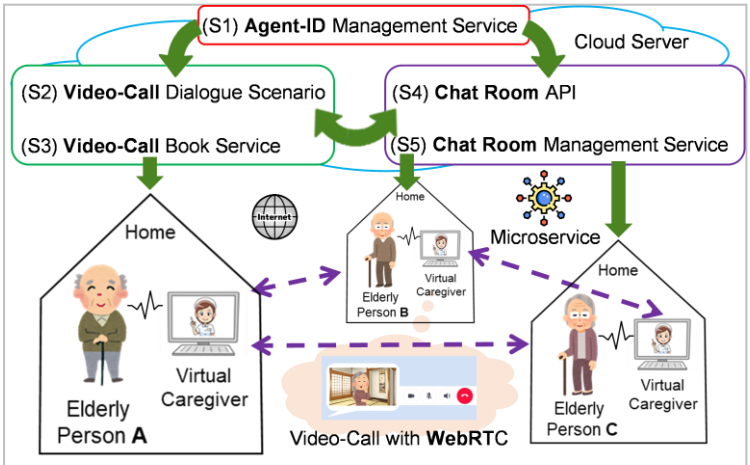

Figure 1: System Architecture Based on the Agent Communications