An Artificial-Intelligence Agent Framework for Intelligent Livingcare Services at Smart Home

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***Abstract*—This paper proposes an Artificial-Intelligence (AI) agent framework for intelligent livingcare services at smart home. An AI agent is an intelligent autonomous software system that has capabilities of sensing, inferencing, and action for humans. This AI agent assists in livingcare for all people including elderly people and disabled people in our living environments like smart home. This paper suggests a software framework and interfaces to construct an intelligent and autonomous system that can interact with human users in human languages and actively work for them by sensing their living environments and monitoring their health conditions.**

I. Introduction

Recently, Agentic Artificial Intelligence (AI) has opened a phase in the AI era in our lives, especially livingcare at smart home [1]. The agentic AI provides human users with various intelligent services through AI agents. An AI agent consists of a perception function, reasoning function, and action function. The perception function collects sensing data from various sensors. The reasoning function performs inference from the sensing data for classification, regression, and clustering. The action function performs an appropriate action based on the inference to satisfy a user's intent.

This papers proposes a software framework for an AI agent framework for intelligent livingcare at smart home. This framework is an intent-driven autonomous system to perform a user's intent through intent translation and closed-loop intent control for human users. This AI agent framework consists of a manager agent (e.g., edge computing device) and worker agents. These agents are AI agents that communicate with each other via Agent-to-Agent (A2A) protocol [2] and collaborate with each other for a given user intent. Worker agents include Internet-of-Things (IoT) devices (e.g., appliances), robots, and humanoids. Each worker agent contains Service Functions (SFs) such as a perception function, reasoning function, and action function. Such SFs can be constructed by containers that can be managed by Kubernetes [3].

II. AI Agent Framework for Intelligent Livingcare

For intelligent livingcare services, an AI agent framework includes a Manager Agent and multiple Worker Agents. Fig. 1 shows an AI Agent Framework for Intelligent Livingcare Services at Smart Home. The Manager Agent consists of Manager Controller (as an orchestrator for the AI Agent Framework), Knowledge Graph (as a repository for AI management and orchestration), Manager Analyzer (as an analyzer for worker agents), and Manager Management System (as a vendor system to provide cloud-native containers to worker agents). A Worker Agent consists of Worker Controller (as a manager for the worker agent), Worker Analyzer (as an analyzer for containers), Worker Management System (as a vendor system to manage containers for SFs within the worker agent), and SFs such as perception, reasoning and action functions.

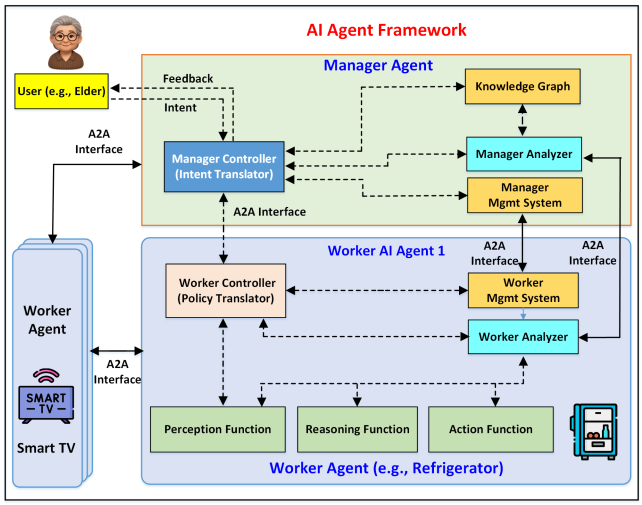

Fig. 1. AI Agent Framework for Intelligent Livingcare Services

A User (e.g., elder) gives her intent in a natural language to the AI Manager. An Intent Translator in the Manager Controller translates the intent into a high-level policy with a Large Language Model (LLM) and the Knowledge Graph. It delivers the high-level policy to an appropriate Worker Agent via A2A Protocol [2]. A Policy Translator in the Worker Agent translates the high-level policy into a low-level policy and delivers it to SFs to perform the intended task.

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