Short Research on Voice Control System Based on Artificial Intelligence Assistant

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Abstract—**This paper proposes a voice control system based on artificial intelligence (AI) assistant. The AI assistant system using Google Assistant, a representative service of open API artificial intelligence, and the conditional auto-run system, IFTTT(IF This, Then That) was designed. It cost-effectively implemented the system using Raspberry Pi, voice recognition module, and open software. The proposed system is expected to be applied to various control systems based on voice recognition.**

Keywords—Artificial Intelligence (AI); Raspberry Pi; Voice control; Google Assistant; IFTTT

I. INTRODUCTION

Conventional interfaces involve text or touch inputs. Users can save costs when using voice recognition (speech recognition) technology as it provides services quickly through an efficient interface without requiring many peripheral devices. Additionally, it increases user convenience with a simple interface through voice interaction between the user and device.

Currently, voice recognition technology is rapidly changing and continues to be applied to daily-use products. A device that supports voice recognition technology is required to use it. This paper proposes a voice control system using Raspberry Pi and open API artificial intelligence (AI) [1, 2].

II. RELATED WORKS

Voice recognition system provides a variety of services through natural language processing using artificial intelligence systems equipped through the user's voice commands. The system is divided into platform-management type and open API type artificial intelligences according to the method of artificial intelligence system. Platform-management type artificial intelligence is capable of detailed operation, but it is not possible to use services on other platforms as it is dependent on a certain platform. For open API type artificial intelligence, it is possible to use services on other platforms [3].

The representative systems developed in relation to speech recognition technology are Google Home, Amazon Echo, and Apple HomePod [4-6]. Once a user sends a voice command, artificial intelligence processes each signal into text, converts the data processed into speech after returning it, and passes it to the output device. Figure 1 shows the flow of data delivery through Amazon Echo [5]. Users must purchase Amazon Echo Dot products in order to use the voice recognition system.
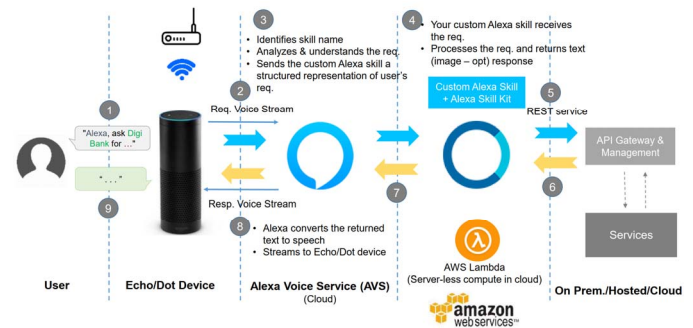

Fig. 1. Amazon voice service architecture

III. PROPOSED VOICE CONTROL SYSTEM BASE ON ARTIFICIAL INTELLIGENCE ASSISTANT

In this paper, a voice control system using Google Assistant, a representative service of open API artificial intelligence, and the conditional auto-run system, IFTTT (IF This, Then That) was designed. IFTTT is a system that connects all apps with devices [7]. It is designed to recognize voices using Google Assistant and handle voice commands via the IFTTT platform.

Voice recognition API is a HTTP-based REST API interface that supports input and output based on the JSON (JavaScript Object Notation) format. To use the voice recognition API, audio files recorded at a sampling frequency of 16 kHz must be encoded into Base64 and delivered to the open API server via HTTP communication [2].

In this paper, Google Assistant was used as the Open API. Users use the Google Assistant service to send voice commands. Voice data sent to Google server are converted to text after being recognized; the data are subsequently sent to the conditional auto-run mode IFTTT service. For IFTTT, one recipe performs one operation. One Recipe created by Trigger and Action sends a PUT request in JSON format to the API

server, which has already been set by itself through Webhooks. The API server exchanges data via WLAN communication and Raspberry Pi. The received PUT request updates the PIN status associated with Raspberry Pi. Figure 2 shows the structure of the voice control system proposed in this paper.
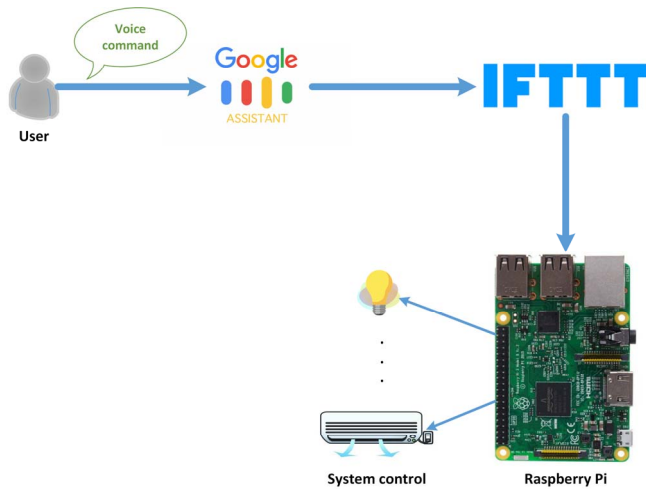

Fig. 2. Proposed voice control system structure

IV. CONCLUSION

In this study, the design of a voice control system using embedded systems and open API AIs is detailed. The proposed system is a voice command system that operates modules, such as a relay module, through a user's voice commands. It cost-effectively implemented the system using Raspberry Pi, modules, and open software. This system allows users to implement their own system through the advantageous voice recognition interface and various modules. The proposed system is expected to affect the development of the voice control AI market and related systems.

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