WEILA

Kitchen AI Assistant Smart Appliance

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Kitchen AI Assistant Smart Appliance Solution

1. Solution Overview

The Kitchen AI Assistant Smart Appliance Solution is built around WKV553 Wi-Fi 6 module, powered by GigaDevice GD32VW553 chipset as its hardware control core. Leveraging its built-in RISC-V processor, the module handles local signal transmission, peripheral control, and hardware coordination. The device connects to the Baidu AI Cloud Large Language Model via Wi-Fi, uploads users' voice commands for cloud-based semantic analysis and intent recognition, and receives intelligent control instructions in real time. This enables natural voice interactions such as recipe guidance, cooking timers, and appliance control, creating a hands-free intelligent cooking assistant.

1.1 Core Hardware Platform: WKV553-A IoT Wireless Module

A. Powered by the GigaDevice GD32VW553 MCU with an integrated RISC-V processor, providing independent local signal processing, peripheral control, and hardware coordination.
B. Integrates Wi-Fi 6 + Bluetooth 5.2 dual-mode wireless connectivity, serving as the complete communication foundation of the device.
C. Supports local signal acquisition, voice data transmission, and kitchen appliance I/O control.

D. Enables fast Bluetooth provisioning and stable high-speed Wi-Fi connectivity, ensuring reliable performance in kitchens with multiple electronic appliances and wireless interference.
E. Offers rich hardware interfaces including GPIO, UART, and I²C, making it compatible with most appliance control boards and enabling rapid secondary development.

1.2 Cloud AI Computing Platform: Baidu AI Cloud Large Language Model

A. Powered by Baidu AI Cloud, optimized specifically for intelligent kitchen applications, providing end-to-end AI voice and semantic services.
B. Supports cloud-based 3A voice processing (Acoustic Echo Cancellation, Noise Suppression, and Automatic Gain Control) with support for Mandarin and multiple Chinese dialects.
C. Features a cooking-oriented Natural Language Understanding (NLU) engine capable of multi-intent recognition, comprehensive Chinese recipe knowledge, cooking logic reasoning, and multi-turn conversations.
D. Supports cloud command delivery, remote device status synchronization, and cloud-based storage of user cooking preferences.

1.3 Solution Architecture

This solution adopts a domestic wireless hardware module + cloud AI collaborative architecture.

The WKV553-A Wi-Fi 6 module, built on the GigaDevice GD32VW553 chipset, serves as the local hardware processing core, while the Baidu AI

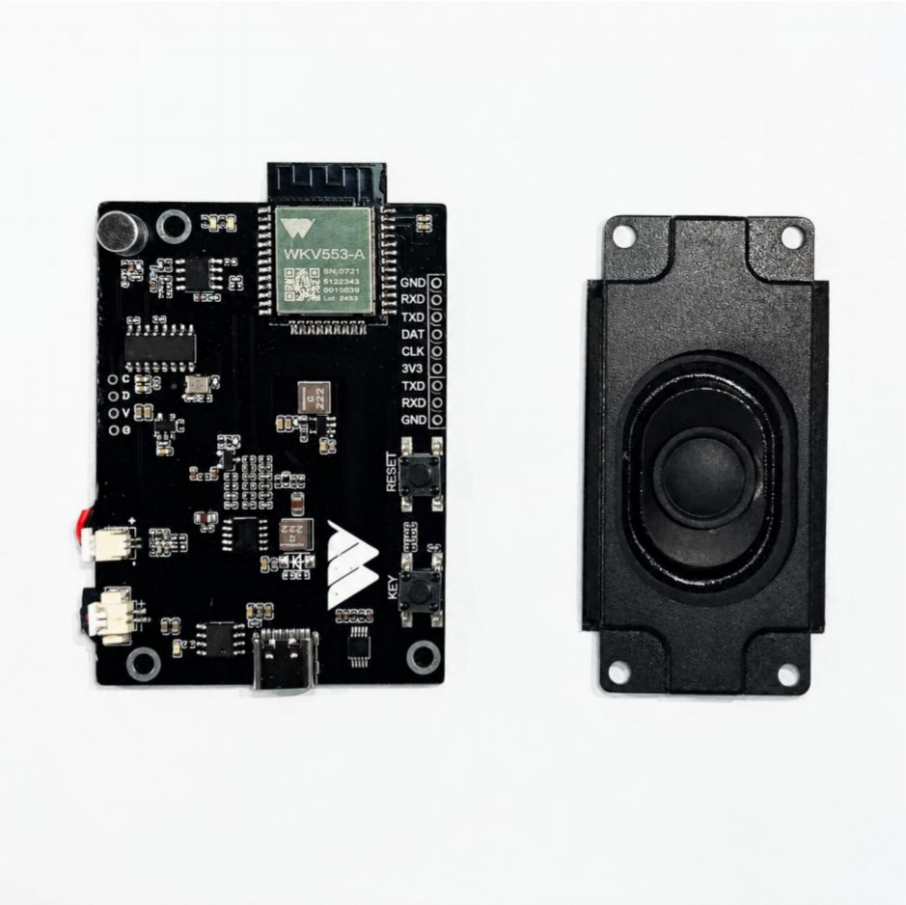
Cloud Large Language Model provides powerful cloud-based AI computing capabilities.

During operation, the module captures users' voice commands in real time and transmits them securely to the cloud. The cloud AI performs multi-intent semantic understanding and cooking scenario analysis, then returns intelligent control instructions to the local module for execution.

The solution supports a complete voice interaction workflow, including:

- Voice-guided recipe instructions
- Intelligent cooking timers and reminders
- Kitchen appliance control
- Multi-turn conversational interaction
- Personalized cooking assistance

By eliminating the need for manual operation throughout the cooking process, the solution addresses common challenges such as occupied hands, complicated appliance operation, and limited voice command capabilities, delivering a lightweight yet powerful AI-powered cooking assistant for modern smart kitchen appliances.



2. Key Functional Modules

2.1 Core Hardware Platform: WKV553-A IoT Wireless Module

The AI Kitchen Assistant provides intelligent voice-guided cooking support throughout the entire cooking process.

Key Features

- Instantly access recipes by voice, including everyday meals, healthy recipes, baking, soups, and more.
- Step-by-step voice guidance covering cooking procedures, ingredient quantities, cooking temperatures, and timing.

- Real-time cooking assistance by answering questions such as ingredient substitutions, odor removal techniques, seasoning suggestions, and heat adjustments.
- Recommend personalized recipes based on available ingredients and users' cooking preferences.

2.2 Dual Control via Voice and Mobile App

The solution supports both hands-free voice interaction and mobile application control, providing flexible operation whether users are at home or away.

Voice Control

Users can control kitchen appliances without touching any buttons, making cooking cleaner and more convenient when hands are occupied.

Supported voice commands include:

- Power on/off appliances
- Adjust cooking temperature or heating level
- Set cooking timers and countdowns
- Start self-cleaning functions
- Control coordinated appliance scenarios such as range hood and cooktop linkage

Mobile App Control

The companion mobile application enables remote management of connected kitchen appliances.

Users can:

· Preheat ovens remotely
· Schedule rice cooking or other cooking tasks
· Monitor appliance operating status
· View cooking history
· Manage timers and scheduled operations

Cloud synchronization keeps voice commands, app settings, and appliance status updated in real time across all devices.

2.3 Multi-Intent AI Task Recognition

Unlike conventional smart kitchen appliances that process only one command at a time, the AI Kitchen Assistant supports multi-intent voice understanding, allowing users to issue several requests naturally in a single sentence.

The cloud AI automatically identifies multiple intentions, separates them into independent tasks, and executes them simultaneously.

Example Commands

"Kitchen Assistant, turn on the steam oven, set it to 180°C for 20 minutes, and show me a steamed fish recipe."
"Turn off the stove, set a 30-minute timer, and recommend some healthy recipes for children."
The cloud AI intelligently decomposes these requests into multiple parallel tasks, including:
· Appliance control
· Timer management
· Recipe retrieval

The corresponding commands are then delivered simultaneously to the WKV553 module, significantly improving interaction efficiency and creating a more natural cooking experience.

2.4 Low-Latency, Multilingual Voice Interaction

Fast Response

The end-to-end voice interaction latency is as low as 1.3 seconds, providing smooth and responsive AI conversations during cooking.

Multilingual Support

Designed for global deployment, the solution supports multiple languages and regional dialects.

Currently Supported Languages

- Chinese
- English
- Japanese
- Korean
- Spanish
- Russian
- Vietnamese
- German
- French
- Arabic

Languages Planned for Future Releases

- Thai
- Hindi
- Indonesian

· Malay

3. Key Advantages

The most significant innovation of this solution lies in combining the WKV553-A Wi-Fi 6 & Bluetooth 5.2 wireless module with the Baidu AI Cloud Large Language Model, enabling both voice control and mobile app control for traditional kitchen appliances. This dual-control architecture fundamentally transforms how users interact with kitchen devices.

3.1 High-Performance RISC-V Architecture

The WKV553-A module is powered by the native RISC-V processor, providing reliable local processing for signal transmission, peripheral control, and appliance interaction.

Key Benefits

· Independent local processing for low-latency hardware control
· Fast response without relying on continuous cloud processing
· Stable domestic chipset supply with cost-effective deployment
· Ideal for next-generation smart home appliance development

3.2 Wi-Fi 6 Connectivity with Cloud AI Intelligence

The solution utilizes Wi-Fi 6 for faster wireless communication and improved network stability, even in kitchens with multiple connected appliances.

By integrating with the Baidu AI Cloud Large Language Model, users can issue complex voice commands that include multiple intentions within a single sentence.

For example:

"Show me a steamed fish recipe, set a 20-minute timer, and turn on the steam oven."

The AI automatically understands and executes all requested tasks simultaneously.

3.3 Hands-Free Cooking Experience

Designed specifically for real kitchen environments, the solution enables completely hands-free operation when users are cooking.

Users can:

- Access recipes by voice
- Control appliances without touching buttons
- Set timers while preparing food
- Adjust cooking parameters through natural conversation
- Operate devices even when hands are wet or oily

This intuitive interaction makes the system suitable for experienced cooks, beginners, and elderly users alike.

3.4 Hands-Free Cooking Experience

The solution adopts a layered architecture that separates hardware control from cloud AI processing.

The WKV553-A module handles local device communication and peripheral control.
The Baidu AI Cloud performs speech recognition, semantic understanding, and intelligent decision-making.

This architecture provides:

- Standardized hardware interfaces
- Open cloud APIs
- Simplified integration
- Faster product development
- Flexible expansion to additional appliance categories

The same platform can be easily extended to support:

- Range hoods
- Gas stoves
- Steam ovens
- Air fryers
- Blenders
- Other smart kitchen appliances

4. Conclusion

The Kitchen AI Assistant Solution is built around the WKV553-A Wi-Fi 6 wireless module, powered by the GigaDevice GD32VW553 chipset. By combining a high-performance RISC-V-based wireless platform with the Baidu AI Cloud Large Language Model, the solution delivers an integrated AI platform for next-generation smart kitchen appliances.

Compared with conventional smart kitchen solutions, it provides significant improvements in intelligent voice interaction, multi-intent command recognition, AI-powered cooking assistance, and reliable domestic hardware integration. Manufacturers can accelerate product development while reducing implementation costs and delivering a smarter, more natural cooking experience.

As consumer demand for intelligent kitchen appliances continues to grow, the industry is evolving from feature-driven products to experience-driven

innovation. With advanced AI capabilities, cloud connectivity, and scenario-based interaction, this solution enables appliance manufacturers to differentiate their products, shorten time-to-market, and unlock new opportunities in the rapidly expanding smart kitchen ecosystem.