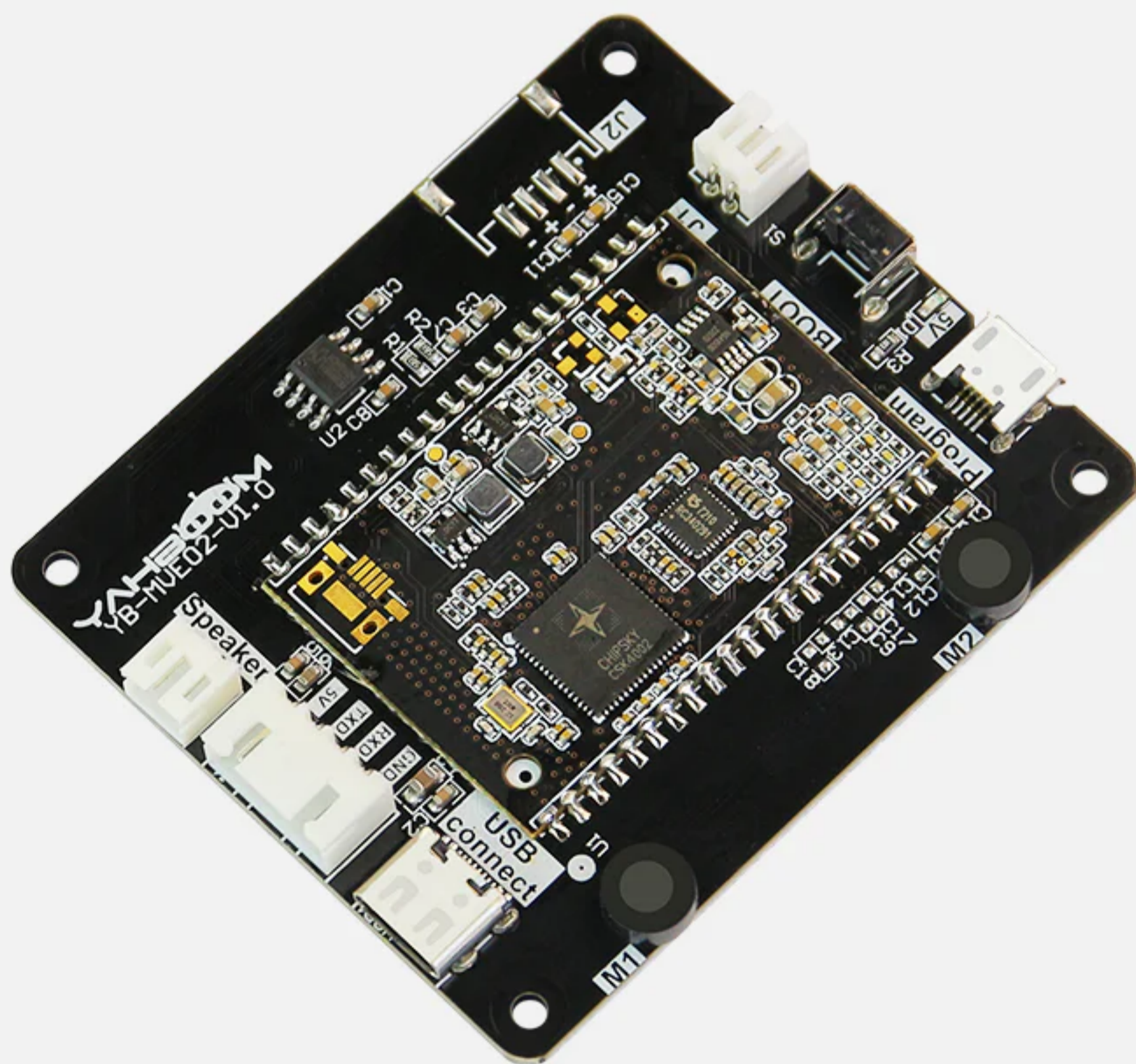


# Intelligent voice interaction module





Far field pickup



Echo cancellation



Noise reduction



Multiple  
usage scenarios



Voice recognition  
& broadcast



Offline recognition



85 command words



128GTOPS voice  
computing power



Support ROS1/ROS2



Support Linux



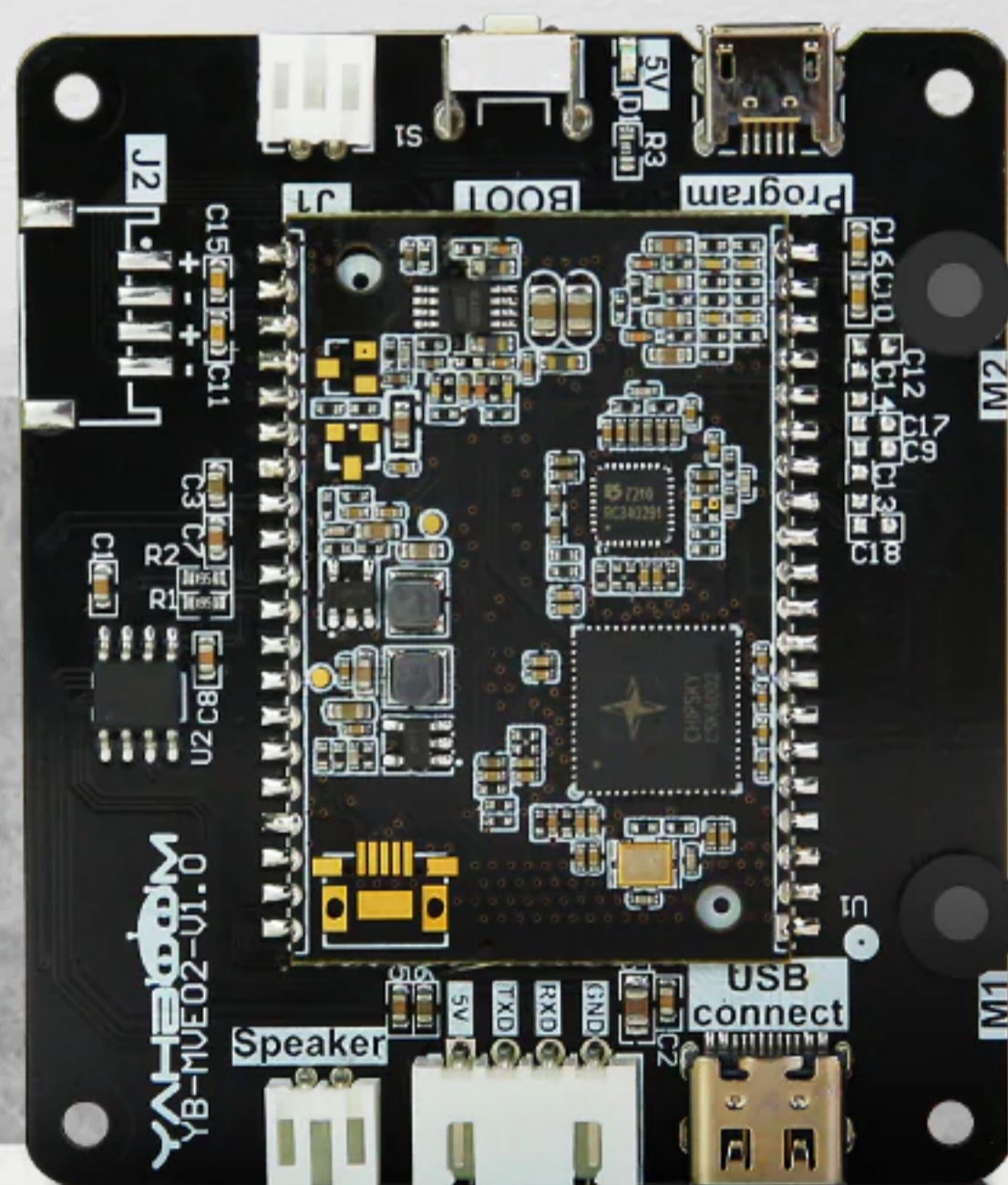
USB serial  
communication



Professional  
technical support

# Product introduction

This high-performance voice interaction module has built-in speech recognition algorithm and pronunciation vocals. Developed based on the CSK4002 chip, it has the characteristics of high performance, strong computing power, low power consumption, and abundant resources. It can be used with a variety of robots to complete functions related to voice interaction, or be applied to scenarios such as smart homes. The voice interaction module supports a variety of neural networks and vector operations, with speech recognition computing power up to 128GTOPS, and has functions such as far-field pickup, echo cancellation, voice broadcast, offline commands, and noise reduction.



# Support ROS1 and ROS2

It is fully compatible with ROS and ROS2 systems and provides SDKs for two systems, and relevant data and technical support will be provided.



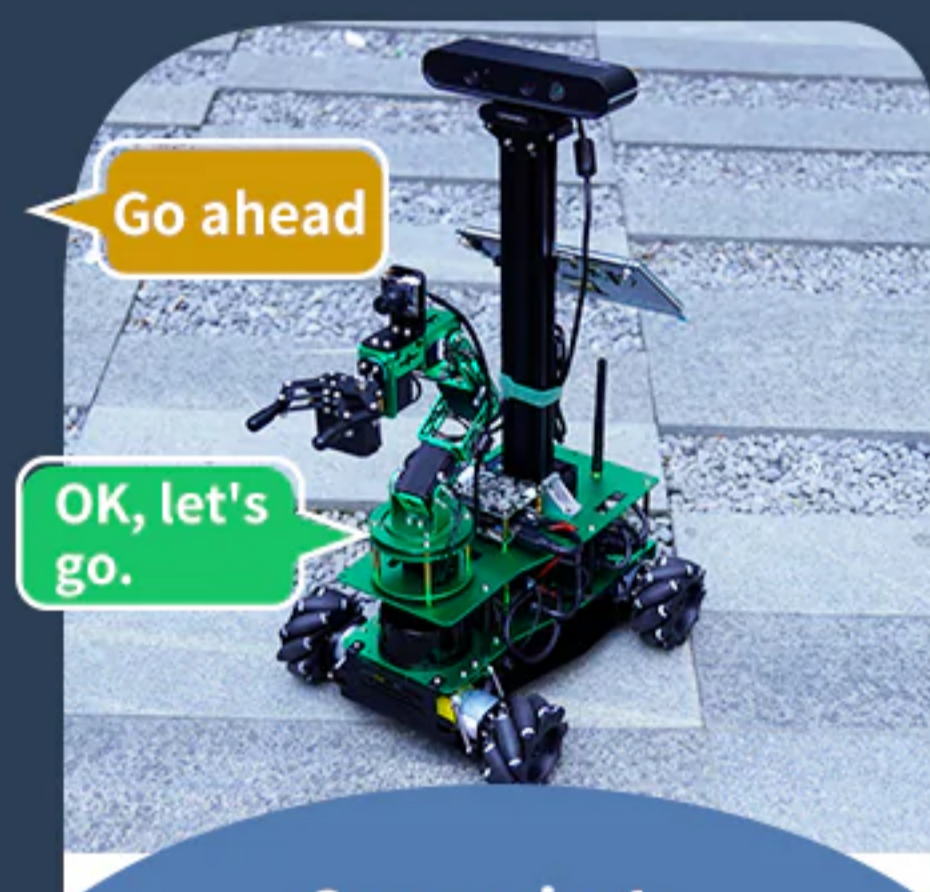
# Intelligent identification & simple operation

The voice interaction module is equipped with an professional voice chip, supports 85 offline voice commands, no need programming, easy to use. It can obtain the identification result through the serial port.



# Instruction words cover multiple product scenarios

Instruction words and voice reply words are in the module offline library



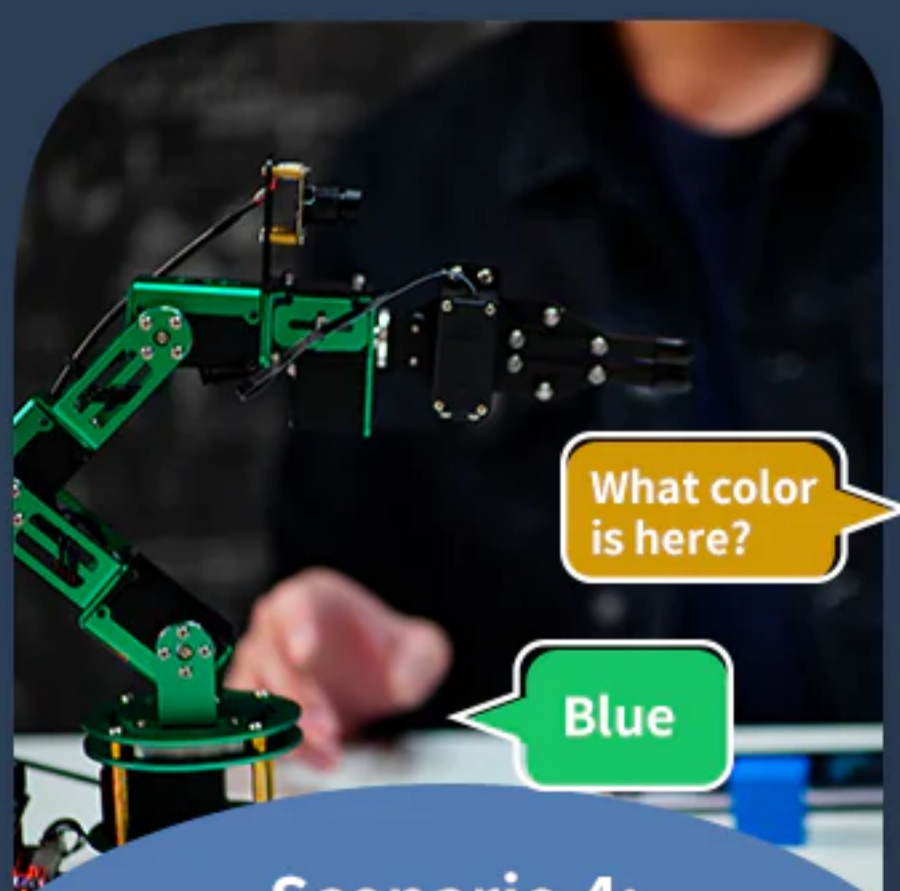
**Scenario 1:**  
Control the movement  
of robot car



**Scenario 2:**  
Voice navigation



**Scenario 3:**  
Smart Home



**Scenario 4:**  
Color block sorting  
and stacking

# Support 85 voice commands recognition

Robot voice interaction covering multiple scenarios

## Garbage sorting broadcast

What garbage is this?

This is a fish bone, which is wet waste

## Voice control robotic arm function

Action A

OK

## Voice navigation

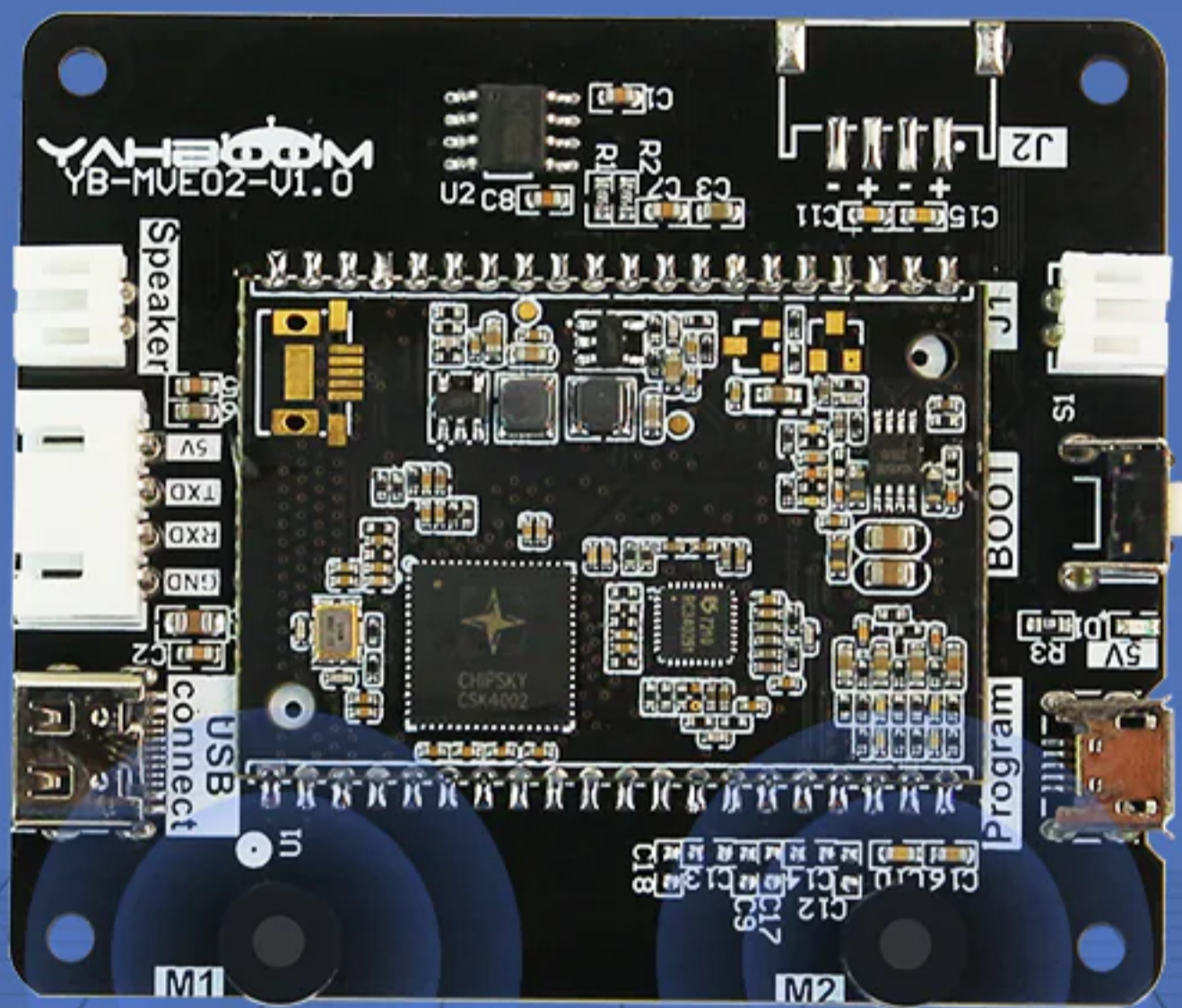
Go to the point A

OK, I'm going to the point A.

The above cases need to be matched with robots, they cannot be realized by separate voice modules

# voice interaction module

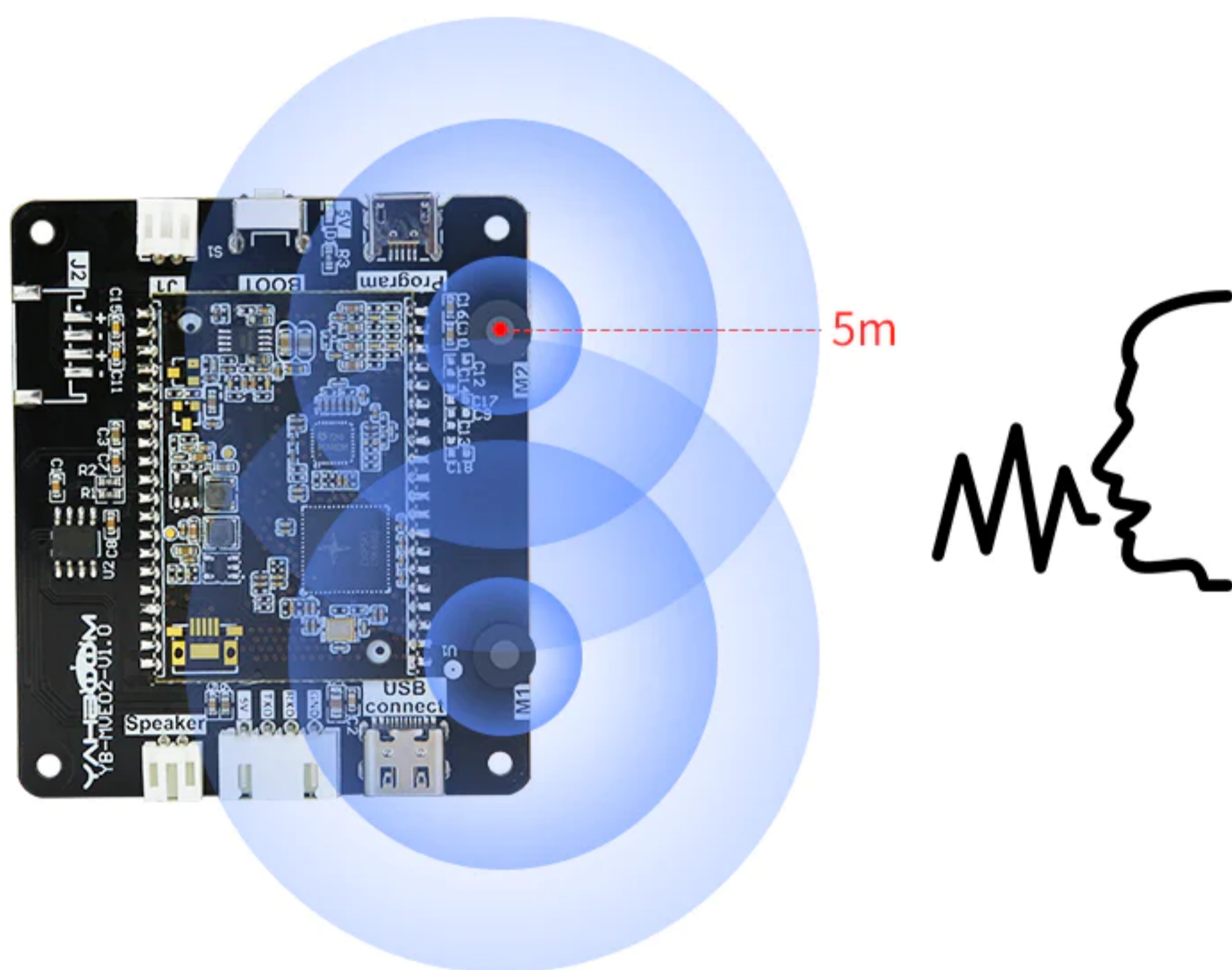
CSK4002 is an AI SoC with high performance, strong computing power, low power consumption and rich resources developed and designed for the AIoT field. It adopts the Andes D1088 core, and its AI/DSP acceleration module MVA supports a variety of Neural Network operators and vector operations. Adapted to AI algorithms, the computing power can reach 128GTOPS, the comprehensive wake-up rate after testing in various environments is 95%, and the comprehensive recognition rate is 93%.



Environmental noise	Noise index	Distance (m)	Wake rate (%)	Recognition rate (%)
Quiet	Environment: 40±5dB Voices: 65±5dB	1	97	95
		3	96	95
		5	95	94
Noise	Environment: 55±5dB Voices: 65±5dB	1	95	94
		3	94	93
		5	93	92

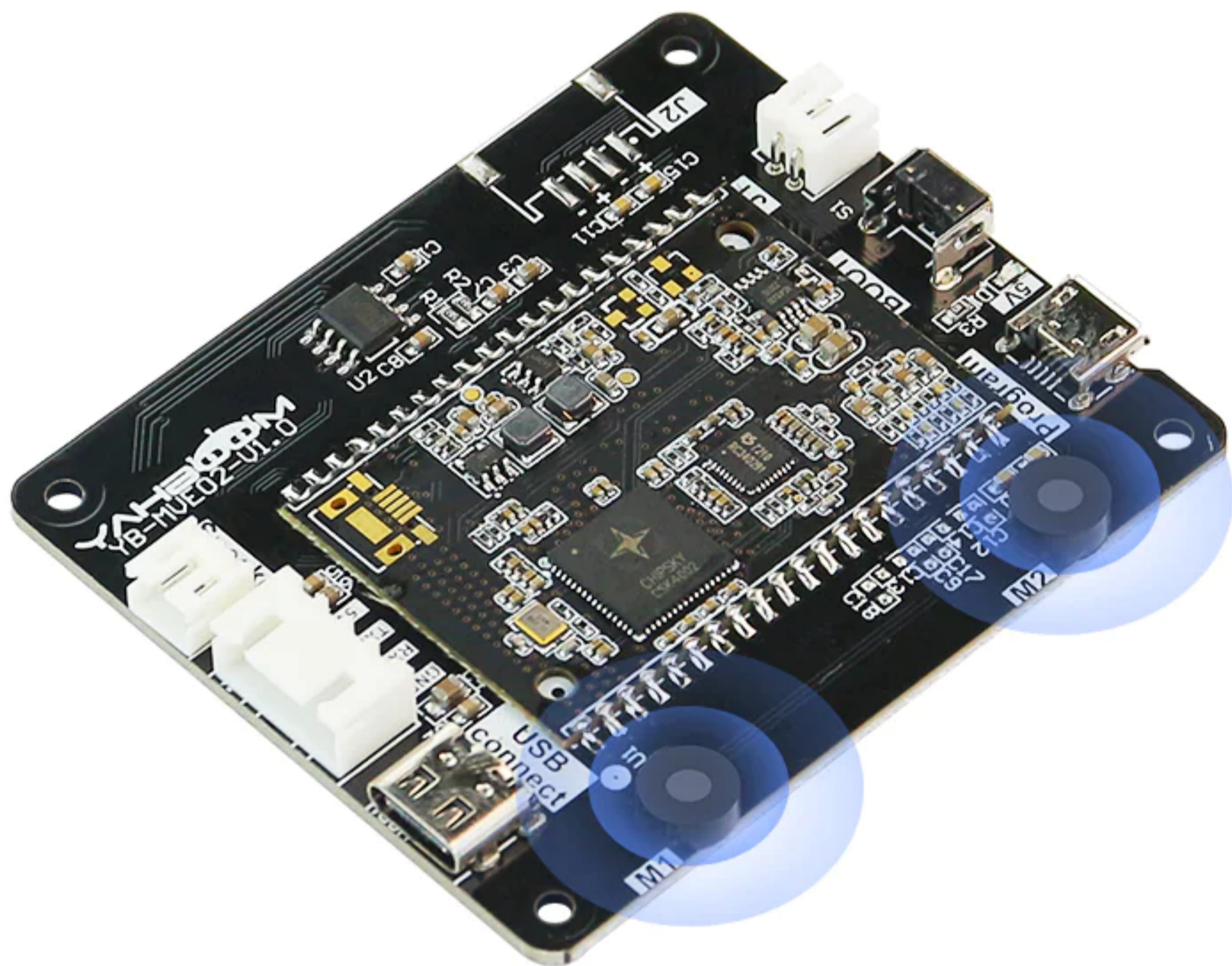
# 360° far-field user pickup

The front end of the voice module adopts a dual-microphone array algorithm, which can realize the user's voice pickup within 5m of the 360° far field. Equipped with automatic vocal gain, which can be adjusted according to the user's volume to ensure that the overall sound of the audio after noise reduction is consistent.



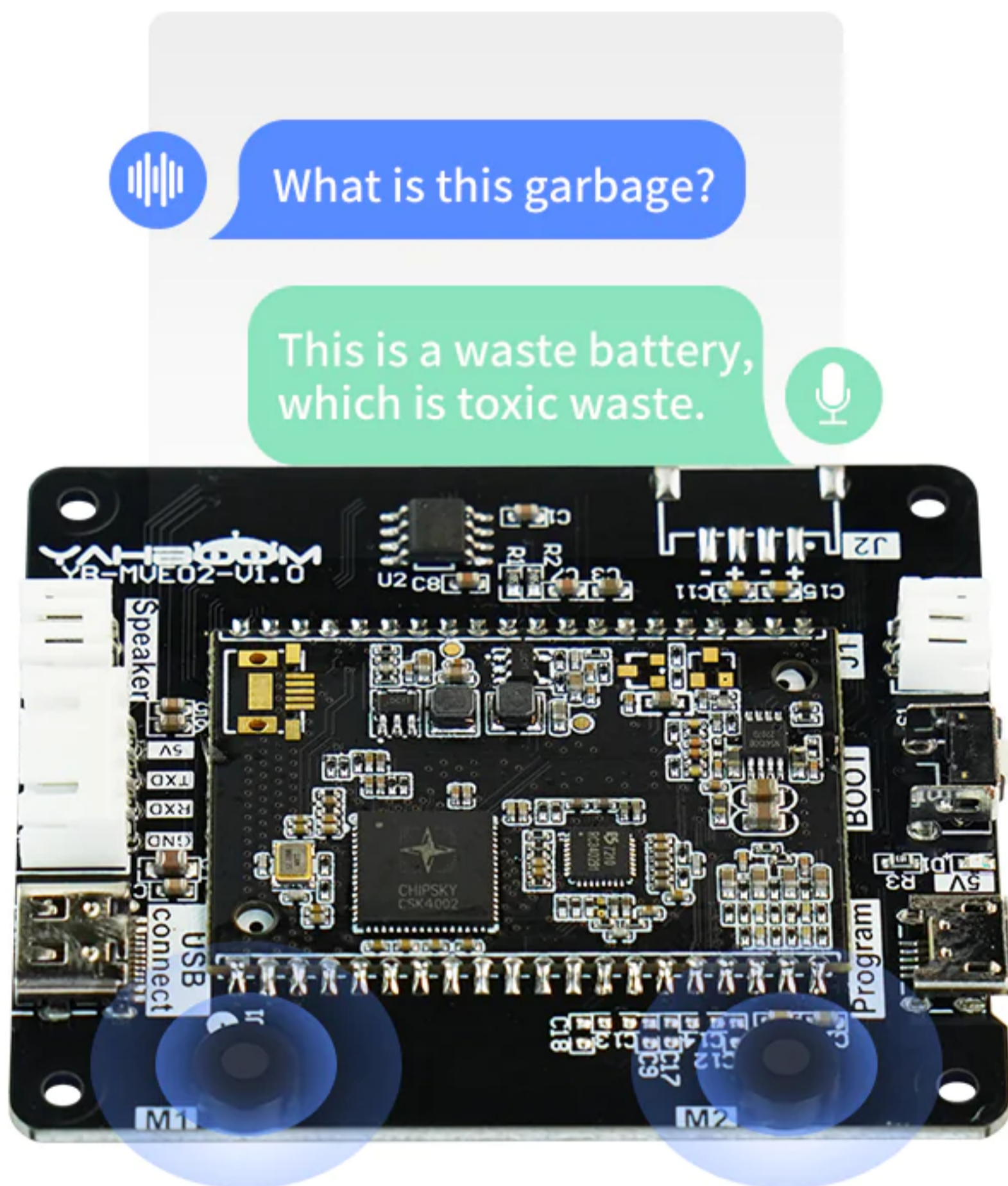
# Natural conversation & Echo cancellation

When the device broadcasts the content, the user can interrupt the broadcast process by waking up and perform the next speech recognition.



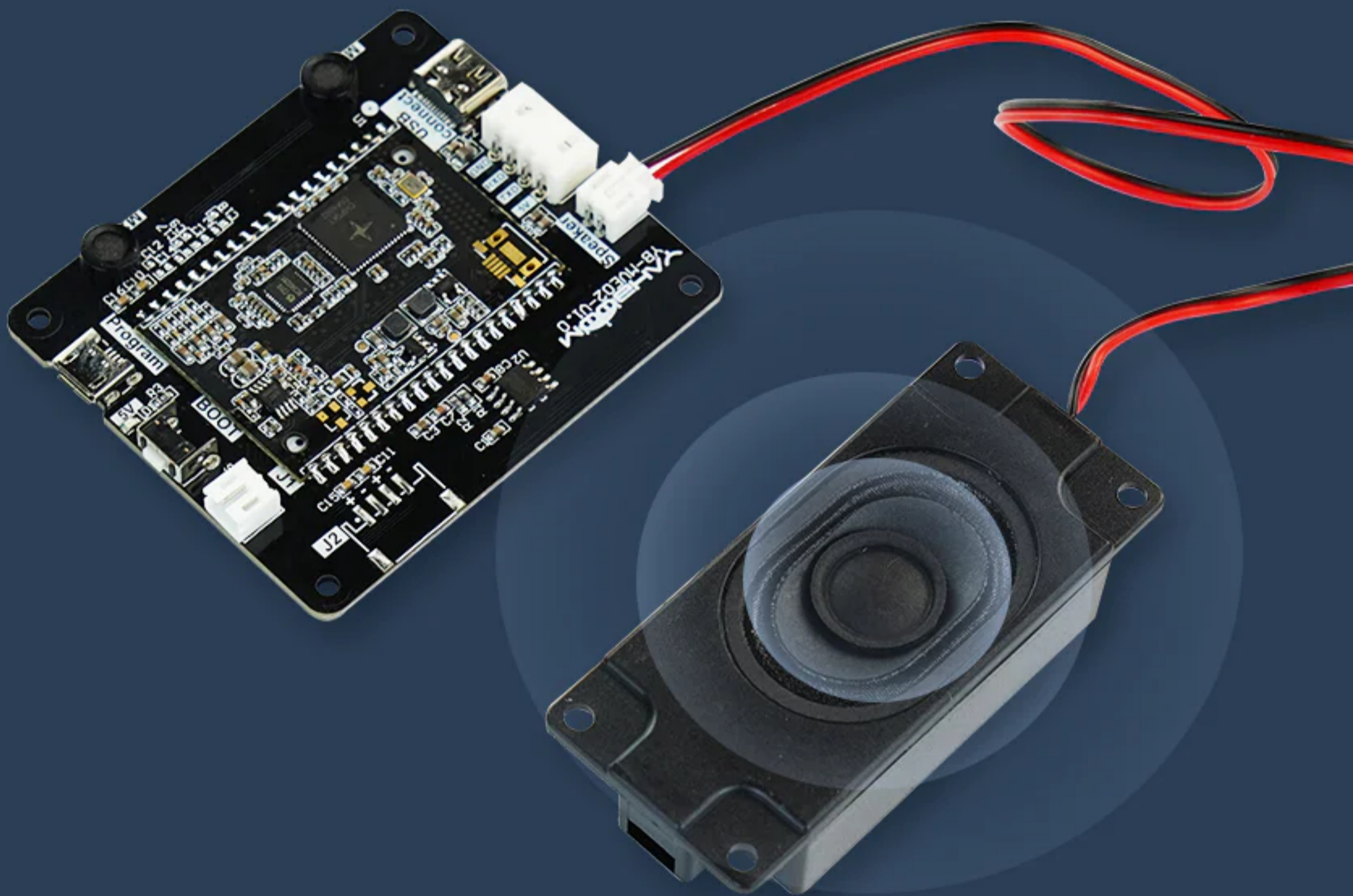
# Voice recognition broadcast

The user wakes up the device and speaks the command word, after the device recognizes the command word, it sends a corresponding reply and broadcast response, so as to realize the voice interaction of listening and answering.



# Module integrated power amplifier

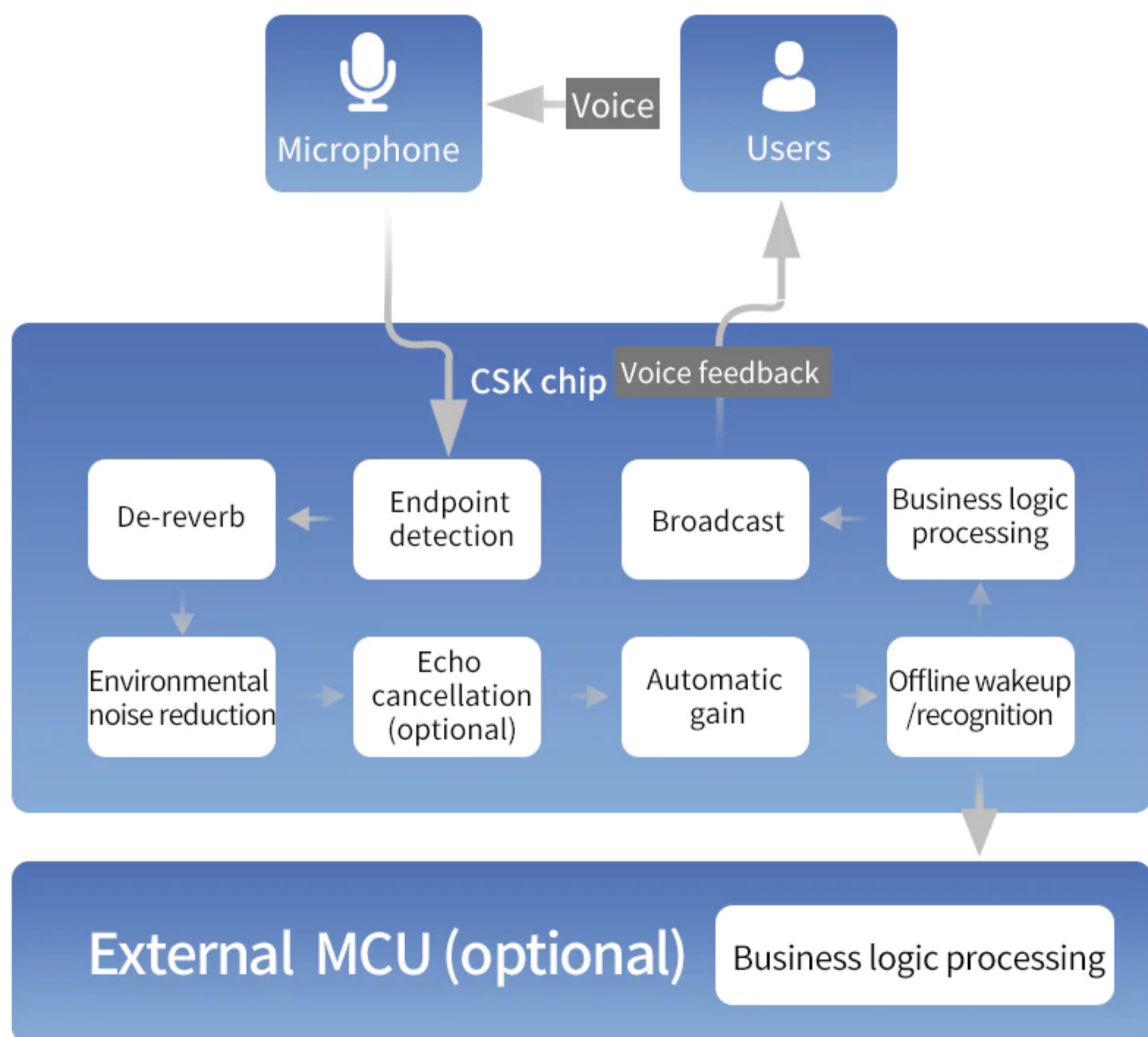
Only need to connect the speaker to feedback the voice broadcast



Speaker for free

# Offline voice interaction processing logic

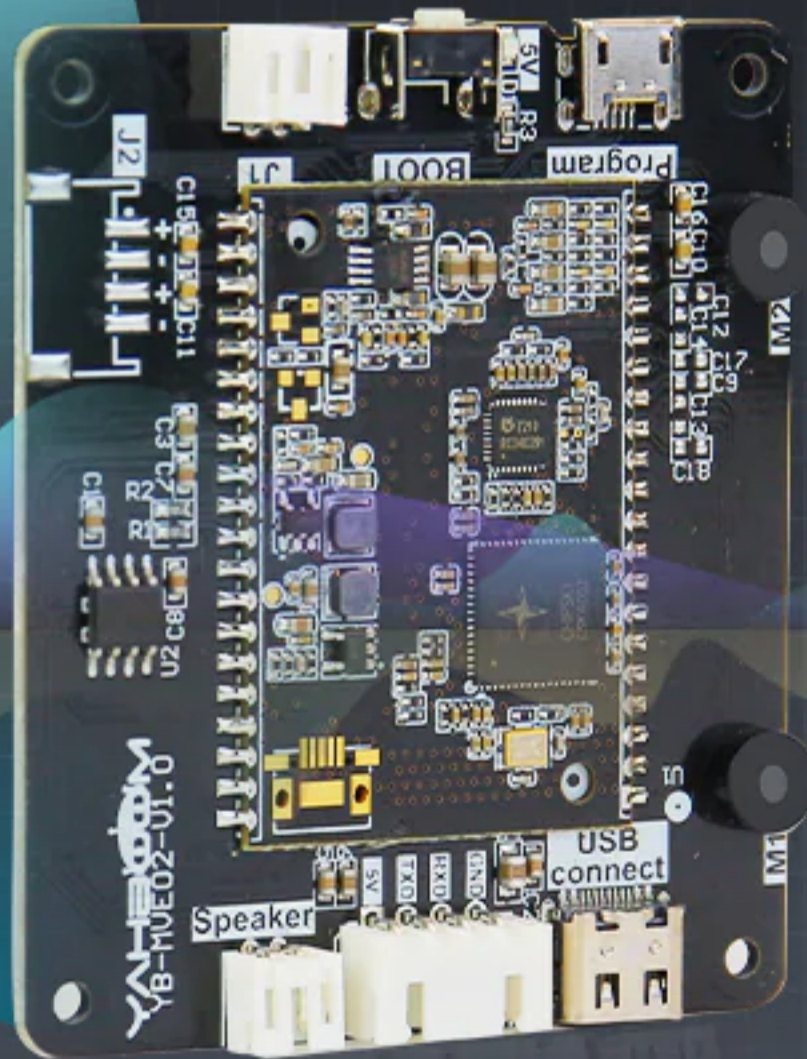
When the device is awake, the user speaks a command word (instruction) within the specified range. After the voice module receives the information, it performs related processing according to the content of the command word in the offline state, or transmits the content information to the PC for related processing.



# Environmental noise reduction

It is widely used in various indoor and outdoor noise environments, while reducing noise while retaining human voice information to the greatest extent, greatly improving the recognition accuracy.

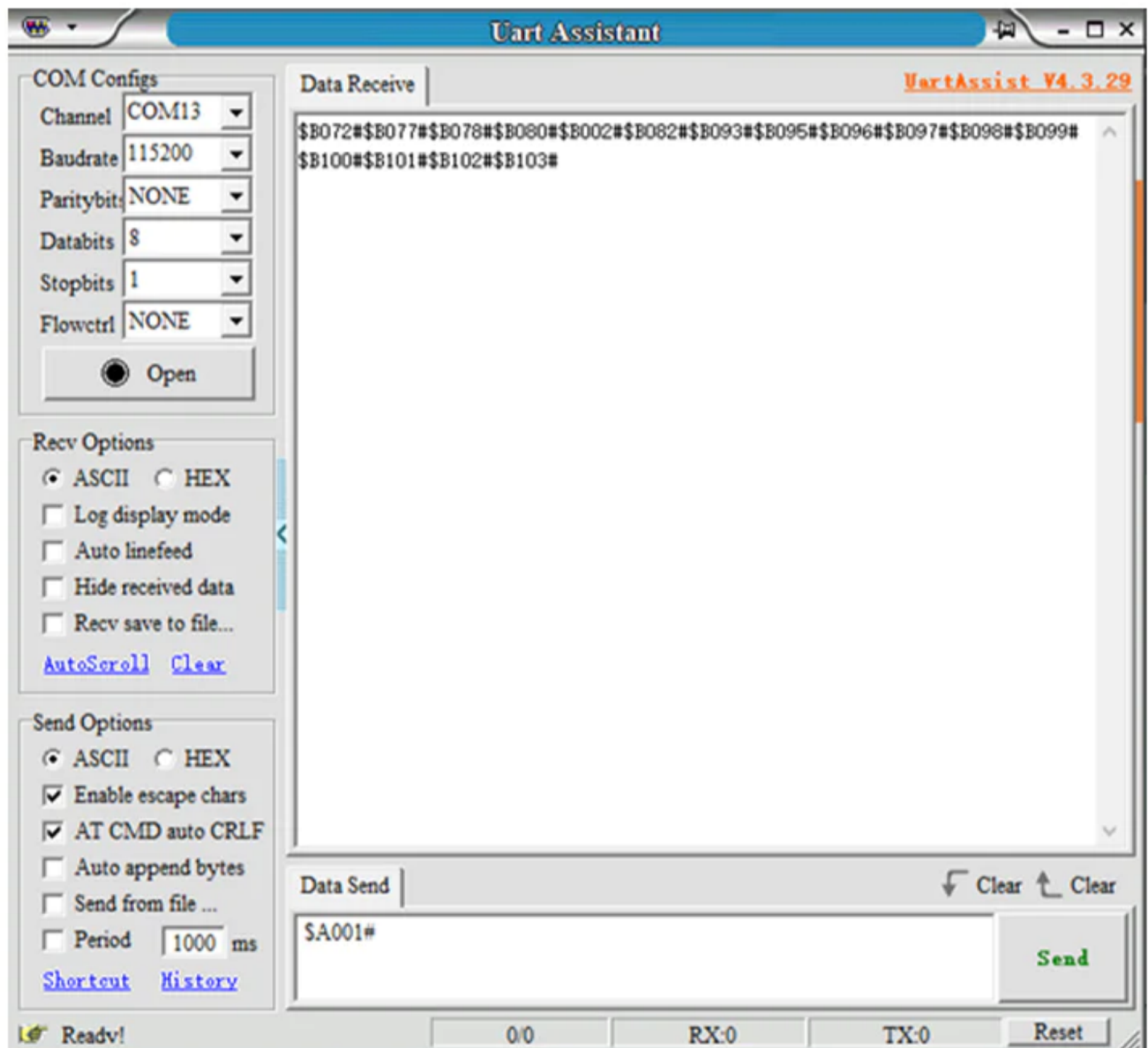
Before noise reduction



After noise reduction

# Support serial communication control

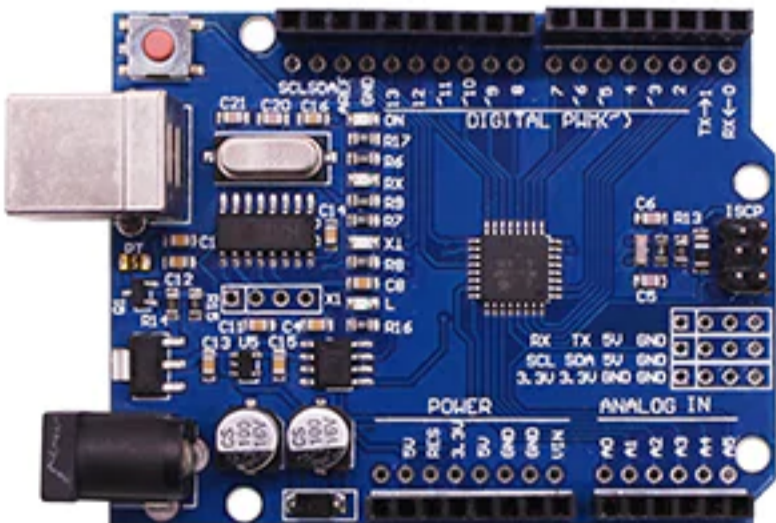
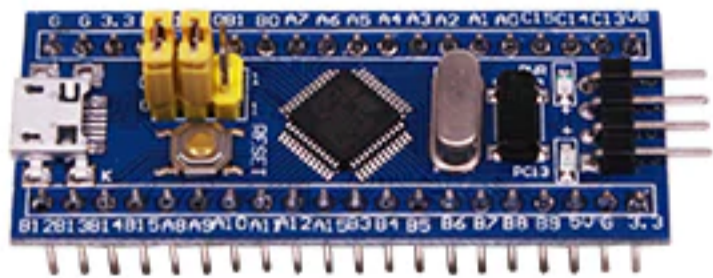
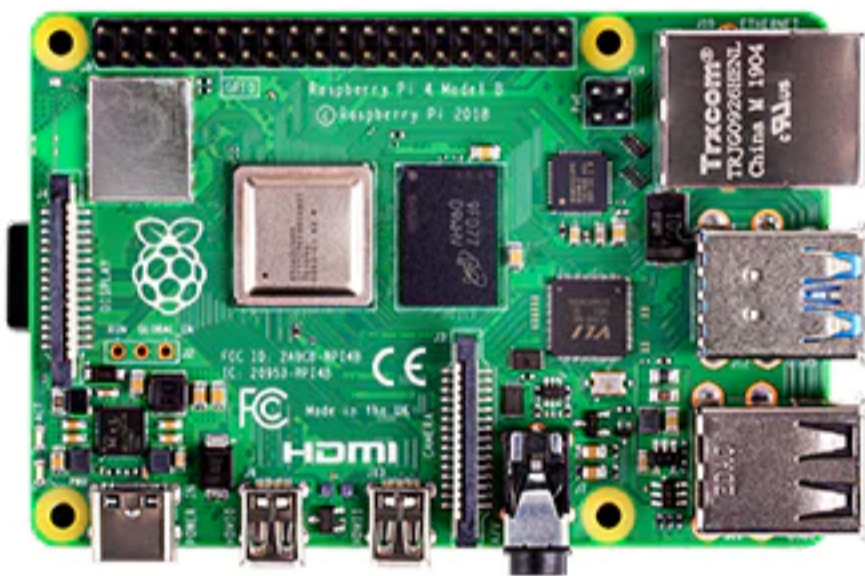
It is convenient to use the PC for debugging






# Supports multiple boards.

Raspberry Pi | JETSON | STM32

Provide Raspberry Pi, JETSON tutorials. The case information takes Python code as an example. If you need C language instructions, you can write that according to the data sheet.



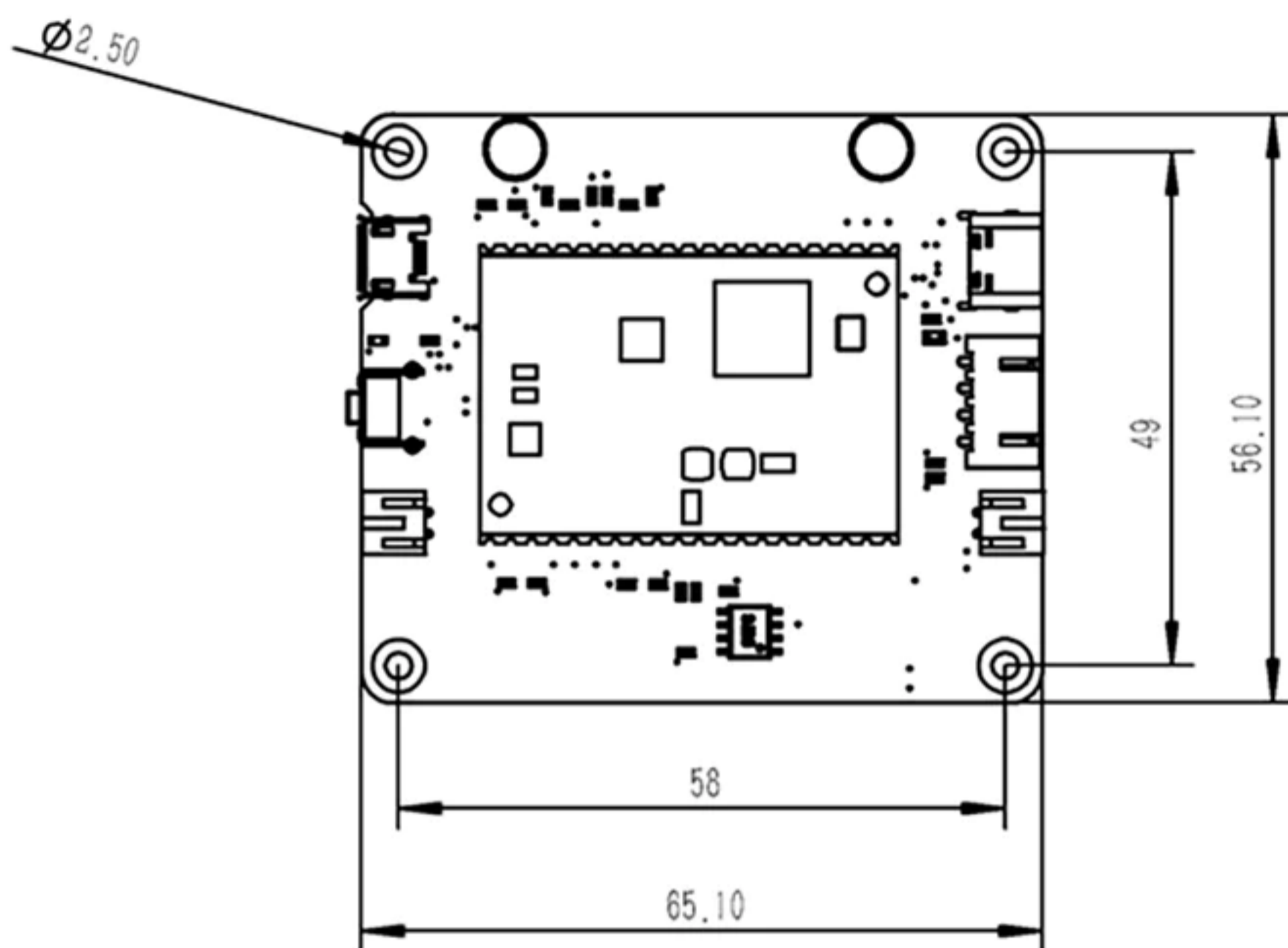
# Voice module parameter comparison

			
	Voice interaction module	Voice recognition module	Voice broadcast module
Voice recognition	√	√	X
Voice broadcast	√	√	√
Chip program	CSK4002	LD3320	XFS5152CE
Communication method	USB Serial	IIC	IIC
Connection interface	micro USB/DuPont line interface	DuPont line interface /Alligator clip interface/PH2.0 cable interface	DuPont line interface /Alligator clip interface/PH2.0 cable interface
Bilingual in Chinese and English	√	X	√
Far field pickup	√	X	X
Echo cancellation	√	X	X
Offline recognition	√	√	X
Environmental noise reduction	√	X	X
Voice speed pitch volume adjustment	X	X	√
Onboard Microphone	Dual channel microphone	Single channel microphone	X
The upper limit of single-use recognition words	85 command words	50 command words	X
Custom command word	X	√	X
Support ROS	ROS1/ROS2	√	X

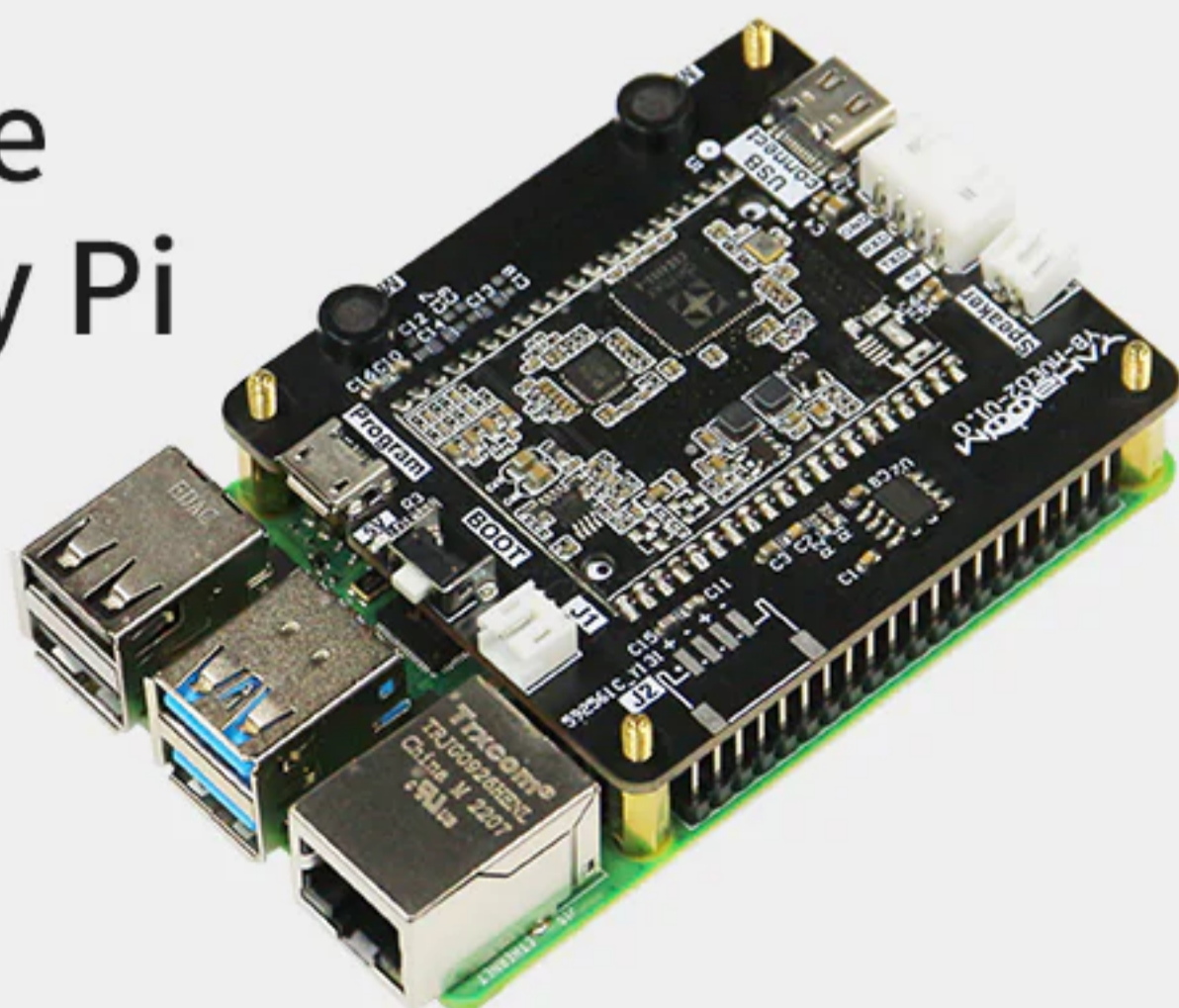
# Product Specification

## Product size

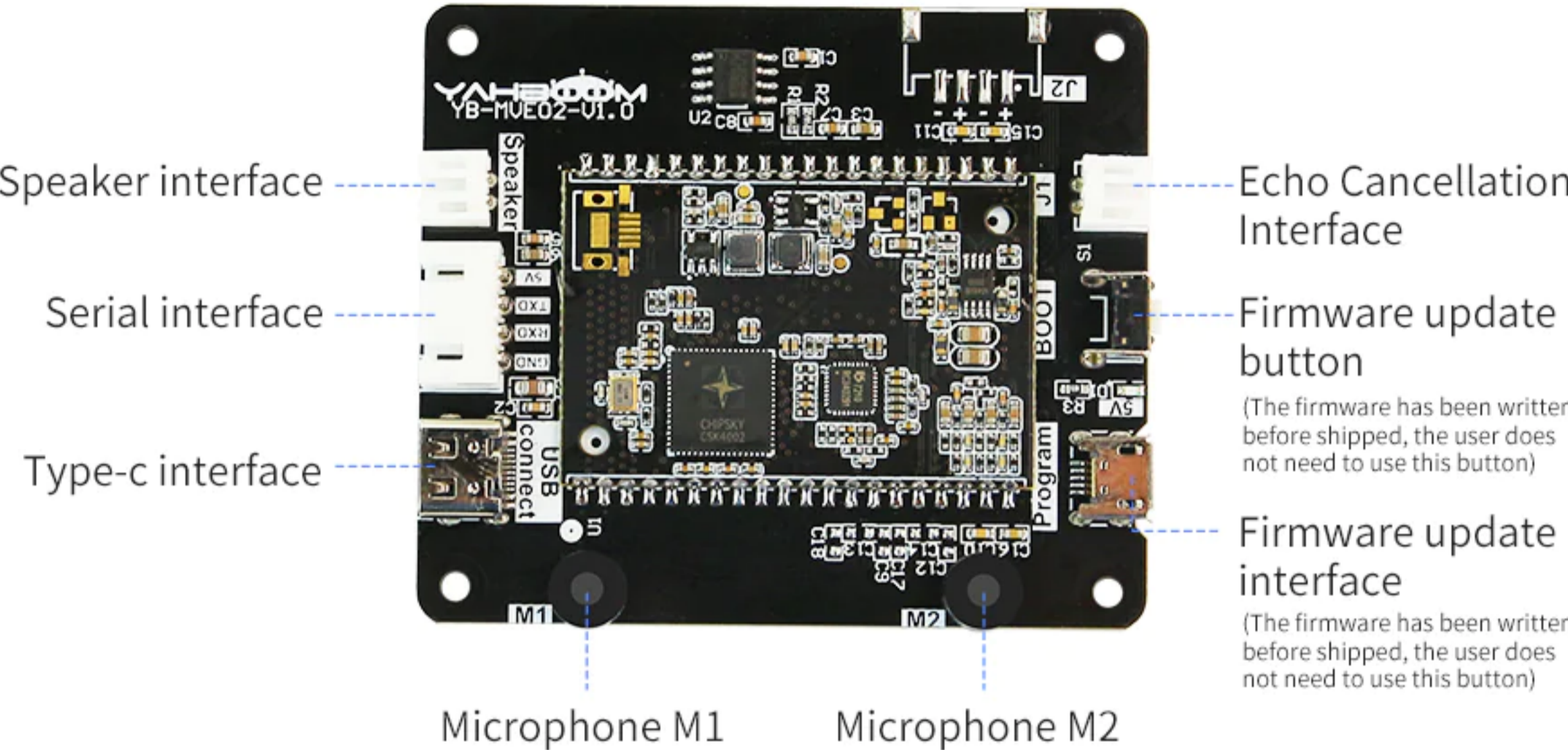
Unit: mm



# Support for use with Raspberry Pi



# Interface introduction



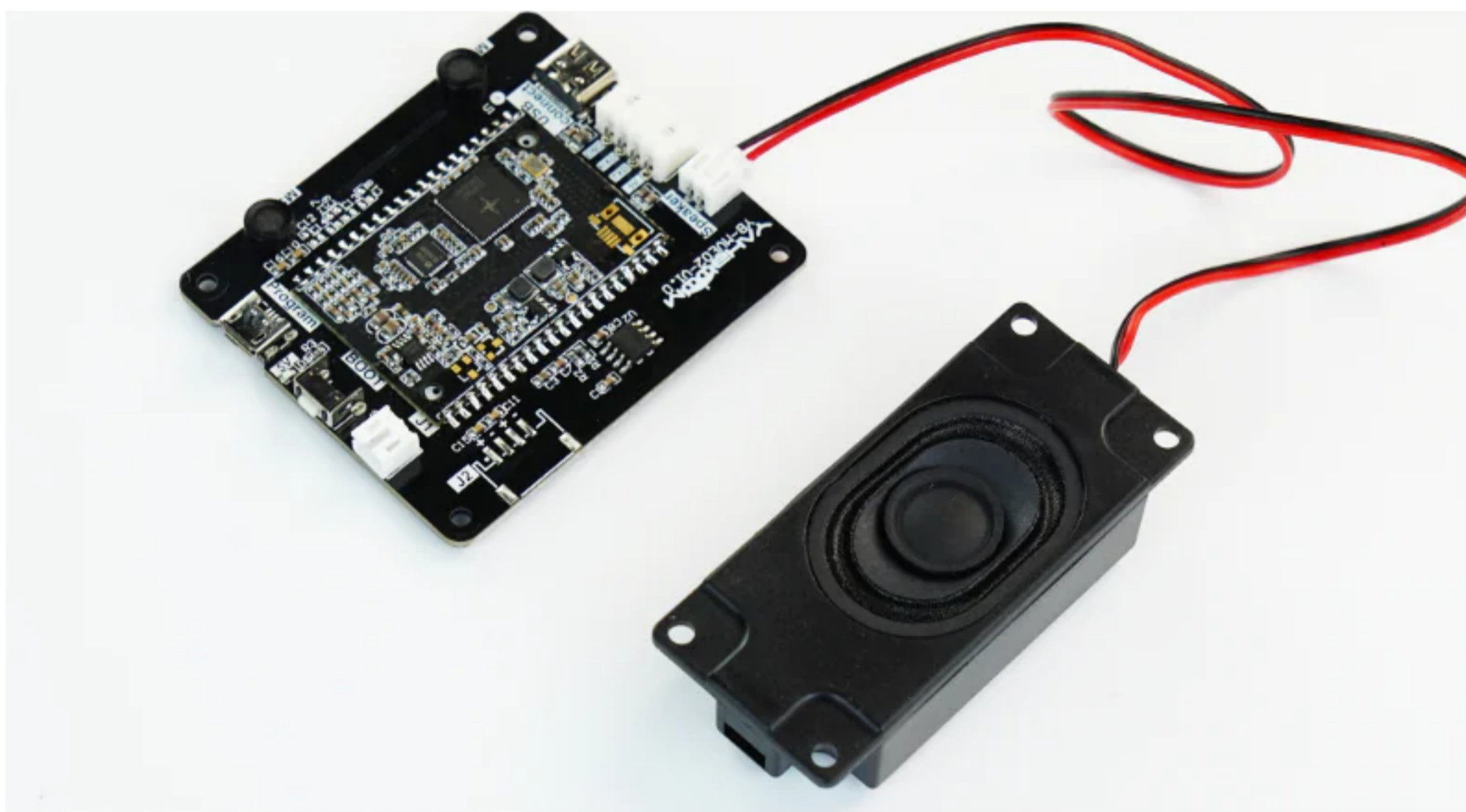
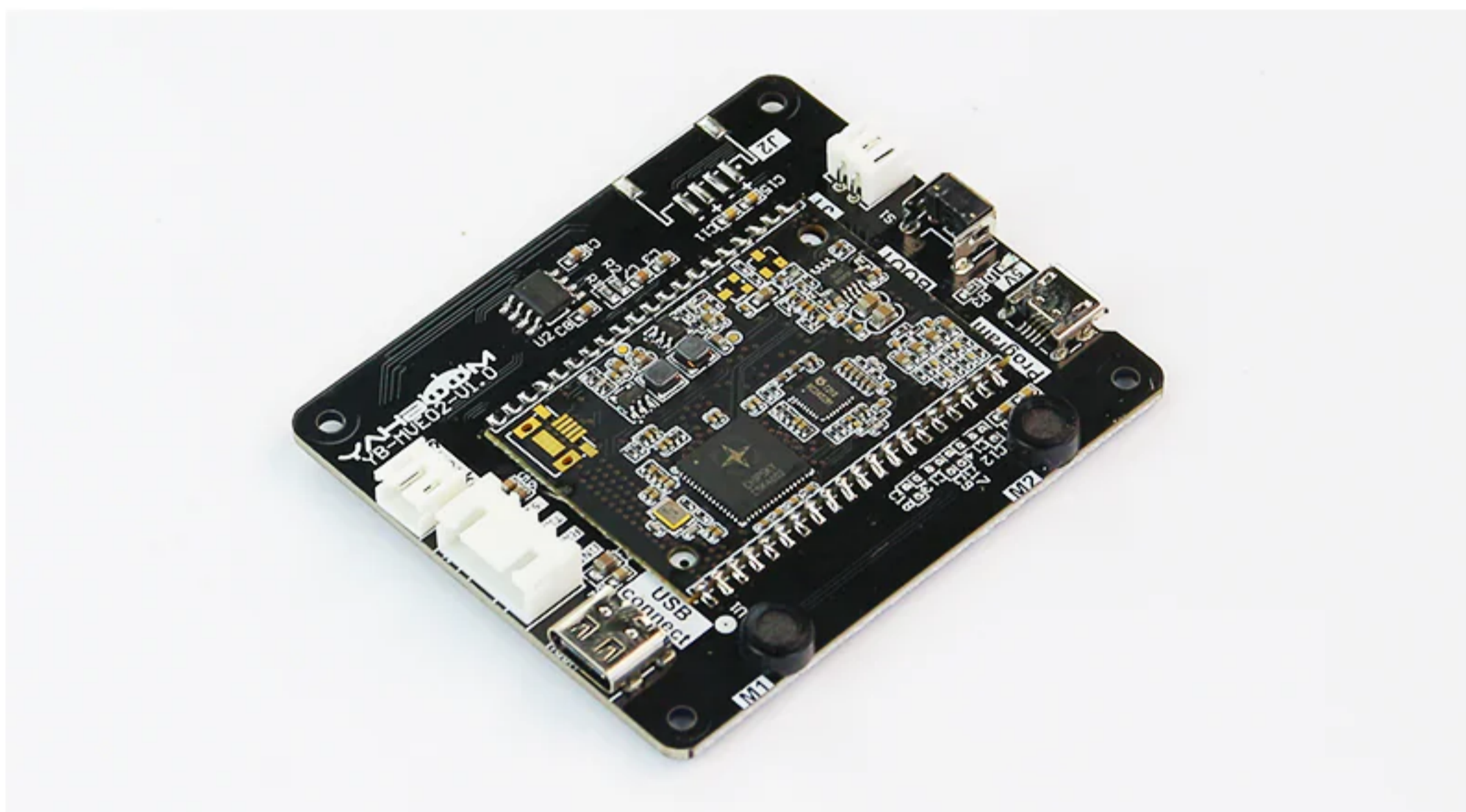
# Product parameters

Module control	CSK4002	Microphone type	Electret microphone
Number of microphones	2	Sensitivity	-38dBV/Pa
Communication method	USB communication + serial communication	Signal to noise ratio	65dB
External interface	1. Type-c interface for USB communication	Onboard functions	Voice recognition, Voice broadcast, Echo cancellation
	2. XH2.54 interface for serial communication		
	3. micro USB interface for firmware upgrade		
	4. The reference signal interface is used for external voice signal input, used in echo cancellation		
Pickup distance	5 meters	Operating Voltage	5V
Operating current	300mA	Size	65mm*56mm*1.6mm

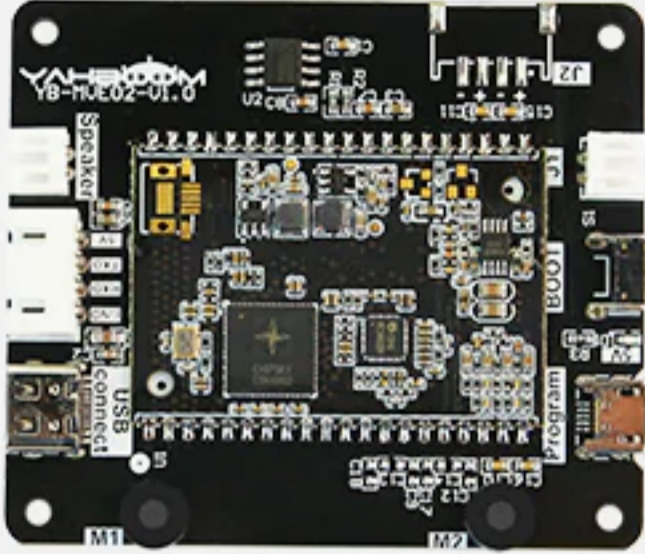
# List of Voice Interaction Command Words and Reply Words

功能名称 ( Function Name)	语音识别内容 (Voice command)	语音播报内容 (Voice broadcast content)
唤醒词 (Wake up word)	你好小亚 Hi Yahboom	自动‘在的’ Hi , I'm here.
语音控制小车运动 (Voice control car movement)	小车停止 Robot stop	好的，已停止 OK , I'm stop.
	停车 Stop	好的，已停止 OK , I'm stop.
	小车休眠 Robot sleep	好的，已休眠 OK , Call me again if there's anything else.
	小车前进 Go ahead	好的，正在前进 OK , let's go.
	小车后退 Back	好的，正在后退 OK , I'm back.
	小车左转 Turn left	好的，正在向左转 OK , I'm turning left.
	小车右转 Turn right	好的，正在向右转 OK , I'm turning right.
	小车左旋 Enter A mode	好的，正在向左旋转 OK, I'm working on A mode.
	小车右旋 Enter B mode	好的，正在向右旋转 OK, I'm working on B mode.
语音控制RGB灯 (Voice controlRGB light)	关灯 Close light	好的，已关灯 OK, light is closed.
	亮红灯 Red light up	好的，已亮红灯 OK, red light is on.
	亮绿灯 Green light up	好的，已亮绿灯 OK, green light is on.
	亮蓝灯 Blue light up	好的，已亮蓝灯 OK, blue light is on.
	亮黄灯 Yellow light up	好的，已亮黄灯 OK, yellow light is on.
	打开流水灯 light A	好的，已打开流水灯 OK, light A is on.
	打开渐变灯 light B	好的，已打开渐变灯 OK, light B is on.
	打开呼吸灯 light C	好的，已打开呼吸灯 OK, light C is on.
	显示电量 display power	好的，已显示电量 OK, battery value has been display .
语音导航玩法 (Voice navigation)	导航去一号位 Go to the point A	好的，正在去一号位 OK, I'm going to the point A.
	导航去二号位 Go to the point B	好的，正在去二号位 OK, I'm going to the point B.
	导航去三号位 Go to the point C	好的，正在去三号位 OK,I'm going to the point C.
	导航去四号位 Go to the point D	好的，正在去四号位 OK, I'm going to the point D.
	回到原点 back to origianl	好的，正在回到原点 OK, I'm return back.
智能追踪玩法 (Smart tracking)	关闭巡线 Close tracking mode	好的，已关闭巡线功能 OK, tracking mode is closed
	巡红线 track red line	好的，已开启巡红线功能 OK, I will track the red line
	巡绿线 track green line	好的，已开启巡绿线功能 OK, I will track the green line
	巡蓝线 track blue line	好的，已开启巡蓝线功能 OK, I will track the blue line
	巡黄线 track yellow line	好的，已开启巡黄线功能 OK, I will track the yellow line
	开启跟随 mode on	好的，已开启跟随功能 OK, mode on
	取消追踪 mode off	好的，取消追踪 OK, mode off
机械臂简单语音控制 (Voice control robotic arm movements)	报警 Warning	好的，已开启报警 OK
	向上 Lift the arm up	好的，已控制向上 OK , the arm has been raised.
	向下 Put the arm down	好的，已控制向下 OK, the arm is down.
	向左 Arm left	好的，已控制向左 OK, the arm has turned left.
	向右 Arm right	好的，已控制向右 OK, the arm has turned right.
	夹紧 Clamp the clip	好的，已控制夹紧 OK, the clip is clamped.
	松开 Open the clip	好的，已控制松开 OK, the clip has been opened.
机械臂智能控制 (Voice control robotic arm funtcion)	鼓掌 Action A	好的 OK
	点头 Action B	
	祈祷 Action C	
	跪下 Action D	
	初始位置 Reset	
	惊吓 Action E	
机械臂动作控制 (Voice control robotic arm special effects)	叠罗汉 Stack the block	好的，开始叠罗汉 OK, let me stack them.
	跳舞 Dancing	好的，开始跳舞 OK, Let's dance.
	夹方块 Clip the block	好的，开始夹方块 OK,let me clip them.
	搬运 Carry the block	好的，开始搬运 OK, let me carry them.
机械臂记忆学习模式 (robotic arm learning)		我可以开始动作输入， I'm ready.Let me record some actions
	输入完成 record it	好的，请输入下一组动作 OK, please set the next action
		已超过20组动作，录入已满啦 Too many actions, I can't record them
		好的，已清空 OK, I have cleared the memory. You can start again.

# Products Real Shot



# Shipping list

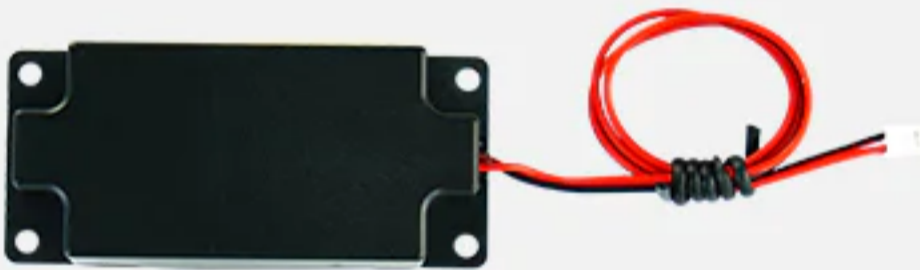


Voice interaction module\*1

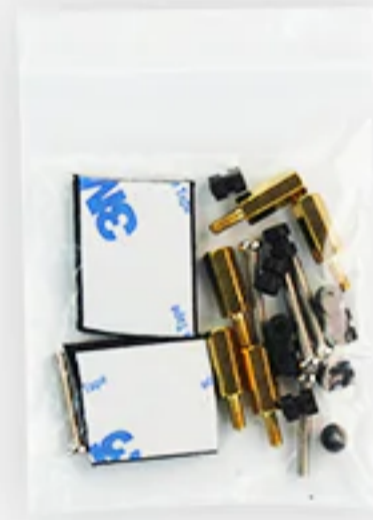


line length: 30cm

Type-C cable\*1



Speaker\*1



Screw copper  
column pack \*1