Rd-03D_V2 Quick Start Guide

Version V1.0.0

Document Resume

Version	date	Develop/Revise Content	Formulate approval
V1.0.0		First formulation	Wei Jie Xu Hong

1. Burning Instructions

The serial port programming wiring for Rd-03D_V2 is as follows:

Rd-03D_V2	USB to TTL
5V	5V
GND	GND
TX	RX
RX	TX

The connection can be made by connecting the right-side pin header or by soldering the upper left corner solder joint, as shown in Figures 1.1 and 1.2.

Figure 1.1 The Rd-03D_V2 module is connected to the serial port tool via the right-side pin header.

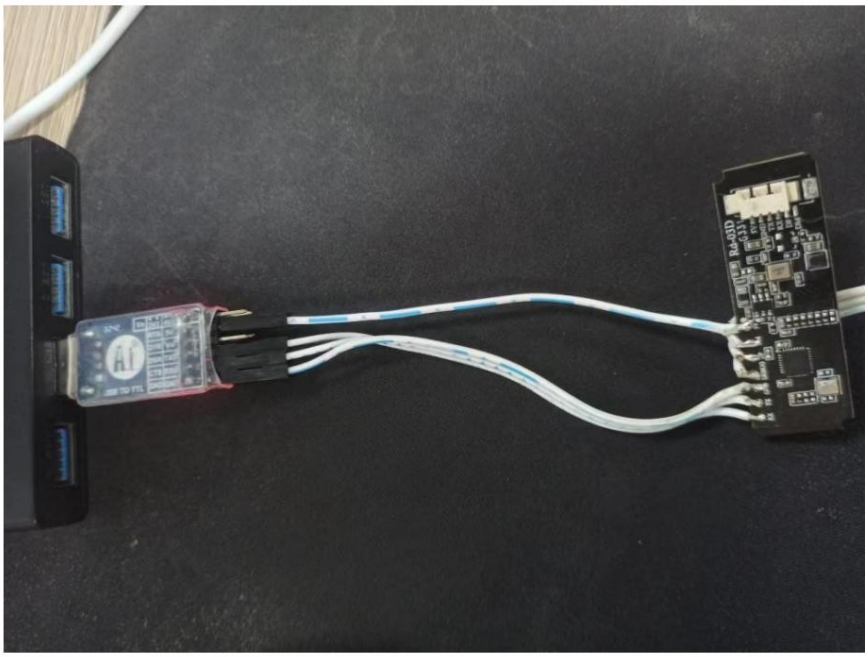


Figure 1.2 The Rd-03D_V2 module is connected to the serial port tool via solder joints.

After wiring is complete, open the firmware upgrade tool: ICLM_Download_JIELI.exe

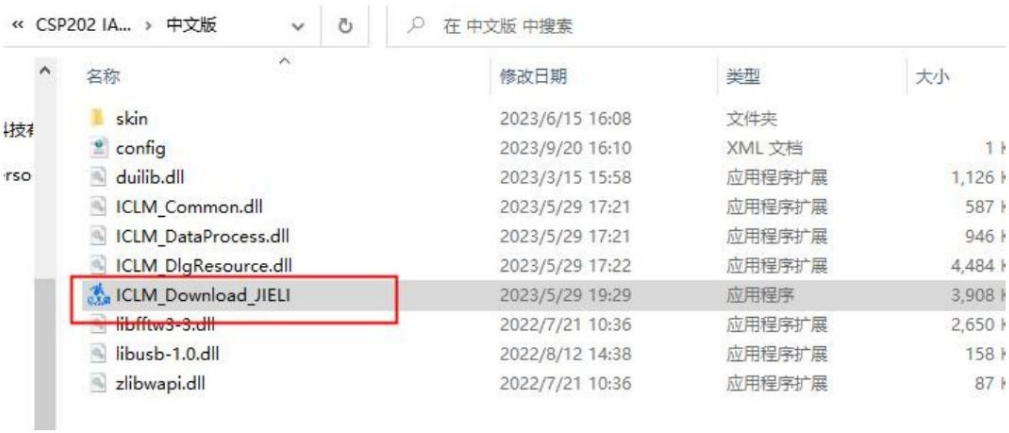


Figure 1.3 Opening the firmware upgrade tool

Open the firmware upgrade tool, click the "Refresh Device" button, and select the radar module's serial number from the "Port Number" dropdown menu.

Slogan, baud rate 256000;

Figure 1.4 Firmware upgrade tool configuration

Click the "Select File Path" button, select the ufw file you want to upgrade; click the "Download" button to start the firmware upgrade.

The download results will be displayed in real time in the notification box on the right, and the download progress will be displayed below the notification box;

Figure 1.5 Firmware upgrade tool download progress

After a successful firmware upgrade, the page will display "Download successful!" in the information box, as shown in the figure; if the firmware upgrade fails, the corresponding error message will be displayed in the information box.

Figure 1.6 Firmware upgrade tool download success message

2. Instructions for use of the host computer

2.1 Host Computer Connection

Tool ICLM_MTT.exe is a green software specifically developed for Rd-03D_V2. After connecting the host computer to...

After installing the Rd-03D_V2 hardware, the host computer tool can display, record, save, and replay radar data.

Step 1: Connect the Rd-03D_V2 module to the serial port tool using a connecting cable, as shown in Figures 1.1.1 and 1.1.2 above.

As shown, the module is connected to the host computer via a serial port tool;

Step 2: Double-click to open the host computer tool "ICLM_MTT.exe". The demonstration tool interface will pop up, as shown in Figure 2.1.1.

Show.

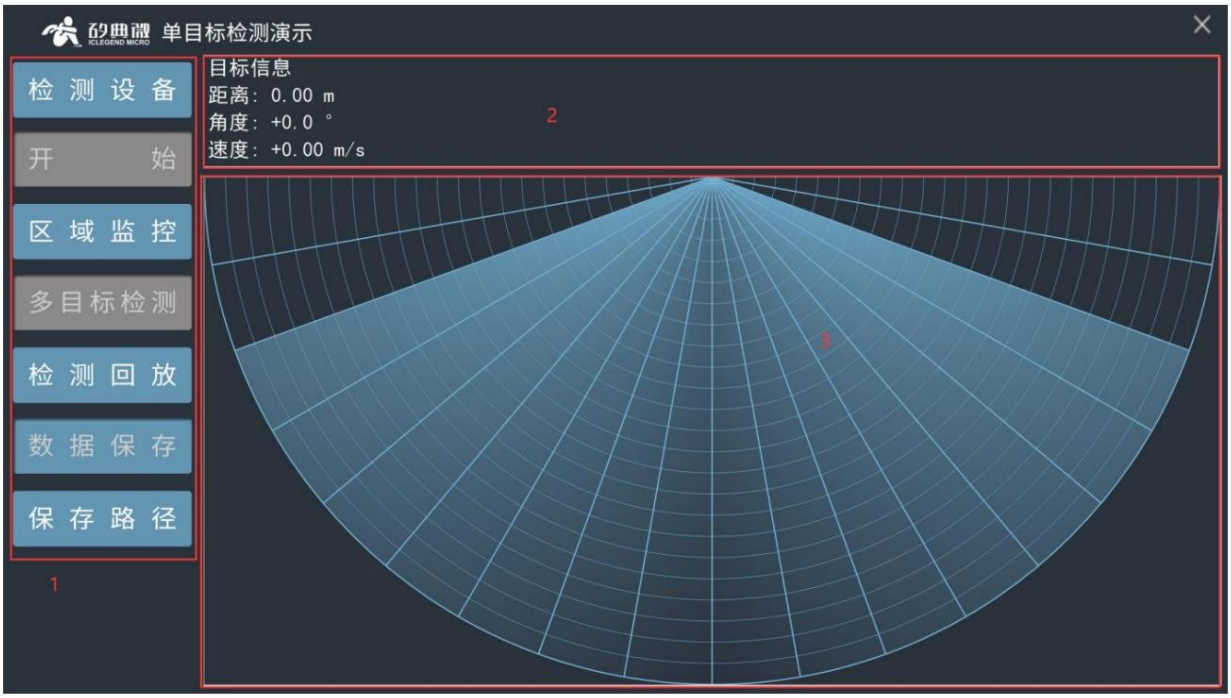


Figure 2.1.1 Demonstration Tool Interface

The visualization tool interface is mainly divided into "Function Button Area 1", "Data Area 2" and "Target Display Area 3", and the functions of each area are as follows:

Below: 1. Function Button Area:

• “Detect Device” button is used to check if the Rd-03D_V2 module is successfully connected. • “Start/Stop” switch button is used to start or stop receiving radar data. • “Area Monitoring” button is used to set the monitoring area and the blind zone range. • “Multi-Target Detection/Single Target Detection” switch button is used to switch between single-target detection and multi-target detection modes. • “Detection Playback/Stop Playback” button is used to play back recorded radar data.

• The "Save Data/Turn Off Save" button is used to start recording radar data. • The "Save Data" button is used to set the storage path for radar data.

2. Data Area: Displays real-time distance, angle, and speed information of the tracked target. 3. Target Display Area:

Visually displays the position of the tracked target within the detection area on the radar image.

2.2 Use of host computer tools 2.2.1 Single/

multi-target detection

The specific operation steps for using the single-target or multi-target detection function of the host computer

are as follows: Step 1: Connect the Rd-03D_V2 module and the serial port tool according to the steps in section 2.1, and open the host computer tool.

Step 2: Click the "Detect Device" button on the interface. If the serial port connection is correct, a prompt box "Serial port device detected" will pop up on the interface, as shown in Figure 2.2.1. Click "OK" to continue.

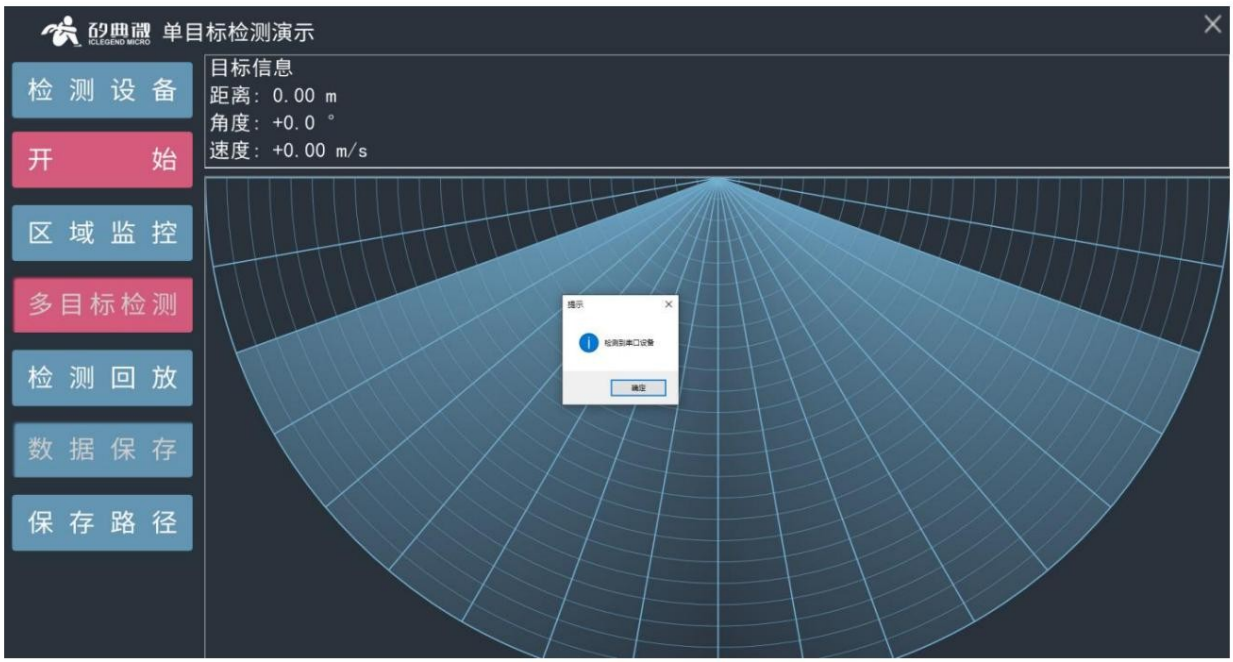


Figure 2.2.1 Device successfully detected

Step 3: Click "Start/Stop" to switch positions, and the target's position relative to the radar will be displayed, as shown in Figure 2.2.2:

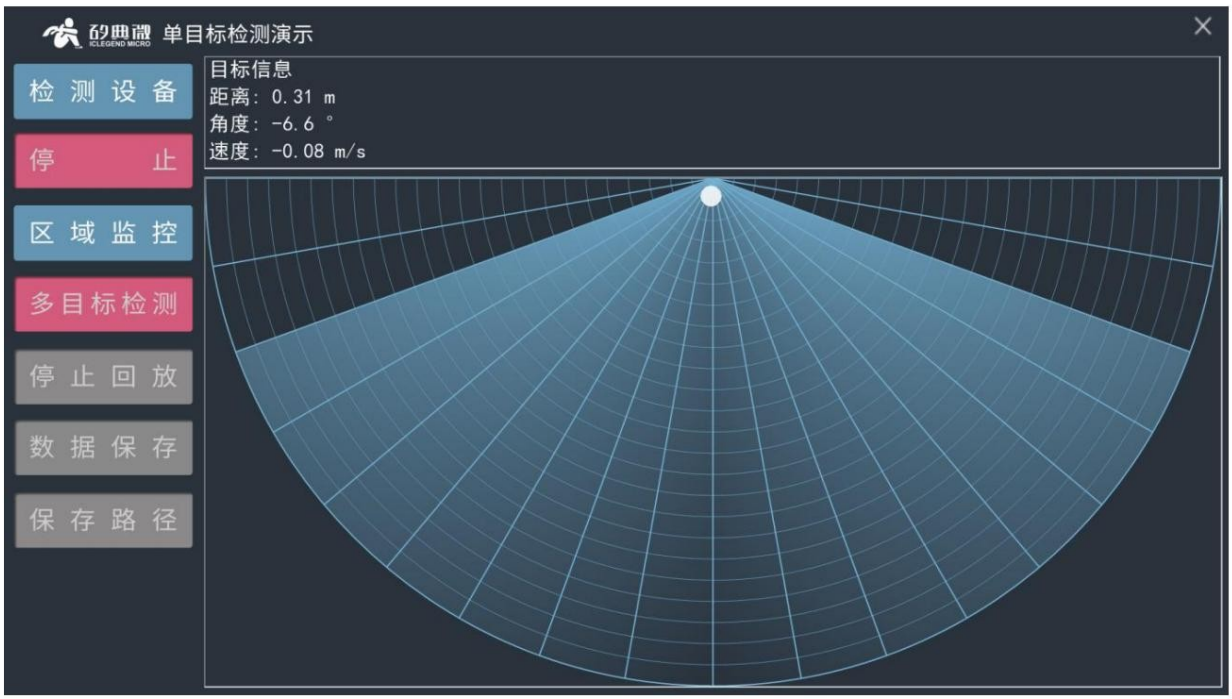


Figure 2.2.2 Single target detection demonstration

Step 4: After opening the host computer, the default setting is "Single Target Detection Demonstration". Clicking the "Multi-Target Detection/Single Target Detection" button will switch to the "Three-Target Detection Demonstration" interface, as shown in Figure 2.2.3. Clicking the button again will switch back to the "Single Target Detection Demonstration" interface. Note: The "Single Target Detection" mode is not suitable for tracking and detecting multiple targets.

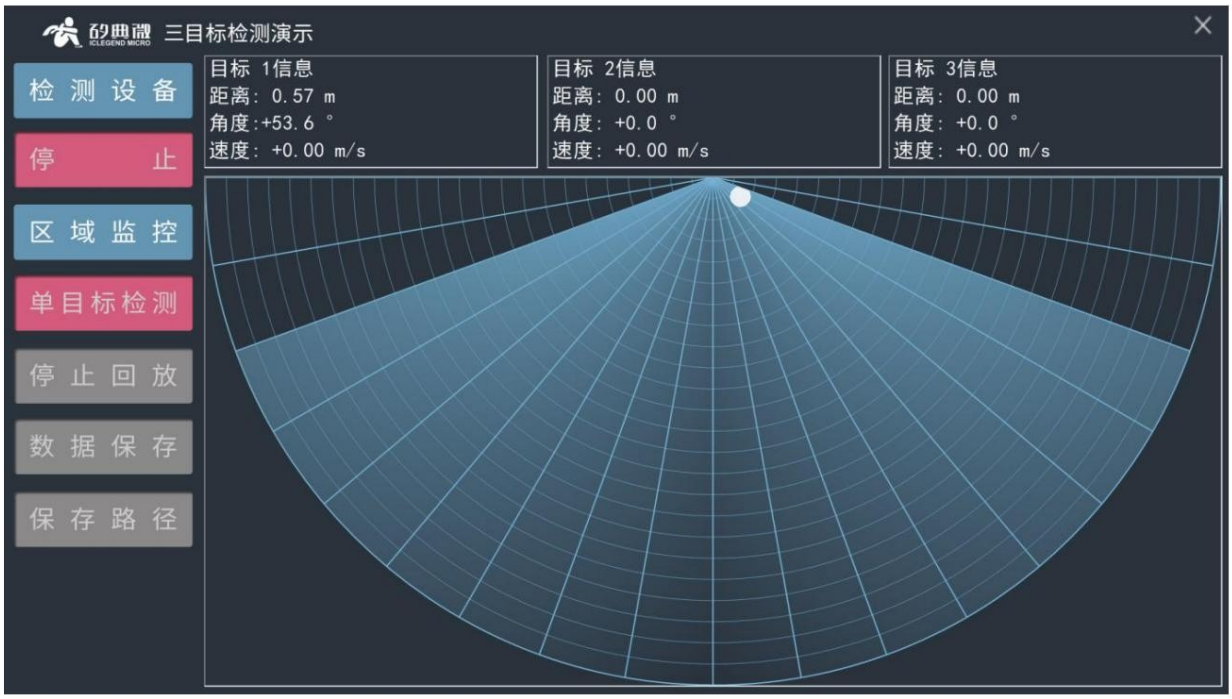


Figure 2.2.3 Multi-target detection demonstration

2.2.2 Area Monitoring and Blind Spot Setting

The host computer provides area monitoring and blind zone setting functions. Area monitoring means that users can set one or more blind zones within the detection area. Multiple polygonal regions of interest are selected, and the color of the region changes immediately once a human target enters the region.

Blind spot setting refers to the user setting the range of radar detection and tracking of interest, and disabling detection in certain distance-limited areas. Measurement and result display. The operation steps for area monitoring and blind zone setting are as follows: Step 1: Connect the radar module and the host computer according to the steps in section 4.2.1 and start target detection;

Step 2: Click the "Area Monitoring" button. The interface shown in Figure 2.2.4 will appear. The functions of each part of the interface are described below:

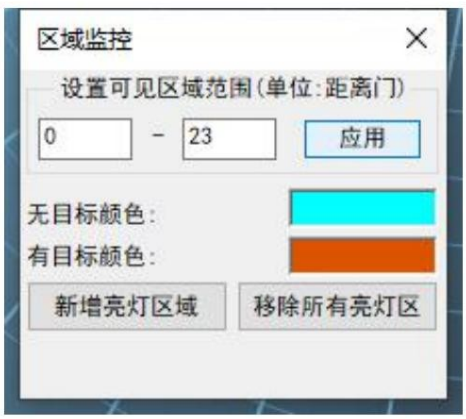


Figure 2.2.4 “Area Monitoring” settings interface

Set the visible area range: The default is 0~23 distance doors, meaning no blind spots. Users can set the nearest and farthest blind spots themselves, for example: setting 1~21, meaning one blind spot for the nearest door and two blind spots (23-21) for the farthest door (each blind spot is 36 cm). After clicking the "Apply" button, the interface will look like Figure 2.2.5, where the red area represents the blind spot location.

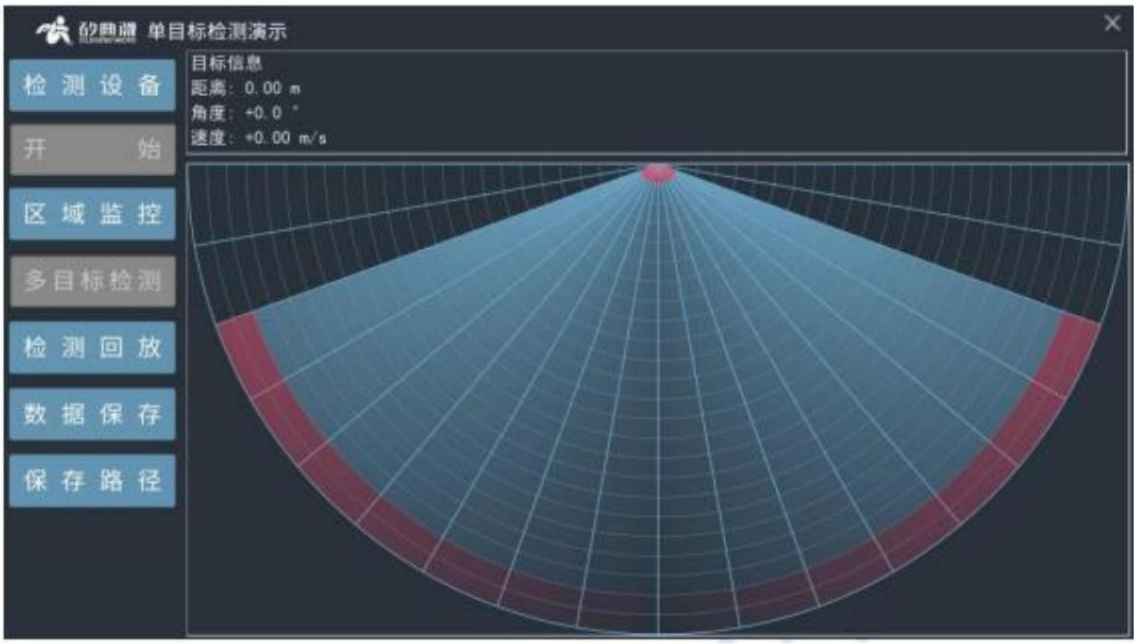


Figure 2.2.5 Example of blind spot setting

No Target Color: The color displayed when there is no human target in the

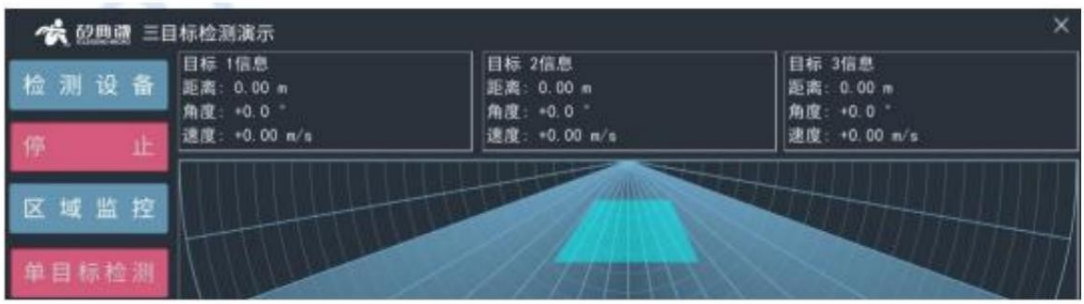
monitored area. Target Color: The color displayed when a human target is present in

the monitored area. Add New Light Area: Begin defining a monitored area. After clicking this button, left-click the vertices of the area on the interface to add it, and right-·

click to end the definition process. Remove All Light Areas: Delete all defined monitored areas.

Step 3: Click the "Add Lighting Area" button on the "Area Monitoring" settings page to begin setting up the monitoring area: [Screenshot of screen]

Left-click within the quadrilateral area to set the vertices of the monitoring area, and right-click to finish setting the monitoring area. The host computer tool will connect the vertices into a polygon displayed on the interface according to the order of mouse clicks. The area enclosed by this polygon is the monitoring area. Figure 2.2.6 shows a quadrilateral monitoring area. When someone enters the monitoring area, the background color of the monitoring area will change to the "target color"; after the person leaves the detection area, the area color will change back to the "no-target color", as shown in Figures 2.2.7 and 2.2.8.



The monitoring area set in Figure 2.2.6

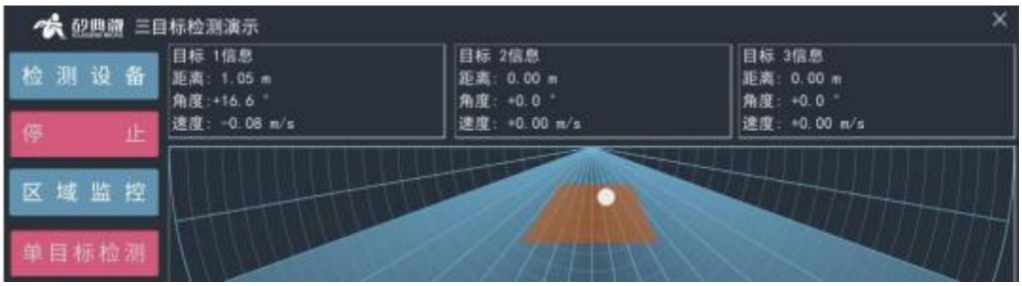


Figure 2.2.7 Target in the monitored area

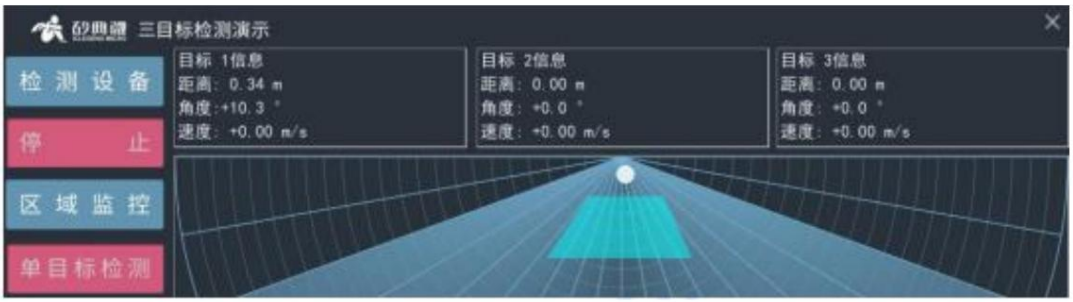


Figure 2.2.8 No target in the monitored area

Step 4 (optional): Repeat step 3 to set multiple monitoring areas of interest;

Step 5 (Optional): Click the "Area Monitoring" button, and in the pop-up window, click "Remove All Lighted Areas" to delete them.

All monitored areas within the sector-shaped detection area.

2.2.3 Recording and Playback of Radar Data The

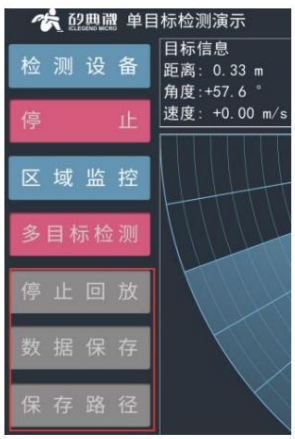
steps for users to record and play back radar data using the host computer tool are as follows:

Step 1: Connect the radar module and the host computer software according to the steps in 2.1, and select the appropriate target detection mode;

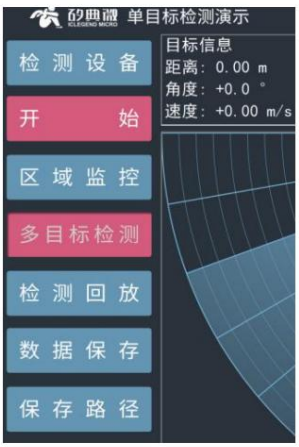
Step 2: When the "Start/Stop" toggle button displays "Start", as shown in Figure 2.2.9(b), click "Save Path".

Button 3, set the number of radars.

According to the save path, the default data save path is the SaveData folder under the host computer tool path;



(a) Data recording/playback related buttons are not clickable.



(b) The data recording/playback related buttons are clickable.

Figure 2.2.9 The data recording/playback buttons are unavailable when the radar is detecting.

Step 3: The "Data Save" function on the host computer is off by default. If the user wants to enable "Data Save" mode,

The "Save Data" button should be clicked when it is clickable (as shown in Figure 2.2.10(a)); then...

Clicking the "Save Data" button again will turn off this mode;

(a) Function not enabled (text is white) (b) Function enabled (text is gray) (c) Not clickable

Figure 2.2.10 The data recording/playback buttons are unavailable when the radar is detecting.

Step 4: With the "Data Saving" function enabled, click the "Start" button to begin detecting the target area in the host computer tool.

Areas 2 and 3 begin displaying human information within the detection area;

Step 5: Click the "Start/Stop" toggle button to stop the detection. You can then find the saved file in the path set in Step 2.

Radar data, data folders should be named using the timestamp format "yyyy_mm_dd_hh_mm_ss";

Step Six: Click the "Detect Playback/Stop Playback" toggle button, select the radar data set of interest in the storage path, and then...

Areas 2 and 3 will begin replaying target information from the radar data;

Step 7: Click the "Detect Playback/Stop Playback" toggle button to stop data playback.

3. Serial Communication Protocol

This communication protocol is primarily intended for users who need to perform secondary development without relying on host computer demonstration tools. The Rd-03D_V2 module communicates via serial port.

(TTL level) For communication with the outside world, the radar serial port has a default baud rate of 256000, 1 stop bit, and no parity bit.

3.1 Enabling Configuration Commands

Any other commands issued to Rd-03D_V2 can only be executed after this command has been issued; otherwise, they will be invalid.

Send data:

Frame header	Intra-frame data length	command word	command value	Frame end
FD FC FB FA	04 00	FF 00	01 00	04 03 02 01

ACK (Success):

Frame header	Intra-frame data length	command word	ACK	Protocol version buffer size		Frame end
FD FC FB FA	08 00	FF 01	00 00	01 00	40 00	04 03 02 01

3.2 End configuration command

After executing the end configuration command, Rd-03D_V2 returns to working mode. To issue other commands again, an enable configuration command must be sent first.

Send data:

Frame header	Intra-frame data length	command word	Frame end

FD FC FB FA	02 00	FE 00	04 03 02 01

ACK (Success):

Frame header	Intra-frame data length	command word	ACK	Frame end
FD FC FB FA	04 00	FE 01	00 00	04 03 02 01

Version number lookup (3.3)

The command to query the Rd-03D_V2 version number is shown in the table below:

Frame header	Intra-frame data length	command word	Frame end
FD FC FB FA	02 00	00 00	04 03 02 01

ACK (Success, data is for example):

Frame header	Intraframe data length, command word ACK, version number length			Version number	Frame end
FD FC FB FA	0E 00	00 01 00 00	00 80	00 00 01 00 01 00 00 00 04 03 02 01	

3.4 Baud Rate Settings

The baud rate setting instructions for Rd-03D_V2 are shown in the table below: (Example of setting a baud rate of 9600 for data transmission)

Frame header	Intra-frame data length	command word	Command value corresponds to baud rate	Frame end
FDFCFBFA	0400	3100	0100	04030201

Command value corresponding to baud rate:

0x0001	0x0002	0x0003	0x0004	0x0005	0x0006	0x0007	0x0008
9600	19200	38400	57600	115200	230400	256000	460800

ACK (Success, data is for example):

Frame header	Intra-frame data length	command word	ACK	Frame end
FDFCFBFA	0400	3101	0000	04030201

3.5 Single/Multi-Target Mode Switching

The radar has two modes: single-target and multi-target. The default mode is single-target. The switching instructions are shown in the table below:

model	instruction
Single target	FD FC FB FA 02 00 80 00 04 03 02 01
Multi-objective	FD FC FB FA 02 00 90 00 04 03 02 01

Single-target mode ACK (success):

Frame header	Intra-frame data length	command word	ACK	Frame end
FD FC FB FA	04 00	80 01	00 00	04 03 02 01

Multi-target mode ACK (success):

Frame header	Intra-frame data length	command word	ACK	Frame end
FD FC FB FA	04 00	90 01	00 00	04 03 02 01

3.6 Output Data Protocol

The radar outputs target information, including the x-coordinate and y-coordinate in the region (the definitions of the x-axis and y-axis are shown in Figure 3-1).

The arrows indicate the positive direction of the coordinate system, along with the target's velocity value. The data frame format reported by the radar is shown in the table below.

Frame header	Intraframe data	Frame tail
AA FF 03 00	Objective 1: Information; Objective 2: Information; Objective 3: Information	55 CC

The specific information contained in a single target is shown in the table below.

target x-coordinate	Target y-coordinate	Target speed	Pixel distance value
Signed int16 type; The highest bit 1 corresponds to a positive coordinate, 0 corresponds to a positive velocity, and 0 corresponds to a negative velocity. 0 corresponds to a negative coordinate; The remaining 15 bits represent the x-coordinate, the Absolute value, unit mm	Signed int16 type; Negative coordinates; remaining 15 bits represent the absolute value of the y-coordinate, and	Signed int16 type; The velocity is negative as it approaches the radar. the remaining 15 bits represent the absolute value of the velocity, in units of... cm/s	uint16 type; Single pixel distance value, single Position mm

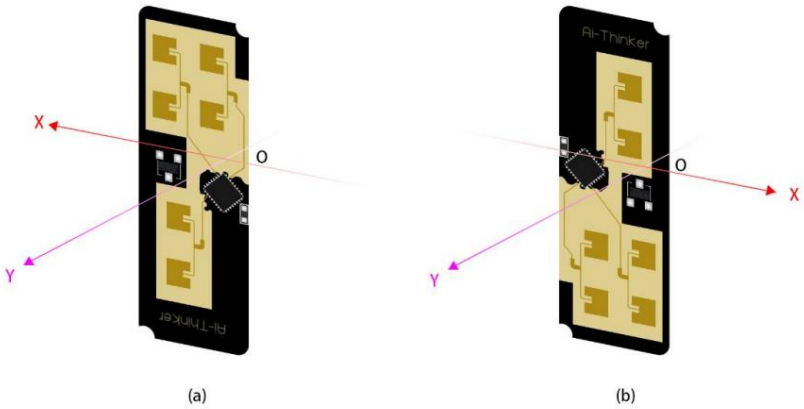


Figure 3-1 Schematic diagram of the target position coordinate system under the recommended installation method

Example data: AA FF 03 00 0E 03 B1 86 10 00 4A 01 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

00 00 55 CC

This set of data indicates that the radar tracked one target, namely target 1 (blue field in the example), and targets 2 and 3 (respectively).

The red and black fields (as shown in the example) do not exist, therefore their corresponding data segment is 0x00. The module converts the data from target 1...

The process of replacing the information is shown below:

Target 1 x coordinates: 0x0E + 0x03 * 256 = 782

0 - 782 = -782 mmÿ

Target 1 y-coordinate: 0xB1 + 0x86 * 256 = 34481

34481 - 2^15 = 1713 mmÿ

Target 1 Speed: 0x10 + 0x00 * 256 = 16

0 -16 = -16 cm/sÿ

Target 1 Distance resolution: 0x4A + 0x01 * 256 = 330 mm.

Contact Us

Anxinke official website | Official Forum | Develop DOCS | Anxinke LinkedIn

Tmall flagship store | Taobao Shop | Alibaba International Station

Technical support email: support@aithinker.com

Domestic business cooperation: sales@aithinker.com | Overseas business cooperation: overseas@aithinker.com

Company Address: Room 403, 408-410, Building C, Huafeng Smart Innovation Port, Gushu, Xixiang, Bao'an District, Shenzhen

Contact number: 0755-29162996

Ask Anxin Ke

Anxinke Official Account

Disclaimer and Copyright Notice

The information contained herein, including URLs provided for reference, is subject to change without notice.

This document is provided "as is" without any warranty, including any warranty of merchantability, fitness for a particular purpose, or non-infringement, and any warranty mentioned elsewhere regarding any proposal, specification, or sample. This document assumes no liability, including liability for any infringement of patent rights arising from the use of the information in this document. This document does not grant any license to use any intellectual property rights herein, whether express or implied, by estoppel or otherwise.

The test data presented in this article are all from tests conducted by the Siasun Robot & Automation Co., Ltd., and the actual results may differ slightly.

All trademark names, trademarks and registered trademarks mentioned in this article are the property of their respective owners.

The final interpretation right belongs to Shenzhen Anxin Technology Co., Ltd.

Notice

The contents of this manual may change due to product version upgrades or other reasons.

Shenzhen Anxin Technology Co., Ltd. reserves the right to modify the contents of this manual without prior notice or warning.

This manual is for guidance only. Shenzhen Anxin Technology Co., Ltd. has made every effort to provide accurate information in this manual. However, Shenzhen Anxin Technology Co., Ltd. does not guarantee that the content of this manual is completely error-free, and all statements, information and suggestions in this manual do not constitute any express or implied warranty.

Important Announcement

Anxin provides technical and reliability data (including datasheets), design resources (including reference designs), application or other design suggestions, network tools, security information, and other resources (hereinafter referred to as "these Resources") "as is," without warranty of any kind, including but not limited to warranties of fitness for a particular purpose, fitness for a particular purpose, or non-infringement of any third-party intellectual property rights. Anxin specifically disclaims all liability for any consequential or incidental damages arising from or related to this application or the use of any of Anxin's products and circuits.

Anxin reserves the right to disclose the information in this document (including but not limited to indicators and product descriptions) and any changes to the company's products involved without prior notice. This document automatically supersedes and replaces all information provided in previous versions of the same document number.

These resources are available to skilled developers who design using Axiomtek products. You will assume full responsibility for: (1) selecting appropriate Axiomtek products for your application; (2) designing, validating, and operating your application and products throughout their lifecycle; and (3) ensuring that your application meets all applicable standards, specifications, and laws, as well as any other functional safety, information security, regulatory, or other requirements.

You are authorized by Synnex to use these resources solely for the development of applications of Synnex products described herein. No part of these resources may be copied, reproduced, or distributed in any form without Synnex's permission. You have no right to use any other Synnex intellectual property or any third-party intellectual property. Synnex shall fully indemnify and hold harmless Synnex and its representatives from any claims, damages, costs, losses, and liabilities arising out of or in connection with the use of these resources.

The products offered by Anxin are subject to Anxin's terms of sale or other applicable terms accompanying the Anxin product. Anxin's provision of these resources does not extend or otherwise change the applicable warranties or warranty disclaimers issued with respect to the product.