ITS-AX1 Barrier Gate Control Radar

(Collision Avoidance Type)

User Manual

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Thank you for purchasing Barrier Gate Control Radar with collision avoidance for smart access radar products. To ensure the best performance of the radar product, you are kindly invited to read this user manual carefully, then you are strongly suggested to install and debug it strictly following the instructions provided in this manual.

Content

1.Introduction

ITS-AX1 barrier gate control radar is developed for the entrance and exit management of parking lots or underground garages. It can precisely control the rising and falling of the gate rod by cooperating with the main control board of the gate control system, which could effectively avoid the "accidental injury" of the gate rod to the passing vehicles or pedestrians in the radar field of view,and realize intelligent anti smashing.

ITS-AX1 radar adopts the highly integrated RF chip SOC scheme, which has the characteristics of small size, low cost, all-weather working capability, high detection sensitivity, high precision, easy to debug&installation, very good stability and reliability.

The working frequency of the radar is 79GHz, with Linear Frequency Modulation and Continous Waveform, which makes the available bandwidth up to 4GHz. The range resolution is up to 4cm, and ranging accuracy is better than 2cm. The radar antenna adopts multiple transmitting and multiple receiving design that enables the radar good angular resolution and high angle measuring accuracy. The onboard signal processing and control unit apply the DSP&arm dual core architecture. Through the joint optimization design of software and hardware, this product can accurately identify and distinguish the pedestrian, vehicle and other targets passing through the brake lever area, and avoid the phenomena of "smashing the vehicle", "smashing the person" and "not dropping the lever".

2.Technical Specifications

Terms	Parameter	Value
Working Condition	Input Voltage(Volts)	10~16
	Temperature Range(℃)	-40~85
	Power(W)	< 2.5
	Water Rissistance Level	IP67
	Connection Interface	RS485/Bluetooth
	Size(mm)	107.5*73.2*18
Detection Zone	Along Road Width	Default ± 0.5m (configurable within ±1.5m)
	Cross Road Range	Default 3 m (configurable

		within 6 m)
Upgrade and Debug	Online debugging	Serial Port / Bluetooth Debug
	Online update	Serial Port / Bluetooth Upgrade
Application type	All brake lever types	

3.Features

The appearance of radar is shown in Figure 1. The main features are:

LED indicators：

There are two LED indicators on the surface of the front of radar.

The red LED is the power state lamp which will stay on when the power supply is turned on. The green LED is the operating status lamp which will be automatically trigger on when objects detected in the access area and it goes off when there is no objects.

Detection Zone configuration:

The default detection Zone of the radar is 3 meters forward times 0.5 meters on the left and right sides. Different detection areas can be configured via mobile APP or debugging software running on uphost computer.

Configuration parameters saving and reload:

Configuration such as detection area could be automatically saved, and the latest configuration parameters after power failure and restart will be reloaded.

Firmware upgrade:

The firmware can be upgraded online through RS-485 or APP interface with host computer without taking off the cover board and the new firmware can take effect just by restarting the power of radar.

Stable performance:

Millimeter wave radar sensing capablity stay nearly the same under different light illuminations, climates such as rain, fog or snow and dust.
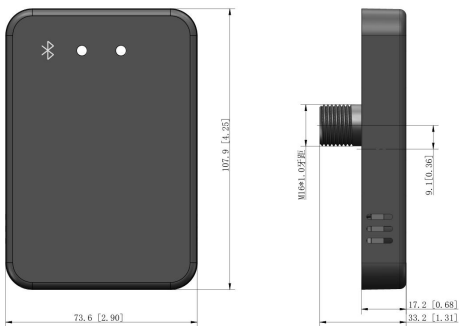
Figure 1. Appearance and Size

107.9 [4.25]

73.6 [2.90]

M16×1.0牙距

9.1 [0.36]

17.2 [0.68]

33.2 [1.31]

The radar must be installed on the surface of gate box body and the radar surface with LED indicators must be perpedicular to the lane (vehicle access) direction. The installation must follow the instructions below:

Step1.Choice of radar mounting location.

the radar LED indicator must be facing down which refers in Figure 2. The installation position of radar must be 200-300mm away from the barrier gate and 550-750mm higher than the ground.
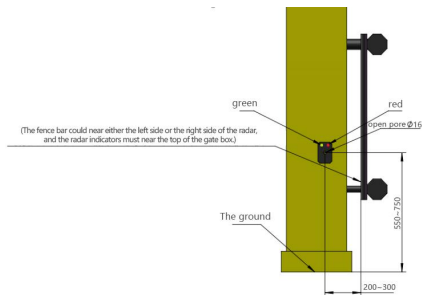
Figure2.Radar Installation Demonstration

Step2.Trepanning

A mounting hole of M16 should be drilled on the surface of gate box according to the installation position illustrated in the former part(see figure 2).

Recommended diameter of drilling hole must be approximately 16mm.

Step3. Radar mounting and fixing.

(a)Put radar through the circular hole

M16 nut

(b)Nut locking and fixing

(c)Post installation display

Figure 3. mounting and fixing steps schematic

As shown in Figures 3 (a)-(c), the radar is fixed to the brake box through the bottom bolt. Firstly the radar is plugged into the brake box, then cover the washer with M16 screws to fix it, then insert the end of the wire harness into the radar in the correct direction and lock the metal buckle. The final installation effect is shown as Figure 4.

Figure 4. Installation Demonstration

5.Interface Definition

NO	CABLE ID	Color	Description
1	12V	Red	positive pole
2	GND	Black	negative pole
3	GND	Yellow	Reserved Ground
4	RX	White	RS485 B-
5	TX	Gray	RS485 A+
6	Normally open1	Blue	Normally open1
7	Normally open1	Green	Normally open1
8	Normally	Brown	Normally close2
9	Normally	purple	Normally close2
10	Enter	Orange	Enter

Here are the detailed connections of these interface to the gate control board.

● **Power supply connection:**

The red wire("VCC") **MUST** be connected to the positive output terminal of the 12V power supply,

The black wire ("GND") **MUST** be connected to the negative output terminal of the power supply.

● **Barrier gate control signal:**

The green and blue wires are normally open signals 1 of the radar onboard relay1.

The brown and purple wires are normally close signals 2 of the radar onboard relay.

The control line wires **MUST** be connected to the originally loop detector interface and the public common signal interface.

- **RS-485 line connection:**

gray line by line RS-485 T/R + end;

white line by line RS-485 T/R - end.


- **Bluetooth connection**

bluetooth name: "Radar…";

user password: 88888888.
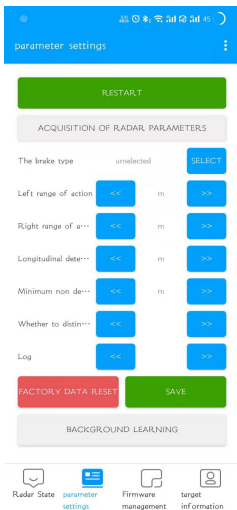
6.Configuration Instructions

The radar can be debugged through either the mobile APP or the debuging software on the uphost computer.

Mobile application debugging instructions:

After installing the debugging application to the mobile phone, click the icon of the application and the user interface is displayed as Figure 5. Click Connect Device button as shown in Figure 6, and select "Radar..." Bluetooth pairing connection
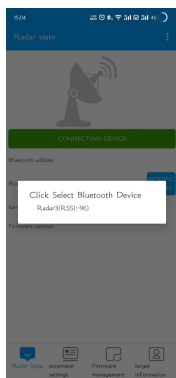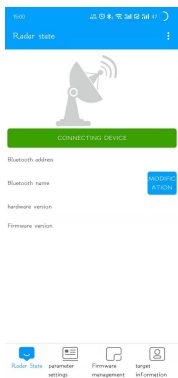
Radar parameters can be reconfigured according to the actual circumstances and then just record the the background clutter.

Other detailed operation can be found in the product manual and application manual.

Computer software debugging instructions

You can configure the radar detection area, the learning and recording environment by using the "Barrier Setting" tool software (the interface is shown in Figure 5), the serial port printing tool, and the one-click distance adjustment.
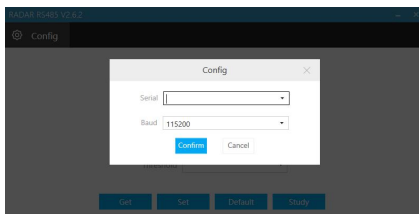

Note: The baud rate MUST be 115200.

Host Software Setting:

● **Step1: Select the serial port number**

Insert the 485 connector to the host computer, to establish the connection between radar and the host computer, and the customers can find the port number

in the device manager list of the computer and select it (for the serial port connection method, refer to Section 5 of this manual for interface cable description).
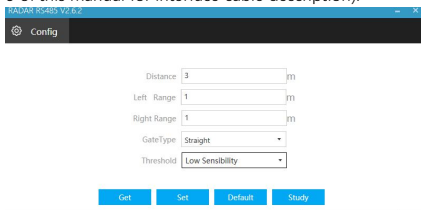
Step2: Radar Sensing Range Setting

The factory default operating range of radar is 3 metres. The user can set it according to the length of the specific gate bar.

Step3: Boundary Setting

the factory default boundary of radar detection along the access road is limited to -0.5 m and 0.5m in the center of the gate bar. The default setting is

recommended. Users can also customize the setting within ±1 m according to the actual situation.

● **Step4: Enable Custom Settings**

After setting the working distance and range, click Reset. After setting the barrier type, click Reset. The new setting parameters will take effect after restarting the radar.

As shown in the figure above:

- Distance: Set the Radar monitoring distance.

- Left Range, Right Range: Set the Radar monitoring left range and right range.

- Gate Type: Set the boom type of the barrier.

- Threshold: Set the detection sensitivity.

High sensitivity supports anti-smashing and dropping boom (for people and vehicles when they leave the Radar detection area) for people and vehicles.

Medium sensitivity supports anti-smashing and dropping boom for vehicles, supports anti-smashing for people.

Low sensitivity supports anti-smashing and dropping boom for vehicles.

- Get: Gets current Radar parameters.

- Set: Saves the Radar parameters to make the settings effective.

- Default: The Radar parameters will be restored to the factory settings.

- The default sensibility is high sensibility, the default detection distance is 3m, and the

left and right are 0.5m, the detection area is
as shown in the figure below.
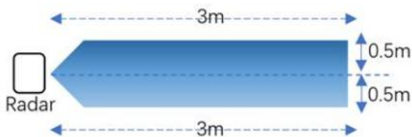
1) Background recording

Bar Type: Straight Boom.

The background learning steps are as follows:

- Keep the barrier bar in a raised state.

- Power on the radar and click 'Record'
  button on the software.

- The straight bar will remain still and the light remains unchanged.

- The Radar can be restarted after power failure.

Bar Type: Fence Bar / Advertisement Bar / Airborne Gate.

The background learning steps are as follows:

- Keep the barrier bar in a raised state.

- Power on the Radar and click 'Recording' button on the software.

- The barrier bar will fall automatically. Stand behind the radar next to the barrier and observe the Radar green LED indicator light (or stand outside the long distance of the

bar set opposite the Radar), the green LED indicator will flash quickly.

- Wait for 3 seconds after the bar is completely stabilized and use the barrier remote control to open and close the gate repeatedly for about three minutes until the green light stay on, indicating that the environmental recording is complete successfully..

- The Radar can be used after power off and restart.

Note: During background recordinging, please ensure that there are no objects (such as vehicles, pedestrians etc) other than the fixed environment within the Radar detection range.

7.Remarks

- Please read the following instructions carefully before using radar:
- Ensure power supply stable to prevent bad influence on the performance of the radar.
- Avoid collision and falling to avoid physical damage of the radar.
- It should be cleaned in time when the radar surface is covered with foreign matter to ensure the transmissivity of electromagnatica waves.
- Please reconfigure the radar parameters and power off and restart when the detection environment changes.
- Objects affecting target detection such as metal objects etc should not be placed within the detection area of radar to avoid triggering by mistake;

- The installed gate box must be stable, and the shaking of the box will easily lead to abnormal radar operation.

- Under normal circumstances, please set the detection distance according to the length of the pole. The detection distance is slightly less than or equal to the length of the pole to prevent people or objects outside the brake lever from being detected by the radar.

Problem: After installation, the green light of the Radar is always on, and the boom does not fall.

Possible Cause: The newly added strong reflector in the Radar detection range needs to be moved out of the Radar field of view or re-learned for background learning.

1. **Problem**: If the person is standing in front of the Radar the green light will not turn on.

   Possible Cause: The Radar starts to detect the difference between people and vehicles after the car triggers the Radar light.

2. **Problem**: The red light of Radar flashes when the 12V power supplied by the gate control board is on.

   Possible Cause: It is recommended to connect an external 12V-1A power adapter.

Packing List

No	Accessory Name	Quantity
1	Radar	1
2	M16 nut	1
3	Waterproof rubber ring	1
4	gasket	1
5	Plug-in wiring harness	1