60GMilimeterwave

Bio-sensing radar

R60AMP1-Multi-person track module using guide

Please read the product instructions carefully before use and keep them properly V1.0

1. Product description

The multi-person trajectory tracking radar performs basic population statistics and multi-person location detection based on the movement amplitude, distance, and angle of people, including breathing movements and other subtle amplitudes. By judging the change of the distance and angle of the personnel through the change of the radar echo in real time, the real-time reporting of the position of the personnel is realized, and the trajectory tracking effect is realized. According to the movement amplitude (sign size) and the weak human breathing micro-motion signal, it can identify the static and active situation of the target, and output a stable static position locking function.

# 2. Appearance introduction

Antenna surface
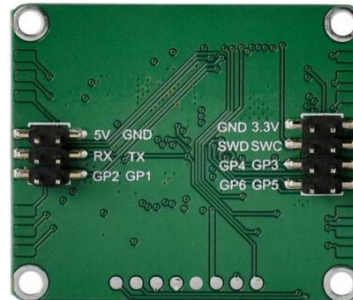
pin

3. Main performance description

3.1. Main functions of radar

| function points	State change time/function explanation
DP1: Multi-target distance changes in real time	Report distance information once in 1s
DP2: Real-time change of multi-target angles	Report angle information once in 1s

4. Module package size and pin description
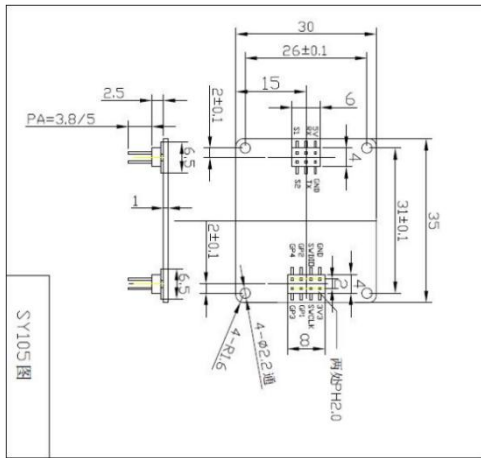
| 接口	引脚	描述	典型值	说明
接口1	1	5V	5.0V	电源输入正端
	2	GND		地
	3	RX	3.3v	串口接收
	4	TX	3.3v	串口发送
	5	GP2		备用扩展引脚
	6	GP1		备用扩展引脚
接口2	1	3V3	3.3V	输入电源
	2	GND		地
	3	SL		保留
	4	SD		保留
	5	GP3		备用扩展引脚
	6	GP4		备用扩展引脚
	7	GP5		备用扩展引脚
	8	GP6		备用扩展引脚

Radar module structure diagram Pin description

Note:
1）GP1~GP6 are parameter selection control terminals, which can be redefined according to user needs.
2）The output signals of this interface are all 3.3V level.
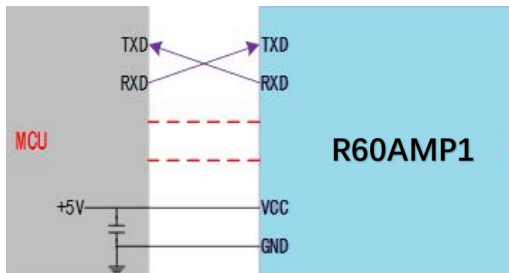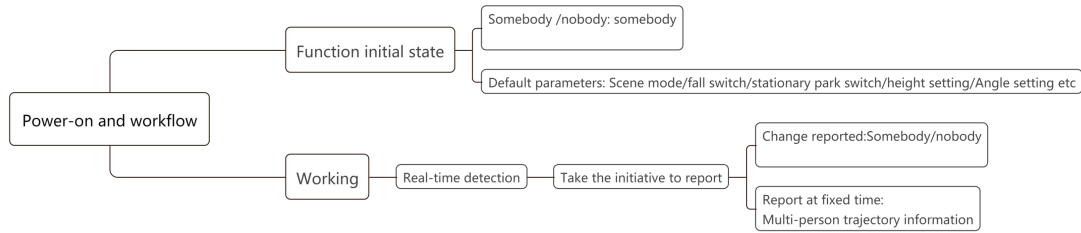

Use wiring diagram module wiring diagram
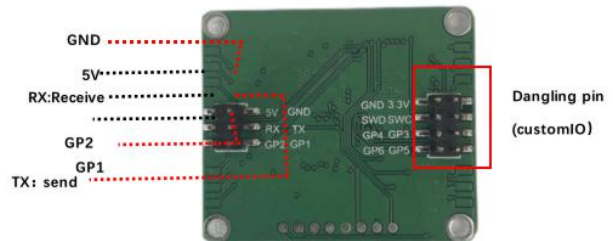
Module wiring diagram

5. Tool preparation

5.1. TTL serial port tool, DuPont line, PC computer, serial port assistant terminal
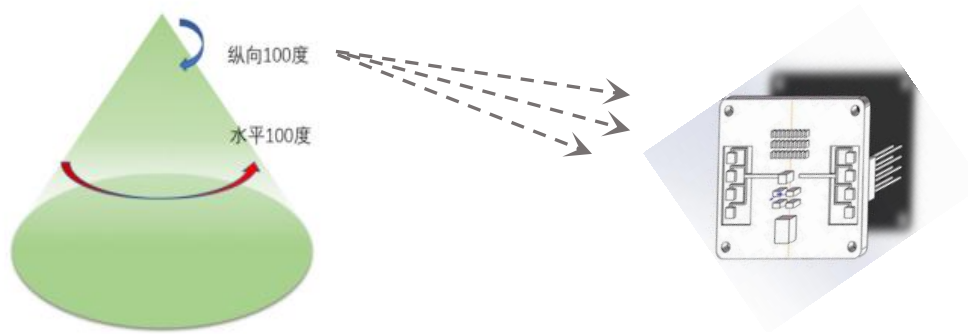5.2. Radar User Manual (Protocol)

6. Power-up and data rules

7. Radar Installation Instructions

7.1. Working range of radar module

The beam coverage of the R60AMP1 radar module is shown in the figure below. The radar coverage is a three-dimensional sector area of 100° horizontally and 100° vertically.

Schematic diagram of R60AMP1 radar coverage area

### 7.2. Radar installation direction and detection range

7.2.1 Horizontal installation

* To ensure the accuracy of radar detection, please install it horizontally!

The radar is installed horizontally to ensure that the main beam of the radar covers the detection area; the recommended installation height of the radar is $1m \leqslant H \leqslant 1.5m$, and it is recommended to install 1.4m by default. There are no obvious obstructions and coverings in front of the radar.

Affected by the installation height of the radar and the range of the radar beam, in this installation mode, the maximum distance of motion trajectory tracking is L3 ≈ 10 meters; the maximum distance of human static position detection is L2 ≈ 6 meters.

(Note: The minimum angle for multi-target motion track tracking to distinguish between multiple people: ≥20°, and the minimum distance for multi-target motion track tracking to distinguish between multiple people: ≥0.5 meters)
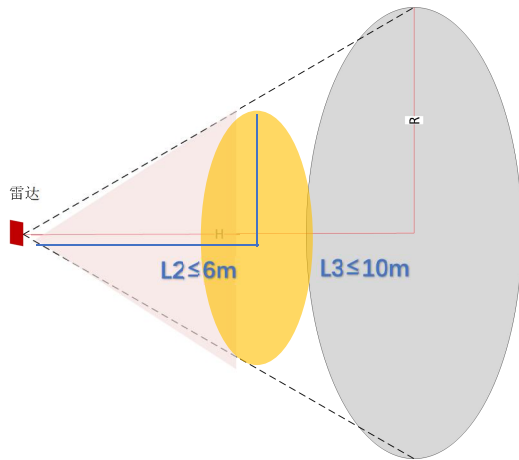
8. Key Functional Testing Guidelines

Motion track tracking test:

● **Track tracking real-time test:**

When performing a multi-target moving test within the radar detection range, the radar will report the real-time angular distance change information of different targets every second, and form a real-time trajectory through the real-time position.

carry out testing Multiple targets move at will within a certain distance	When judging whether the radar can normally report the real-time angular distance change information of multiple targets per second, if the output can be judged normally, it means "passed"

Example test table format:

Testing frequency	move	Is the trajectory tracking normal?	pass
the first time	move freely	Yes	pass

Static position detection test:

● **Static distance information accuracy test:**

The mobile test is carried out within the radar detection range, and when it stops at a random position, the distance reported by the radar at the end is compared with the actual distance to confirm whether the distance error value is within a reasonable range to confirm the accuracy of the

distance information.

carry out testing Move freely within the range for a certain distance and then stop at any position	Judge whether the error between the last reported distance of the radar and the actual distance is within the specified accuracy range, within the specified accuracy range, it means "pass"

Example test table format:

Testing frequency	Radar distance information	Compared with real distance information Whether it is within the accuracy requirements	pass
the first time	2.1m	Yes	pass

● **Static angle information accuracy test:**

The mobile test is carried out within the radar detection range, and when it stops at a random position, the last angle reported by the radar is compared with the real angle to confirm whether the distance error value is within a reasonable range to confirm the accuracy of the distance information.

carry out testing Move freely within the range for a certain distance and then stop at any position	Determine whether the error between the angle finally reported by the radar and the real angle is within the specified accuracy range, and within the specified accuracy range, it means "pass"

Example test table format:

Testing frequency	Radar angle information	Compared with real distance information Whether it is within the accuracy requirements	pass
the first time	50°	Yes	pass

When performing a multi-target moving test within the radar detection range, the radar will report the real-time angular distance change information of different targets every second, and form a real-time trajectory through the real-time position.

carry out testing Multiple targets move at will within a certain distance	When judging whether the radar can normally report the real-time angular distance change information of multiple targets per second, if the output can be judged normally, it means "passed"

Example test table format:

Testing frequency	move	Is the trajectory tracking normal?	pass
the first time	move freely	Yes	pass

Static position detection test:

9. Guide to the actual installation steps of the radar

Step 1: Confirm the main activity and stay area of the person, which is the coverage area of the radar

Step 2: Confirm the actual horizontal installation height of the radar is 1.2m-1.5m

Step 3: Confirm whether there is an interference source within the radar detection range , and remove the interference source as much as possible

Step 4: Follow the steps to confirm the final installation location for normal use

10. Layout Requirements for Antenna and Housing

PCBA: Need to keep the height of the radar patch ≥ 1mm than other devices

Shell structure: It is necessary to maintain a distance of 3mm between the radar antenna surface and the shell surface

Shell detection surface: non-metallic shell, need to be straight, avoid curved surface, affect the performance of the entire scanning area.
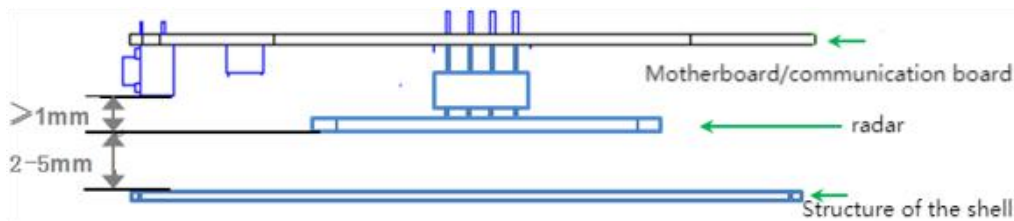
11. Common problem

Interference factors: Radar is an electromagnetic wave detection sensor, and active non-living will cause false alarms. The movement of metals, liquids, can lead to false positives. Usually, electric fans, pets close to the radar, and the shaking of metal curtains can cause false positives. Radar needs to be planned in terms of installation angle.

Non-interfering factors: radar electromagnetic waves will penetrate human clothing, curtains, thin wood, and glass. The installation angle and

performance of the radar need to be determined according to the application.

Semi-interference factor: Radar judges the existence of human body and is not suitable for directly facing the air conditioner. The motor inside the air conditioner can cause the radar to misjudge. It is required that the radar product does not directly face the air conditioner. Or in the same direction as the air conditioner.

12.Historical version update instructions

Revision	Release Data	Summary
V1.0_0520	2022/05/20	first draft