60GMilimeterwave Bio-sensing radar

R60AFD1-Fall detection module using guide

Please read the product instructions carefully before use and keep them properlyV1.0

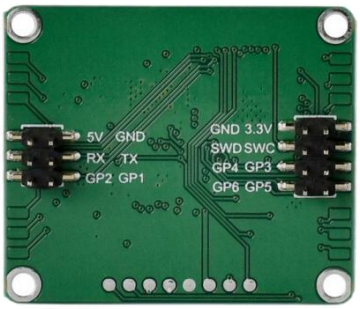
MicRadar Technology (Shenzhen) Co. ,LTD

1. Product description

The fall detection radar makes algorithm judgment based on the characteristics of personnel attitude parameters. It detects the falling state of the target person through changes in speed, distance, attitude and other motions, continuously records whether the target is in danger of falling, and responds to the stationary residence alarm for long-term abnormal stay. This product is installed on the top of the kitchen and bathroom. The fall/still dwell function detection is not affected by factors such as temperature, humidity, noise airflow, dust, light, and complete stillness of the human body.

2. Appearance introduction

Antenna surface



Pin

3. Main performance description

3.1. Main functions of radar

function points	State change time/function explanation
DP1: Someone/Nobody	No one to someone, report within 0.5s From someone to no one, output no one status within 1 minute
DP2: Someone is stationary / Someone is active	Static to dynamic switching, report within 0.5 seconds Dynamic to static switch, report after 3 seconds
DP3: Motion amplitude parameter 0 - 100	Output data once per second [Reference: Description of Body Motion Amplitude Parameter Output]
DP4: Fall Alarm	If it is judged that the conditions are met, report a fall alarm

DP5: Stationary park alarm	Report static parking alarm when it is stationary for 5 minutes
DP6: Installation height setting	The default setting is 240 cm, and it can be set to 200 cm - 300 cm
DP7: Fall alarm switch	Control whether the fall alarm is reported
DP8: Static parking alarm switch	Control whether the static parking alarm is reported or not

3.2. Body Motion Amplitude Parameter Output Description

Body Motion Parameter		
0%	unmanned	unmanned environment
1%	still (sleep)	Only breathing without limb
2%-30%	micro-motion	Only slight head or limb
31%-60%	Ambulation/rapid	slower body movement
61%-100%	running/close range	rapid body movement

4. Module package size and pin description

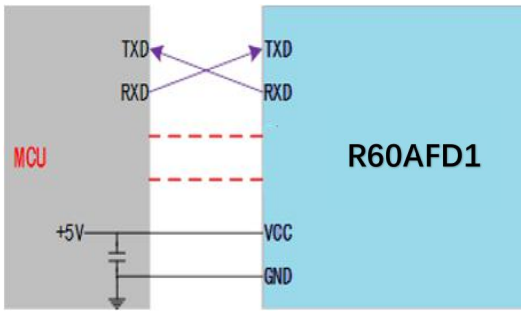
interface	pin	describe	Typical value	illustrate
interface 1	1	5V	5.0V	Power input positive terminal
	2	GND		land
	3	RX	3.3v _	Serial receive
	4	TX	3.3v _	Serial send
	5	GP2	3.3V / 0V	Someone/Nobody
	6	GP1	3.3V / 0V	active/still
interface 2	1	3V3	3.3V	output power
	2	GND		land
	3	SL		reserve
	4	SD		reserve
	5	GP 3		Spare expansion pins
	6	GP 4		Spare expansion pins
	7	GP 5		Spare expansion pins
	8	GP 6		Spare expansion pins

Pin Description

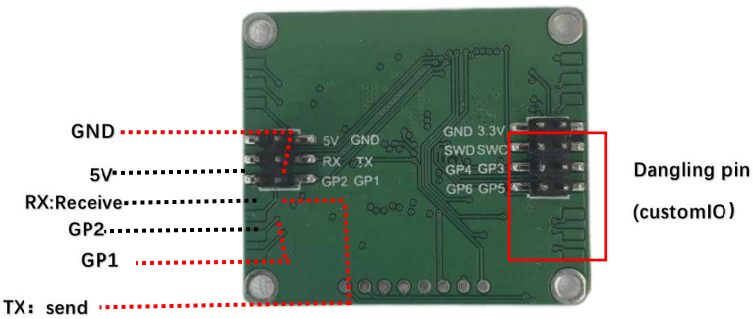
Note:

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 diagrams



Module wiring diagram

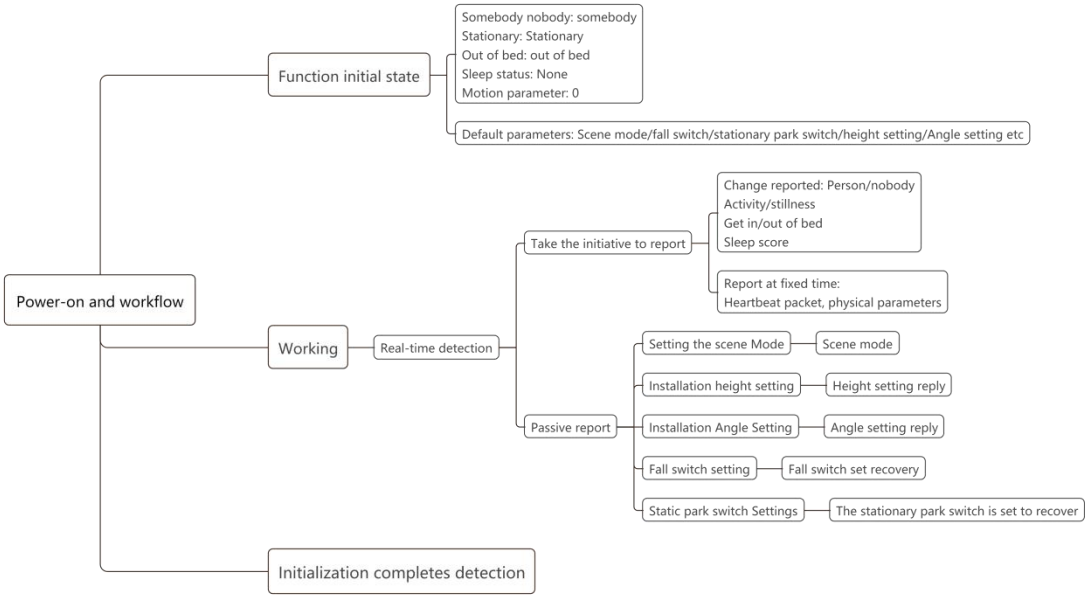
5. Tool preparation

5.1. TTL serial port tool, DuPont line, PC computer, serial port assistant terminal

5.2. Radar-EVB demo board (default Tuya platform, you can freely adapt your own communication module)

5.3. Radar User Manual (Protocol)

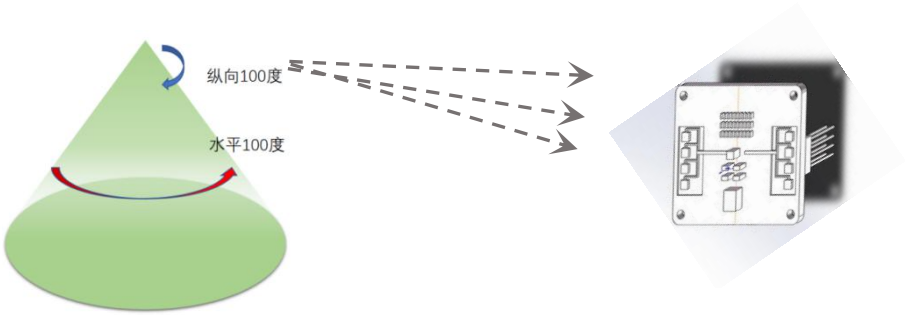
6. Power-up and data rules



7. Radar Installation Instructions

7.1. Working range of radar module

The beam coverage of the R60AFD1 radar module is shown in the figure below. The radar coverage is a three-dimensional sector of 100 ° horizontally and 100 ° vertically.



Schematic diagram of R60AFD1 radar coverage area

7.2. Radar installation direction and detection range

7.2.1 . Overhead installation

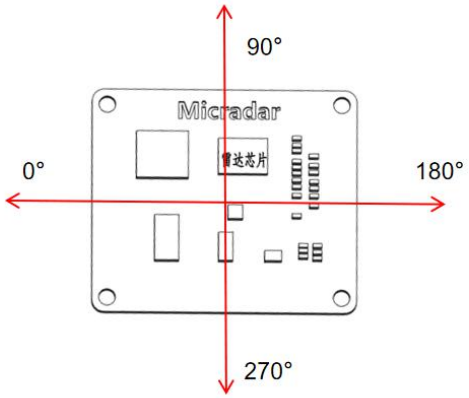
* To ensure the accuracy of radar detection, please install it on the top!

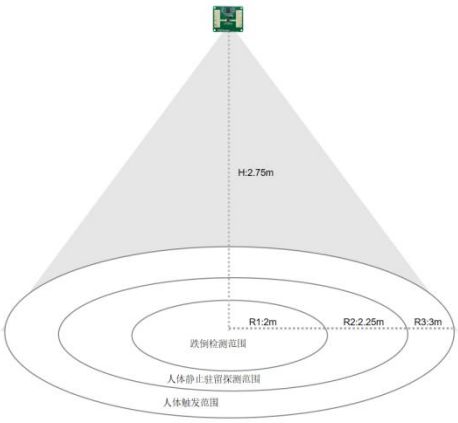
radar is installed vertically, and the horizontal deviation angle is ≤ 5 ° to ensure that the main beam of the radar covers the detection area; the recommended installation height of the radar is 2 meters ≤ H ≤ 3 meters; there are no obvious obstructions and coverings in front of the radar.

Affected by the installation height of the radar and the range of the radar beam, in this installation mode, the maximum radius of moving human detection is R3 ≈ 3 meters; the maximum radius of human stationary detection is R 2 ≈ 2.25 meters ; the fall detection radius R 1 ≤ 2 meters.

Detection range

When the overhead radar detects human activity, the trigger range is about 4 meters * 6 meters, the detection range when the human body is stationary is 4 meters * 4.5 meters , and the human fall detection range is ≤ 2 meters.





8. Guide to the actual installation steps of the radar

Step 1: Confirm the main activity and stay area of the person (fall detection area), and the center of this position is the installation position of the radar

Step 2: Confirm the actual installation height of the radar, and set the height of the radar according to the specific height

Step 3: Confirm the actual installation method of the radar, and select the installation angle setting according to the specific installation method (the installation method is top-mounted)

Step 4: Determine the entrance and exit of the space, and point the long side of the radar to the entrance and exit to ensure the trigger effect of people entering

Step 5: Confirm whether there is an interference source within the radar detection range

Step 6: Confirm whether the real use scene of the radar is a bathroom/kitchen/bedroom and other scenarios that need to consider fall detection and stationary parking detection, and use the fall alarm and stationary parking alarm functions accordingly.

Step 7: Follow the steps to confirm the final settings for normal use

Example:

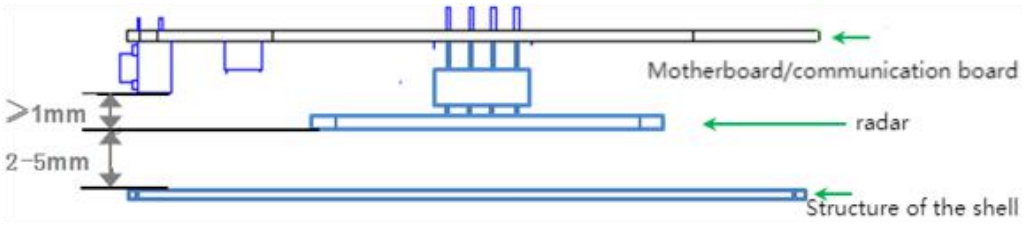
Space size: 3.5㎡ - 6㎡
Possible sources of interference: exhaust fans/metal shutters/blackout coated curtains
Recommended scene mode: kitchen/bathroom
Installation orientation: the long side faces the door

9. Layout Requirements for Antenna and Housing

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

3 mm between the radar antenna surface and the housing surface

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



10. 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.

11.Historical version update instructions

Revision	Release Data	Summary	Author
V1.0_0520	2022/5/20	first draft	OF_Frank