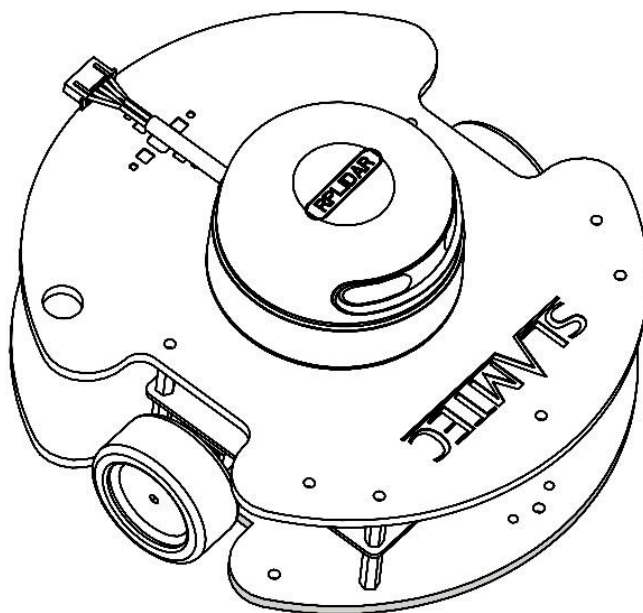


SLAMWARE

RoboStudio-Android

User Manual



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I. Introduction

RoboStudio.Android is an Android app for easy deploying robots with multiple convenient functions, such as virtual walls, virtual tracks, restricted areas, etc.

II. User Guide

1. Connect Device

In the “Device” view, input IP address and port then click button “Connect” to connect a device. See figure 1.



Figure 1: Connect Device.

2. Disconnect Device

There are two ways to disconnect a device. One way is using the system back button or using the system back gesture to back to the “Device” view. This action will disconnect the device. (See figure 2)

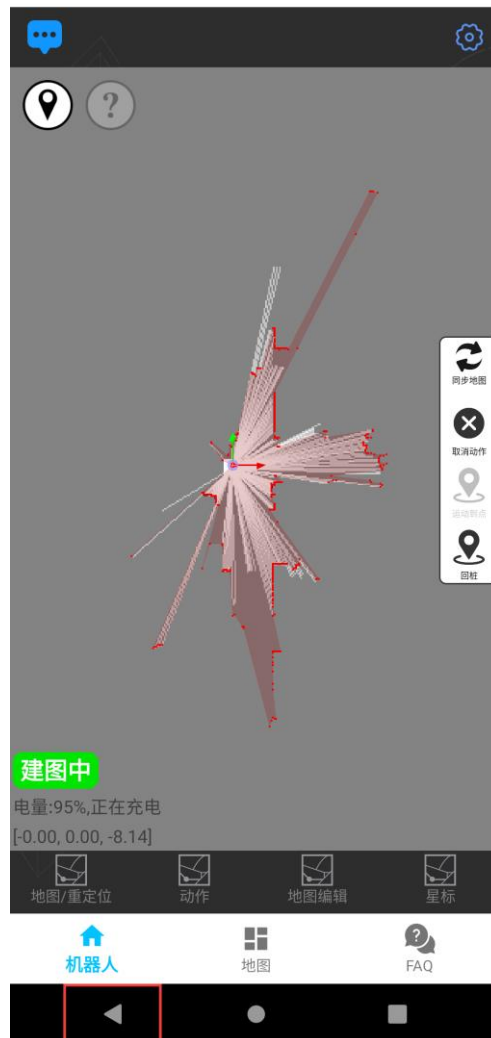


Figure 2: Use back button to disconnect a device.

The other way is going to the “Device Setting” view and click the button “Disconnect”. (See figure 3 and figure 4).

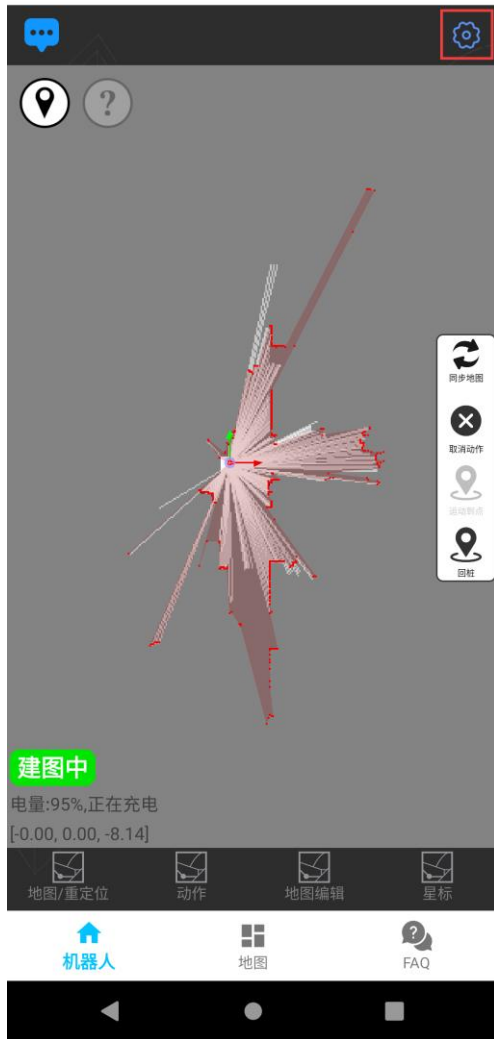


Figure 3: Go to “Device Setting” view.



Figure 4: Click the button “切换设备”.

3. Map Display

You can always use the following gestures to move, zoom or rotate the map.

- Use a pan gesture to move the map.
- Use a pinch gesture to zoom the map.
- Use a rotate gesture to rotate the map.

RoboStudio.Android also provides two viewpoints. By clicking the viewpoint image (see figure 5), you can switch between the global mode and the following mode.

- Global Mode: you can see the whole map on the screen and the robot indicator will move on the map.
- Following Mode: the robot indicator will always keep steady and the map will moves automatically according to the robot’s position.



Figure 5: the viewpoint.

4. Move Device

RoboStudio.Android provides ways to move the robot. While controlling the robot moving, it can plan a path to the destination and avoid obstacles.

Use Move-To: Click the button “Move To” (see figure 6) to enable “Move To” mode. By tapping on the map to set a destination, the robot will stop the current action, then plan a path to the destination and start moving to it.



Figure 6: the “Move To” button.

Use a joystick: Click the button “Joystick” to show the joystick controller (see figure 7). You can use it to control the robot moving to anywhere. Please note the robot will execute your command directly in this mode. You have the responsibility to avoid obstacles.



Figure 7: the Joystick.

Back to dock: Click the button “Dock” to order the robot go back to the dock (see figure 8). If there is no dock registered, the app will ask you to set one. Please tap on the map to set a dock position.



*Figure 8:
the Dock
button.*

Stop: At any time you can click the button “Stop” (see figure 9) to stop the robot.



*Figure 9:
the Stop
button.*

4. Localization and Mapping

Simultaneous localization and mapping is core technology of autonomous robot movement. RoboStudio.Android provides functions to control how robots localize and map.

A. How To Understand The Map

Simultaneous localization and mapping of Slamtec robots is based on raster graphics. Robots can keep updating the map while exploring the environment.

In RoboStudio.Android, the grayscale value of each raster pixel represents the probability of an obstacle. White means no obstacle exists and black means an obstacle exists. While mapping, not all raster pixels are white or black. Unexplored areas are not blocked nor clear. They will be gray.

B. Eraser

Click button “Eraser” in “Edit” to enable eraser mode (see figure 10). You can choose “gray” (unexplored area), “white” (clear area) or “black” (blocked area) and you can choose the eraser size. Please zoom in the map then click the “eraser” image. Now you can use your finger moving on the map to edit it.



Figure 10: Eraser

C. Clear Map

Click the button “Clear Map” in “Map / Localization” to clear the map. Robot will then enable mapping automatically so you can build a new map.

D. Synchronize Map

RoboStudio.Android will update the area surrounding the robot by default. When you want to update the whole map, please click the button “Sync” on the right of the screen.

5. Virtual Walls

RoboStudio.Android provides virtual wall function that you don’t need any extra items to achieve it. Robot treats virtual walls as solid walls and will bypass them. You can always edit virtual walls whenever you want.

Click the button “V-Walls” in “Edit” to enable virtual wall editing mode.

A. Add A New Virtual Wall

There are two types of virtual wall, straight wall and curve wall. Add a wall by clicking “+Stright” or “+Curve”.

B. Move A Virtual Wall

See figure 11. There is a dot at each endpoint of a virtual wall. Drag the dot to move the virtual wall.

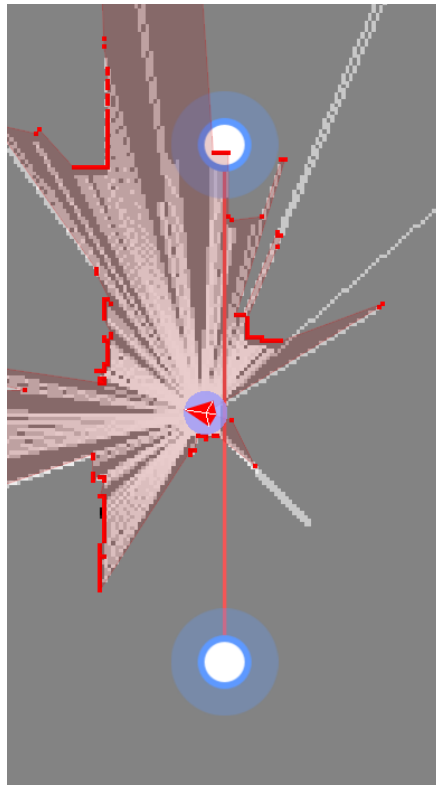


Figure 11: Move the virtual wall.

C. Delete A Virtual Wall

Click “Delete” and an “X” image will display at the middle of each virtual wall. Click the image to delete the virtual wall.

D. Save

Remember to click “✓” to save the result.

E. Precaution

If you have used the windows version of RoboStudio to edit virtual walls, please don’t reference virtual walls displaying in RoboStudio.Android. And please don’t use RoboStudio.Android to edit those virtual walls. Please use the windows version of RoboStudio to reference and edit those virtual walls.

6. Virtual Tracks

Like virtual walls, virtual tracks allows you to draw tracks on RoboStudio.Android to guide robots following the path to move. Virtual tracks are very useful in scenarios of requiring robots following fixed paths to patrol, such as indoor delivering, patrolling, factory transporting, etc. Robots will search

the nearest location of the tracks while planning a route. Then it will go to that location to enter the tracks and follow the tracks to move.

Click “V-Tracks” in “Edit” to enable virtual tracks editing mode.

A. Add A New Virtual Track

There are two types of virtual tracks, straight virtual track and curve virtual track. Click “+Straight” or “+Curve” to add a new track.

B. Move A Virtual Track

There is a dot at each endpoint of a virtual track. Drag it to move the virtual track.

C. Delete A Virtual Track

Click “Delete” and then a “X” image will display in the middle of each virtual track. Click the image to delete the virtual track.

D. Save

Remember to click “√” to save the result.

E. Navigation Mode

Robots will not follow the virtual tracks to plan movements in the default mode. You have to set the navigation mode in the “Setting” view. There are two navigation modes which robots can follow the virtual tracks.

When “Track Restrictive” mode activates, robots will follow the virtual tracks restrictively. If there is an obstacle on the track, robots will stop moving until the path is clear.

When “Track Prioritized” mode activates, robots will follow the virtual tracks at best. If there is an obstacle on the track, robots will be off the track to bypass it and then go back to the track.

F. Precaution

If you have used the windows version of RoboStudio to edit virtual tracks, please don't reference virtual tracks displaying in RoboStudio.Android. And please don't use RoboStudio.Android to edit those virtual tracks. Please use the windows version of RoboStudio to reference and edit those virtual tracks.

7. Restricted Zone

When there is an area that you don't want robots to enter, it's convenient to use a restricted zone to achieve it instead of creating four virtual walls.

Click “R-Zone” in “Edit” to enable restricted zone editing mode.

A. Add A New Restricted Zone

Click “+Restricted” button to add a new restricted zone.

B. Move A Restricted Zone

Tap the center of a restricted zone and drag it to move the zone.

C. Scale A Restricted Zone

Tap the right bottom image of the restricted zone and drag it to scale the zone. (See figure 12)

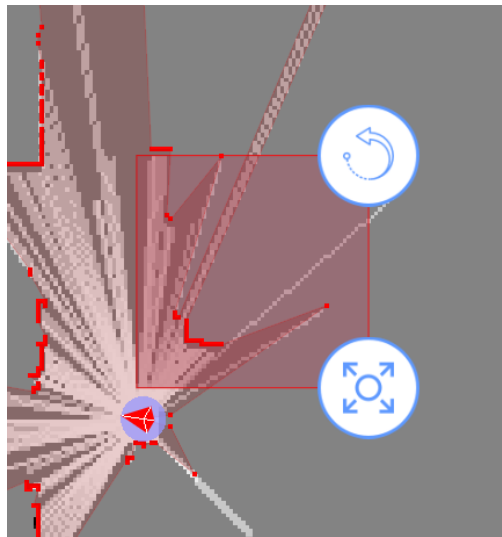


Figure 12: Scale the restricted zone.

D. Delete A Restricted Zone

Click “Delete” button. An “X” icon will display at the right bottom of each restricted zone. Click that icon to delete the restricted zone.

E. Save

Remember to click “√” to save the result.

F. Precaution

Robots only support rectangle zones that are parallel to the robot physical coordinate system. So when saving zones which are not parallel to the coordinate system, robots will calculate a rectangle which is tangential to the original restricted zone and parallel to the coordinate system and then save the calculated rectangle zone.

8. Dangerous Zone

A dangerous zone is an area that robots have to slow down to pass inside to avoid danger.

Click “D-Zone” in “Edit” to enable dangerous zone editing mode.

A. Add A New Dangerous Zone

Click “+Dangerous” button to add a new dangerous zone.

B. Move A Dangerous Zone

Tap a dangerous zone and drag it to move the zone.

C. Scale A Dangerous Zone

Tap the right bottom image of a dangerous zone and drag it to scale the zone.

D. Delete A Dangerous Zone

Click “Delete” button. An “X” icon will display at the right bottom of each dangerous zone. Click that icon to delete the dangerous zone.

E. Save

Remember to click “√” to save the result.

F. Set the maximum speed for the dangerous zone

Click right top icon to enter the “Setting” view. Move the slider in the dangerous zone section to set the speed.

G. Precaution

Robots only support rectangle zones that are parallel to the robot physical coordinate system. So when saving zones which are not parallel to the coordinate system, robots will calculate a rectangle which is

tangential to the original dangerous zone and parallel to the coordinate system and then save the calculated dangerous zone.

9. Maintenance Zone

When partial of the environment has changed and you just want this part of environment to be updated, you can use the maintenance zone feature. Create maintenance zones, enable the mapping mode and move the robot. Robot will only update map data inside the maintenance zones. Areas outside maintenance zones won't be updated.

Click “M-Zone” in “Edit” to enable maintenance zone editing mode.

A. Add A New Maintenance Zone

Click “+Maintenance” button to add a new maintenance zone.

B. Move A Maintenance Zone

Tap and drag the center of a maintenance zone to move it.

C. Scale A Maintenance Zone

Tap the right bottom image of a maintenance zone and drag it to scale the zone.

D. Delete A Maintenance Zone

Click “Delete” button. An “X” icon will display at the right bottom of each maintenance zone. Click that icon to delete the maintenance zone.

E. Save

Remember to click “√” to save the result.

F. Precaution

Robots only support rectangle zones that are parallel to the robot physical coordinate system. So when saving zones which are not parallel to the coordinate system, robots will calculate a rectangle which is tangential to the original maintenance zone and parallel to the coordinate system and then save the calculated maintenance zone.

10. POI

You can use RoboStudio.Android to manage POIs.

A. POI List

Click “POI List” button to open the list dialog. (See figure 13)

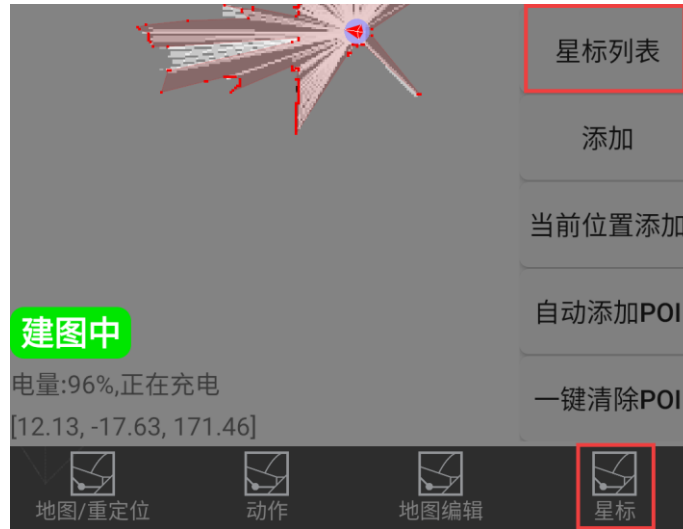


Figure 13: POI List.

B. Create A New POI

There are two ways to create a new POI.

Create A New POI At Current Position

You can create a new POI at the robot current position. Click “Current As POI” button to open “Create” dialog and input the information for this new POI to create it.

Free As POI

You can also choose a position freely on the map to create a new POI. Click “Free As POI” button. Then you can tap on the map anywhere you want the POI locates. After the tap you have to choose the yaw of the POI (see figure 14). Click “√” icon to continue editing POI information. Finally input the information and save the new POI.

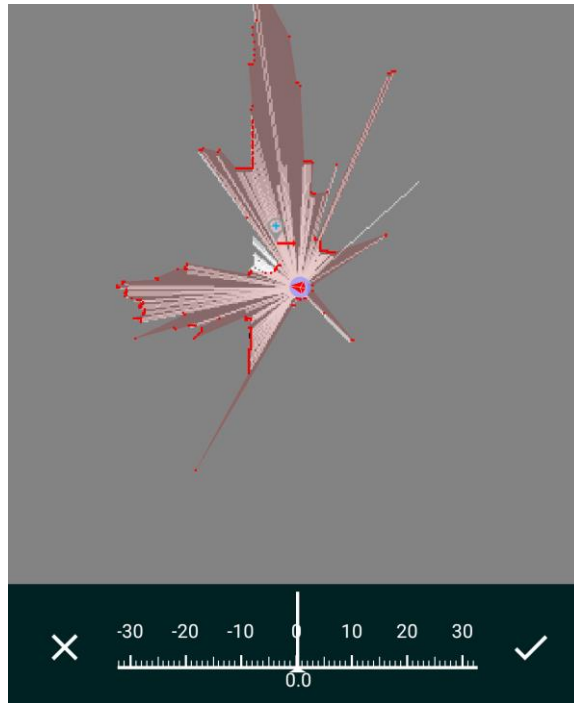


Figure 14: Free As POI.

C. Edit A POI

Click “POI List” in “POI”. A POI list dialog will display. (See figure 15) You can click the edit icon to choose a POI to change its property.



Figure 15: POI List.

D. Move To A POI

In the POI list dialog, you can click a POI to order robot moving to it.

E. Delete A POI

In the POI list dialog, you can click the “delete” icon to delete a POI. (See figure 16)



Figure 16: Delete a POI.

11. Manage Local Maps

You can upload a map to robot, save a map to your Android device and edit local maps via RoboStudio.Android.

A. Browse Local Maps

Click “Maps” tab at the bottom of the screen to browse local maps. (See figure 17)



Figure 17: Local Maps

If it is your first time of clicking “Maps” tab, the Android system will ask you whether to allow RoboStudio.Android to access the file system. Please permit the request otherwise RoboStudio.Android is unable to manage local maps.

All local maps have to be saved in /sdcard/Documents/robostudio folder.

B. Edit A Local Map

Click a map in “Maps” view to enter “Map Detail” view. You can use functions at the bottom to edit the map (see figure 18). RoboStudio.Android supports virtual walls, virtual tracks, eraser and setting a new dock for local map editing.



Figure 18: Local map editing.

C. Upload a map to a robot

Please connect a robot first in the “Robot” view. Then open the map you want to upload in the “Maps” view. Click the upload icon at the top right of the screen. When the upload finishes, the robot will load the new map. (See figure 19)

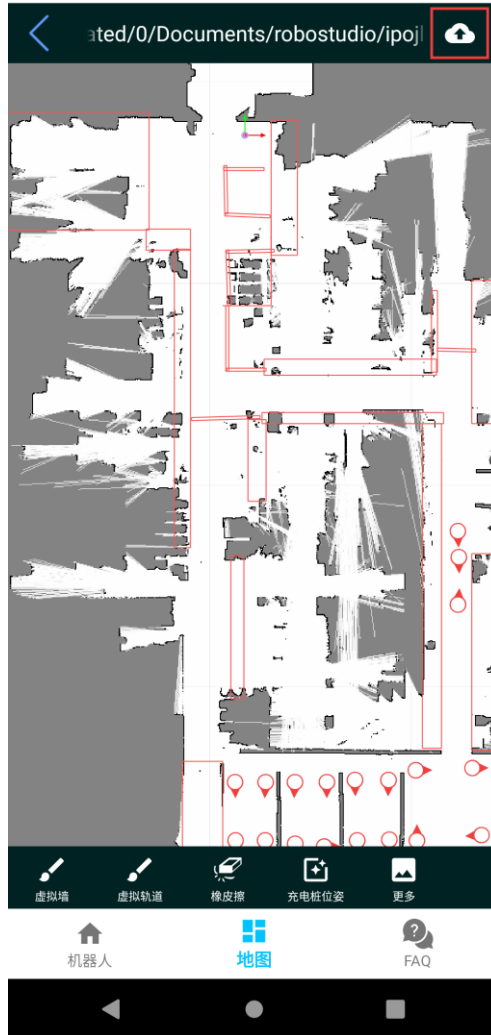


Figure 19: Upload a map.

三、Revision

Date	Version	Description
2023-06-13	1.0	First edition. This edition is made for RoboStudio.Android 1.0 version.