APT Operating Manual(Quick Study)

1 Start the vehicle

Press the green “START” button as shown in the figure；

Turn the key switch to point to the red dot;At this point,the entire vehicle is powered on and the system starts to start.**If the car is not powered on at this time, you need to turn the power off button.**

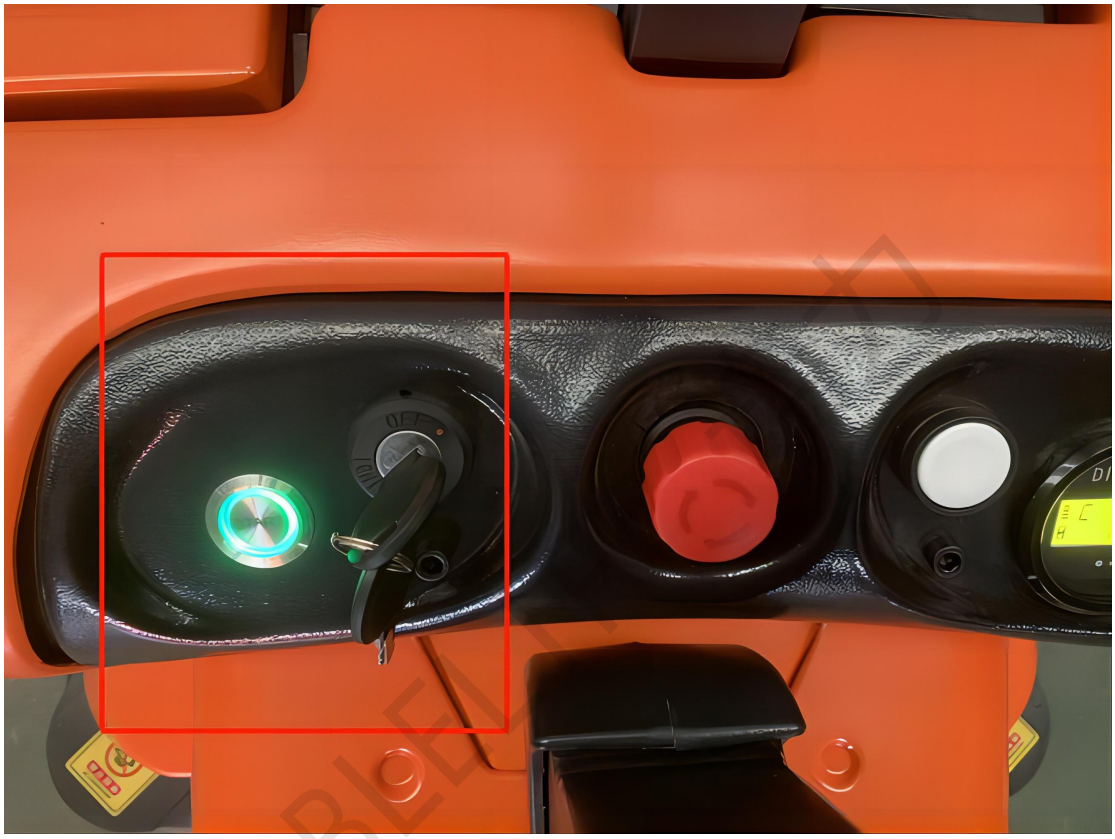

Figure 1-1

Figure 1-2

2 SLAM mapping

Firstly, select the “Mapping” button,then click on “BoschTotallnit” to enter drawing preparation.

Figure 2-1

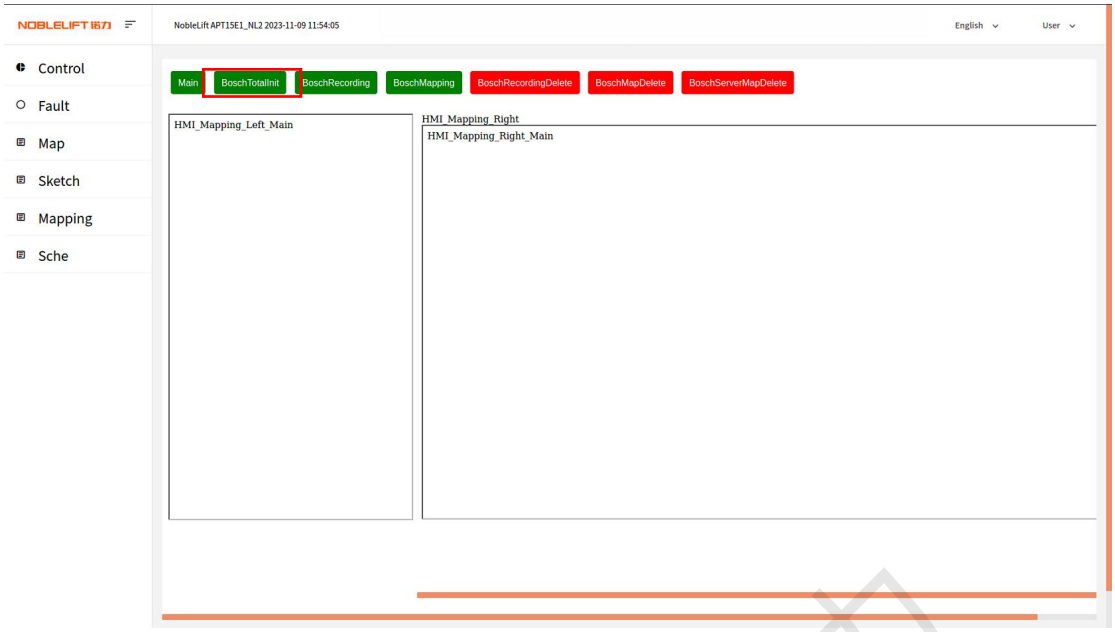

Figure 2-2

Then click on “BoschRecording”.

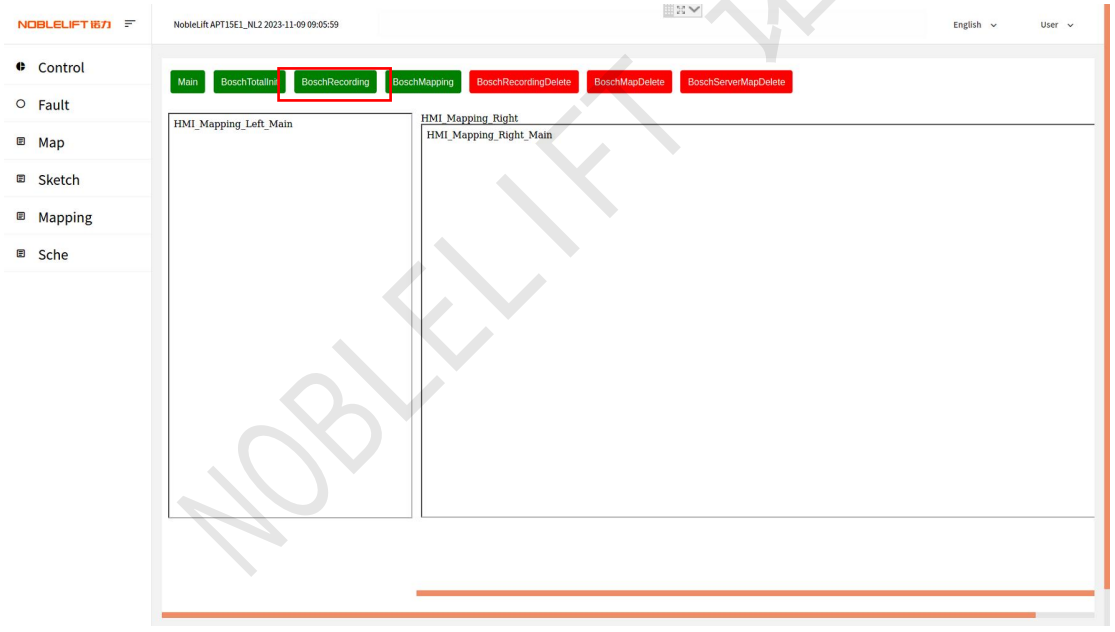

Figure 2-3

Click on “Button_BoschLocalizationStop” on the page,load for a period of time.

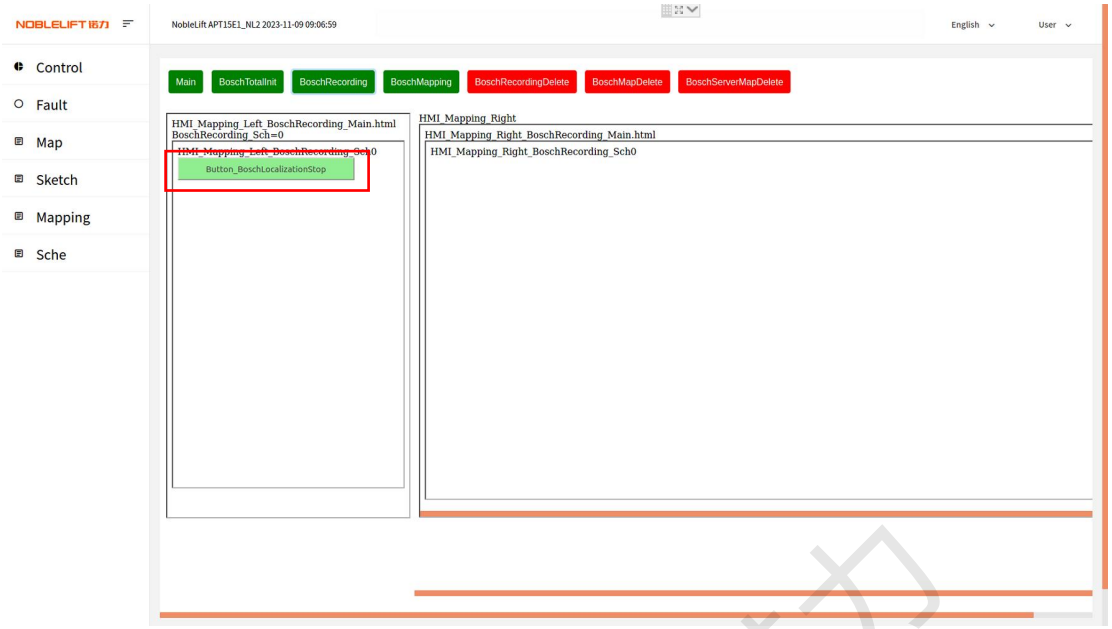

Figure 2-4

Then click on “Button_BoschRecordingStartVisualRecording”.The“.html interface”will appear.

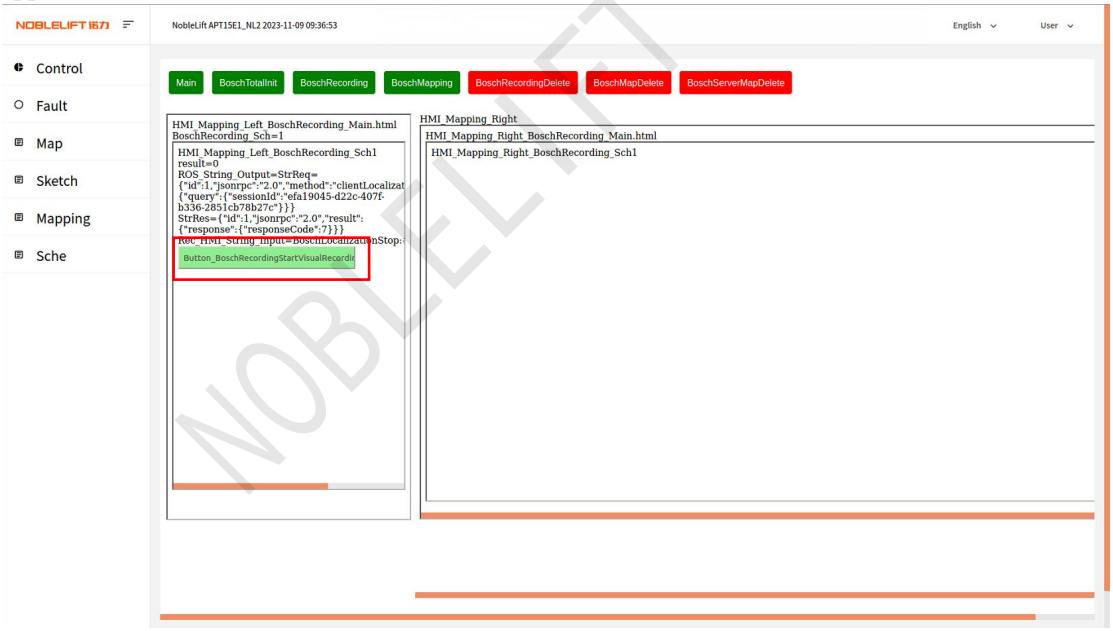

Figure 2-5

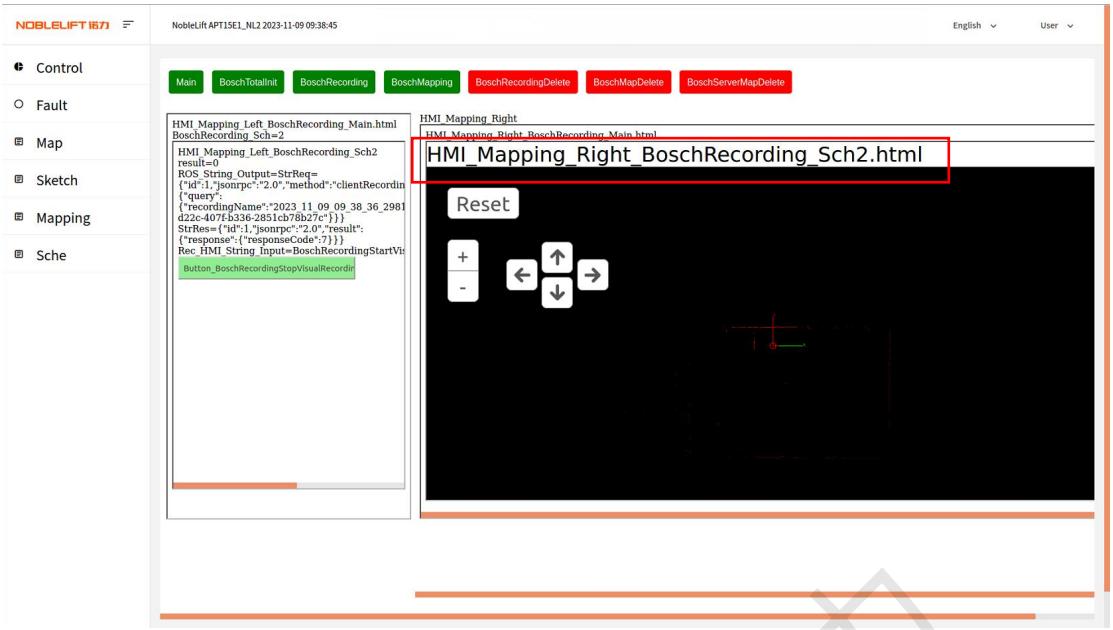

Figure 2-6

You can see that the line is being drawn.The current forklifts movement path is now displayed on the right screen.You need to manually control the forklifts movement to scan the environment moving and scanning.

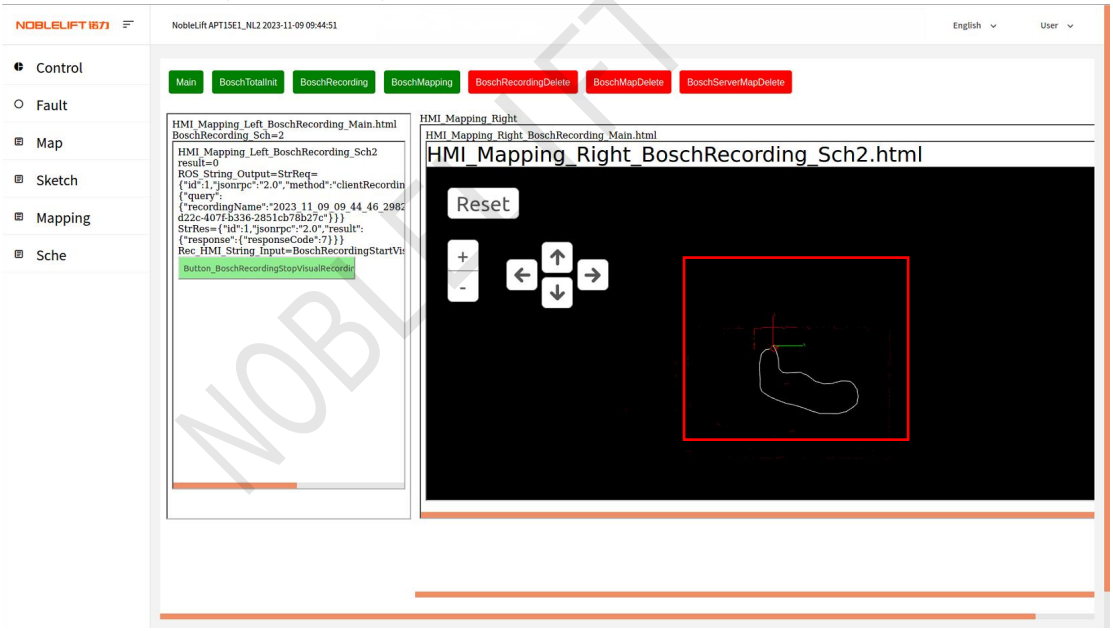

Figure 2-7

After the scan is completed,click the green button on the left to end the scan and wait for processing.

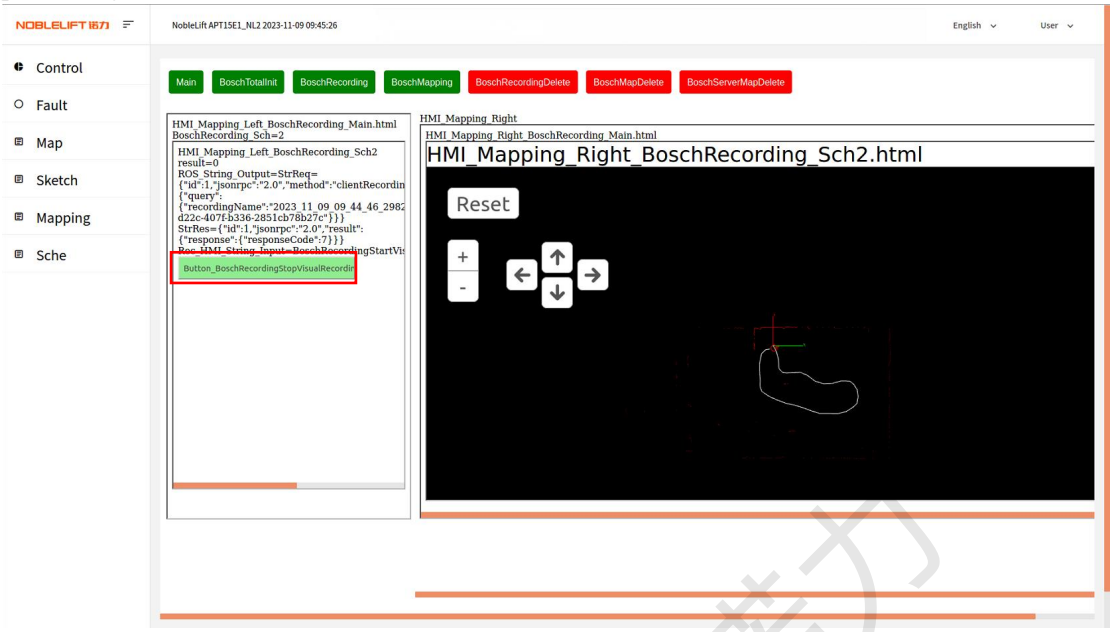

Figure 2-8

Then click on the “BoschMapping” button above,Click on “Button_BoschRecordingList” again,select the map that matches the current time period, confirm that the map is correct.

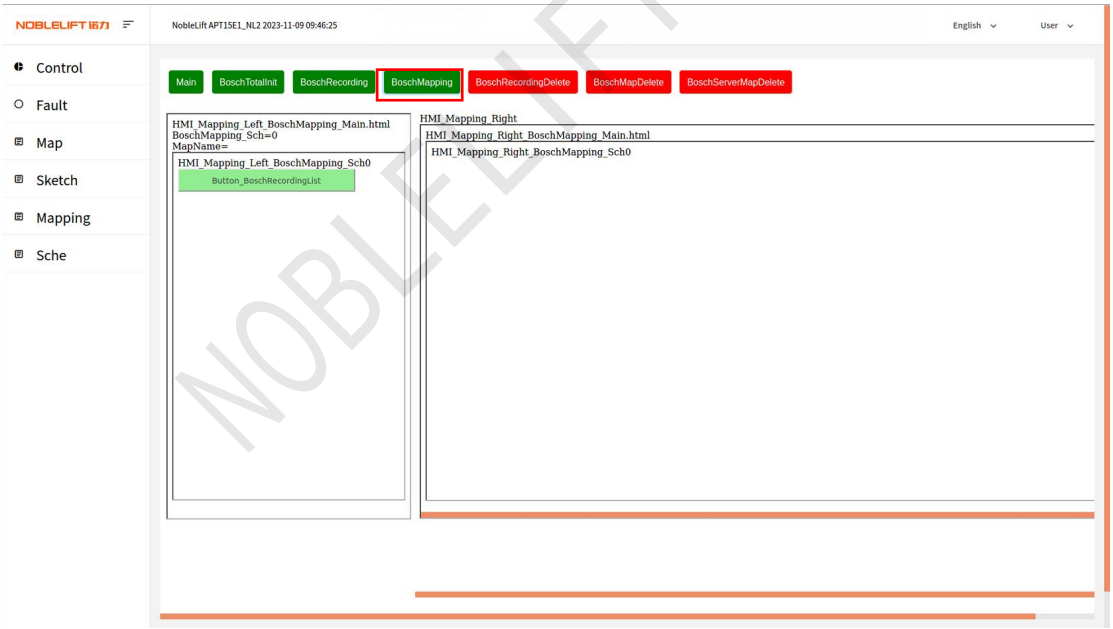

Figure 2-9

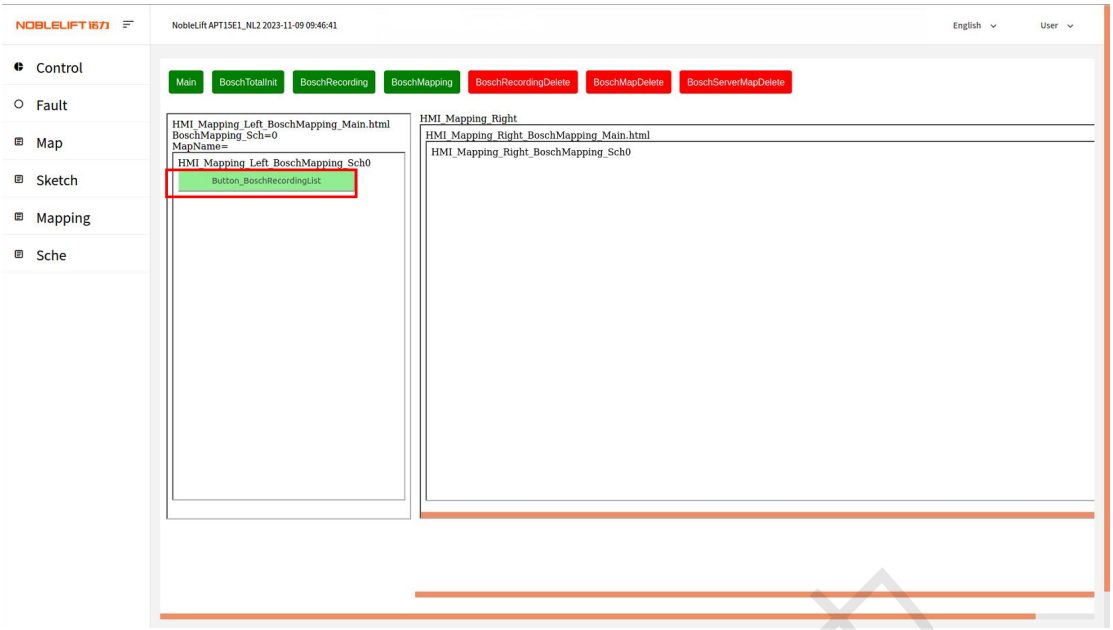

Figure 2-10

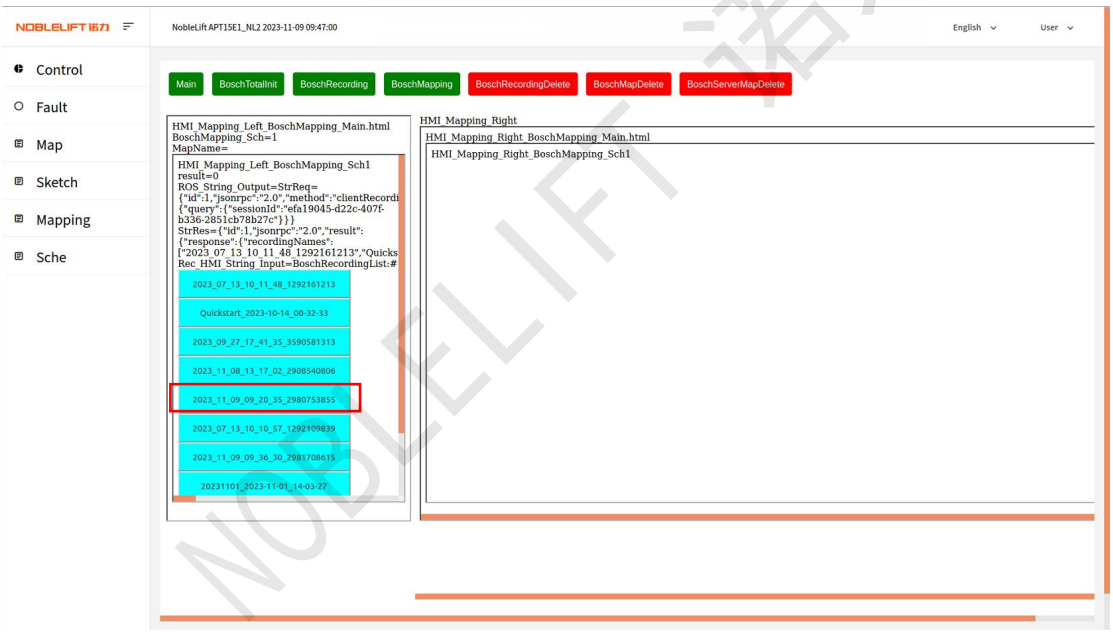

Figure 2-11

Click on “Button_BoschMapSend”,wait for the loading to complete.

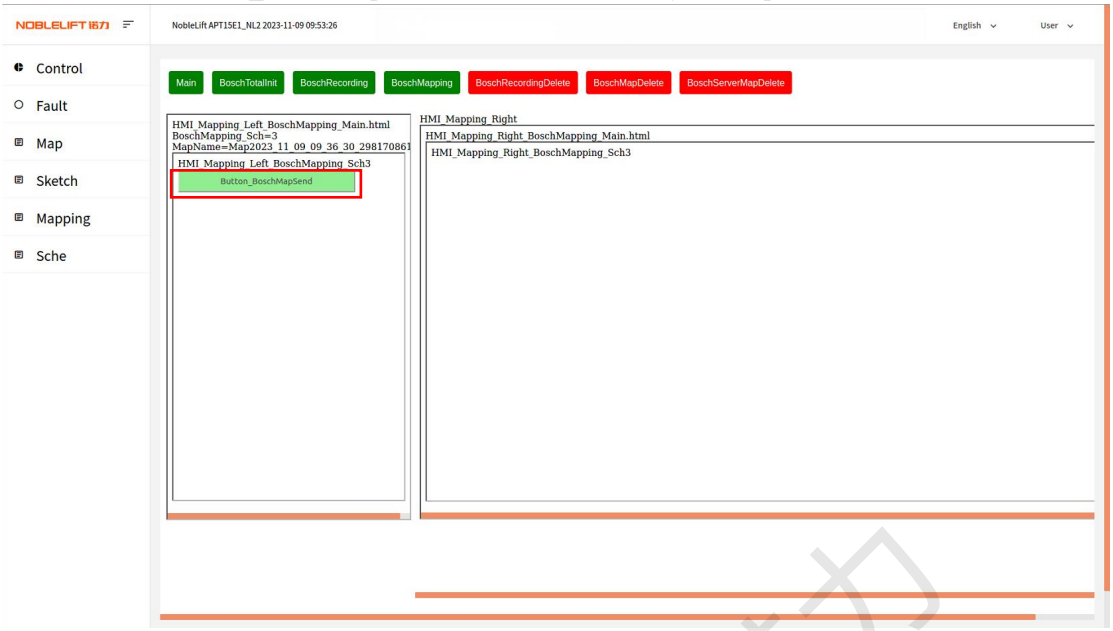

Figure 2-12

Click on “Button_BoschLocalizationActiveMap”,wait for the loading to complete.

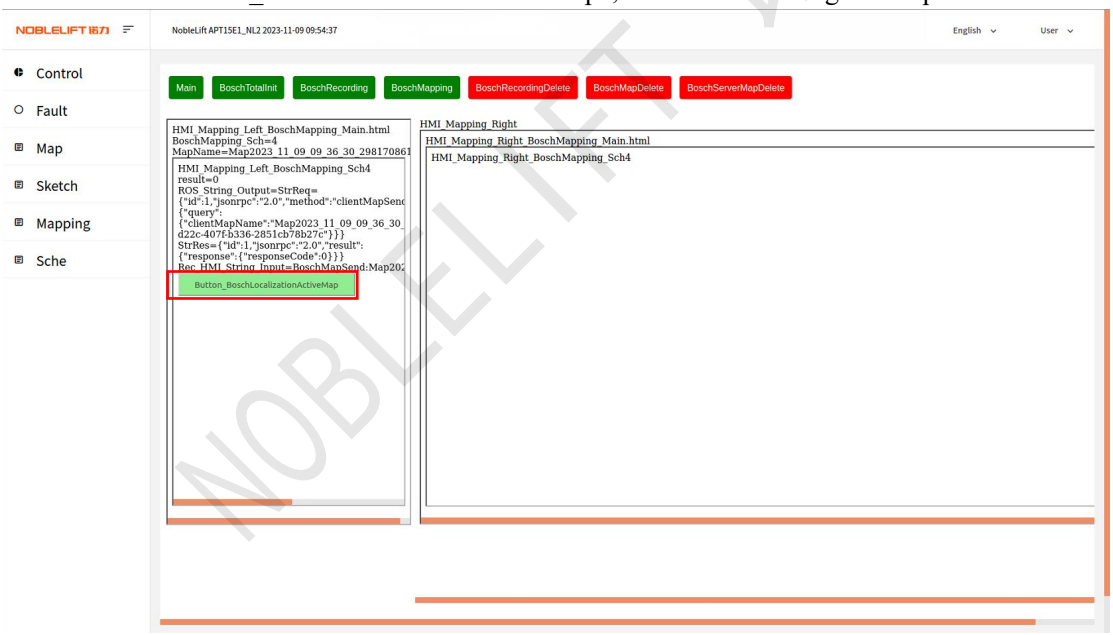

Figure 2-13

Click on the “Map” button in the left command bar to see the created map.

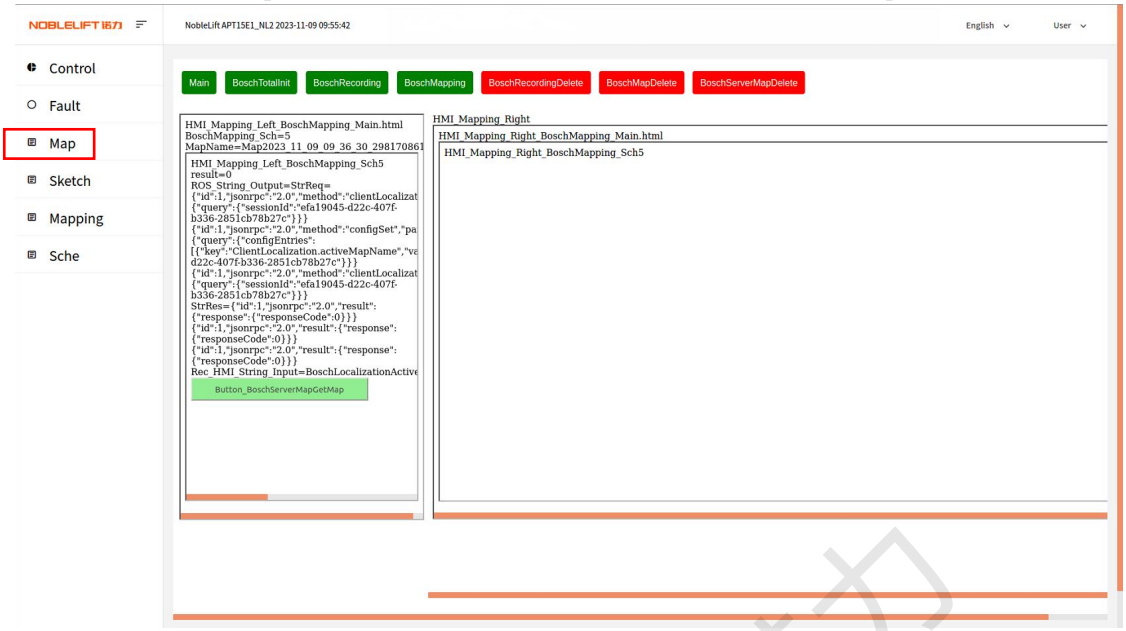

Figure 2-14

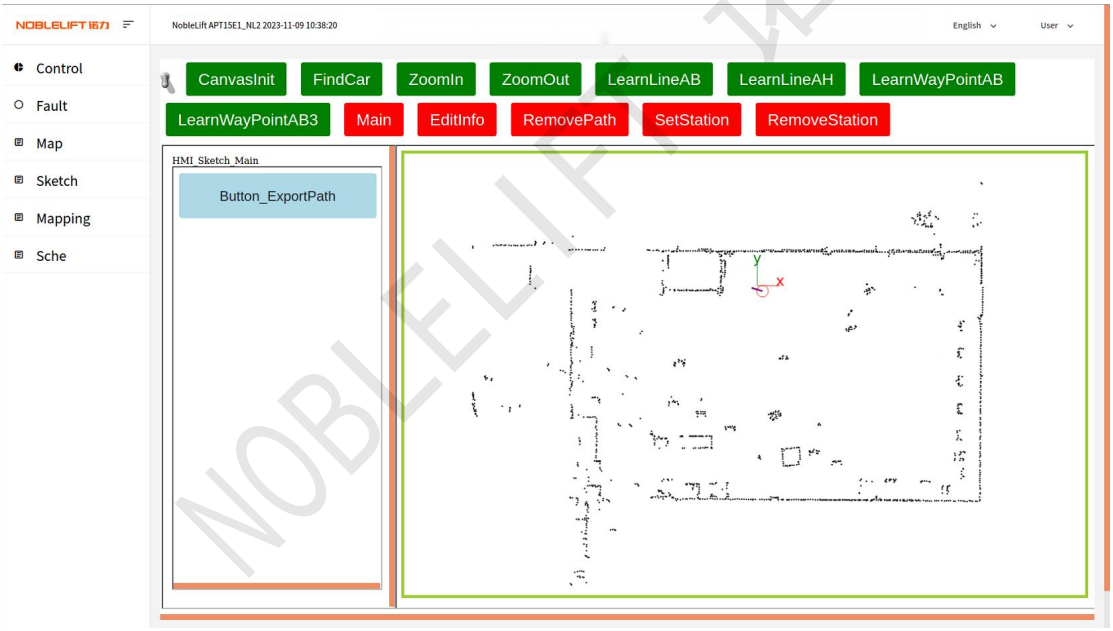

Figure 2-15

3 Vehicle positioning and preparation before starting

After the industrial computer is fully started, the display screen shows.As shown in Figure 3-1, the vehicle can be manually operated.

Note: When starting, the manual/automatic button must be switched to automatic, otherwise a Curtis abnormal alarm will appear.

If there is a Curtis abnormal alarm, press the power off button, rotate the manual/automatic button to automatic mode, and then turn the power off button again. The Curtis abnormal alarm will disappear.

Figure 3-1

Manually drive the vehicle to the "APT starting point" or "APT station".

Check if the vehicle has a fault, click on the "Fault" option on the left, and a red light indicates that the fault has occurred.

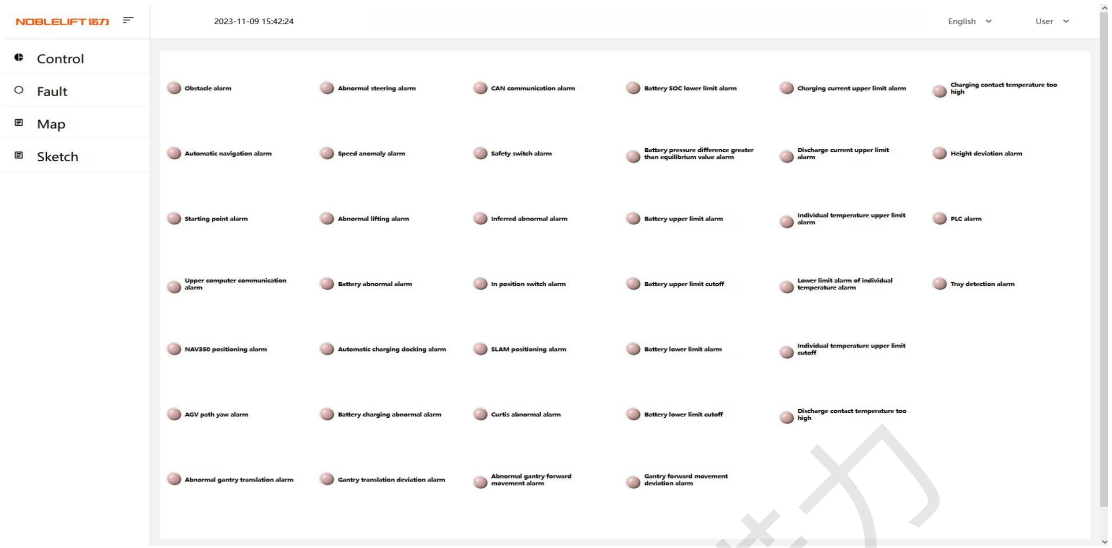

Figure 3-2

If both the "automatic navigation alarm" and the "SLAM positioning alarm" appear at the same time, the vehicle will lose its positioning. At this point, it is necessary to pull the vehicle to run a circle to restore positioning.

If there is an "obstacle warning", check if there are people or objects around the vehicle, move away or away from the vehicle, and the obstacle warning is eliminated.

4 Distribute tasks and cancel tasks midway

Click on the "Control" option on the left, as shown in the figure：

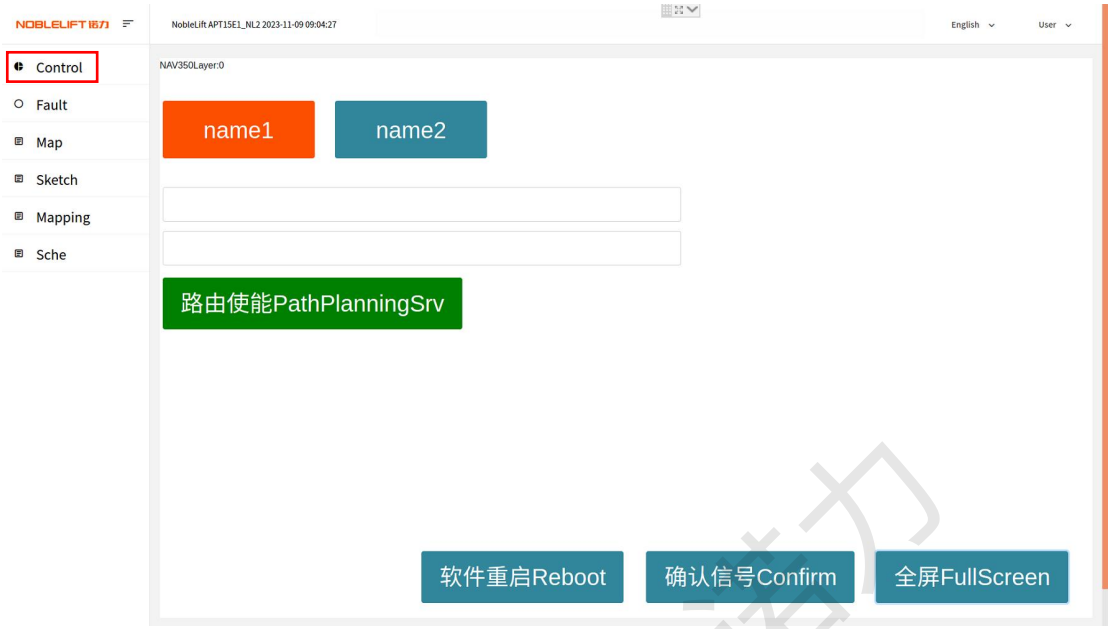

Figure 4-1

After clicking on the site you want to go to, click on "Routing Enable Srv" again. After successful sending, the word "Sending Successfully" will appear under the Routing Enable Srv. Finally, press the "White Reset" button on the control panel, as shown in the figure：

Figure4-2

Figure 4-3

If you need to replace or cancel a task midway, click the "Software Restart" button in the control interface to cancel the current task.

Figure 4-4

If the vehicle is manually moved away and stopped at the position before the move (with an accuracy of ± 20cm), press the "reset button" to restart.

5 Teaching function

Firstly, select the "Sketch" command in the left taskbar to see the already created map. Click "ZoomIn" and "ZoomOut" in the command bar above to zoom in and out on the map.

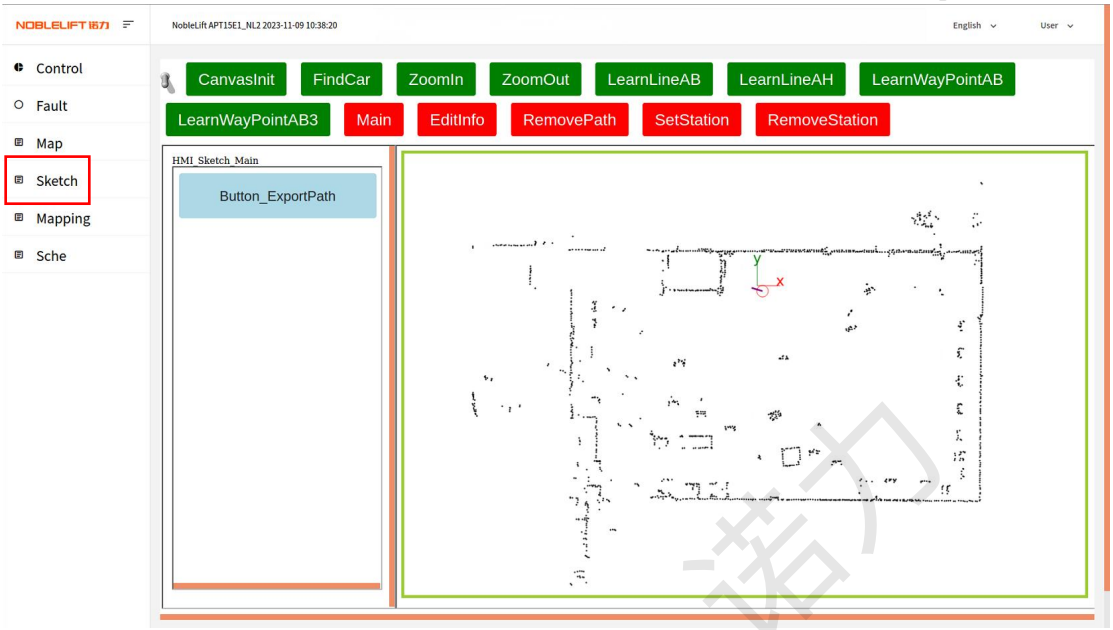

Figure 5-1

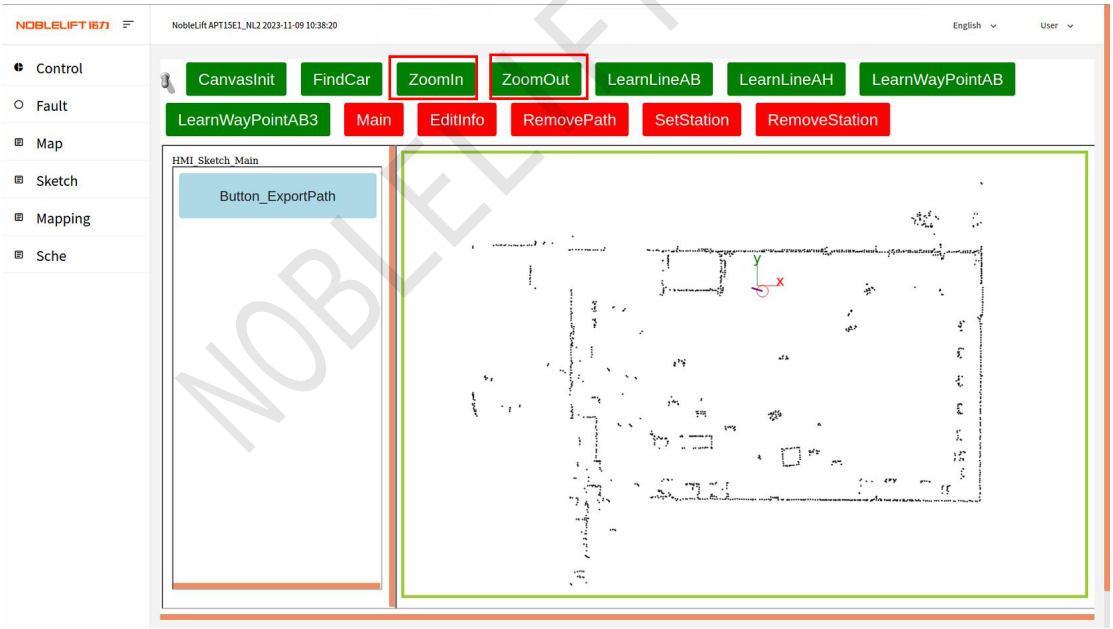

Figure 5-2

5.1 Teaching straight line AB

Click "LearnLineAB" in the upper toolbar.

Figure 5-3

Then click on the green button "Button_GetPointA" on the left.

Figure 5-4

At this point, draw the line AB. Manually pull the cart to draw the line.After drawing, click on the red button "Button_GetPointB" to see the information about the endpoint of the line.

Figure 5-5

Click "Button_SetLinePathAB_Slow".

Figure 5-6

If there are no errors, click "OK".

Figure 5-7

After loading the information, click "Quit" to exit.

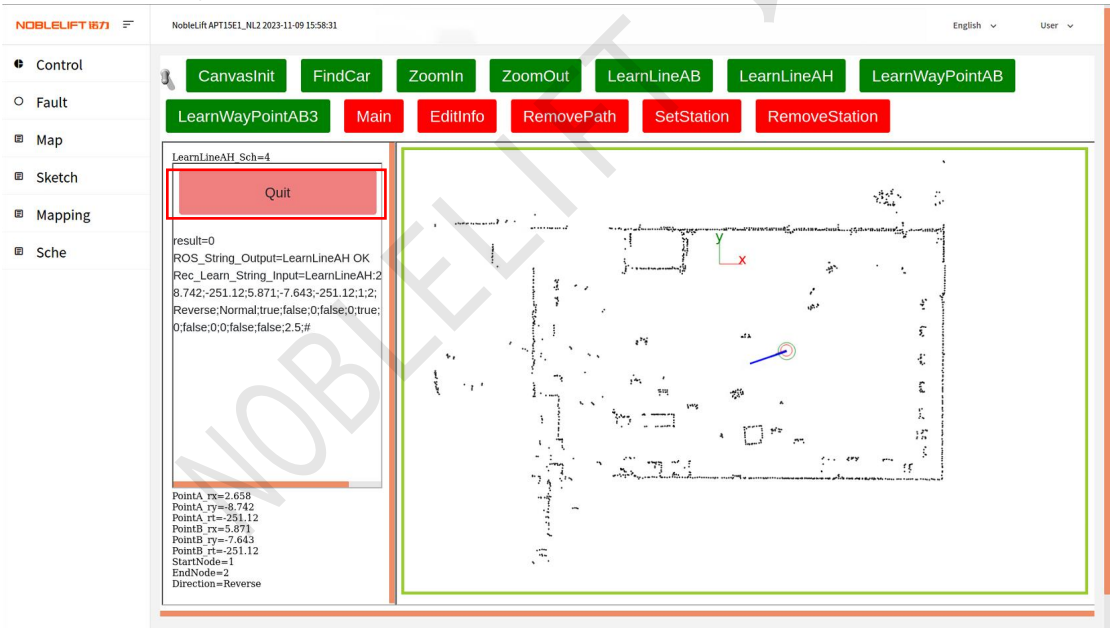

Figure 5-8

Click on the "Button_ExportPath" and then click "ExportPath" to complete the path output.You can see that the drawn straight line has already appeared in the map.

Figure 5-9

5.2 Teaching straight line AH

Firstly, select the "Sketch" command in the left taskbar, click "LearnLineAH" in the upper toolbar.Then click the green button "Button_GetPointA" on the left to confirm the starting point A.

Figure 5-10

Then manually pull the cart to draw the line, and click “Button_GetPointB” after reaching the end.

Figure 5-11

You can see the information about the endpoint of the straight line, and then click "Button_SetLinePathAB_Slow".

Figure 5-12

If there are no errors, click "OK".

Figure 5-13

After the information is loaded, click "Quit" to exit.

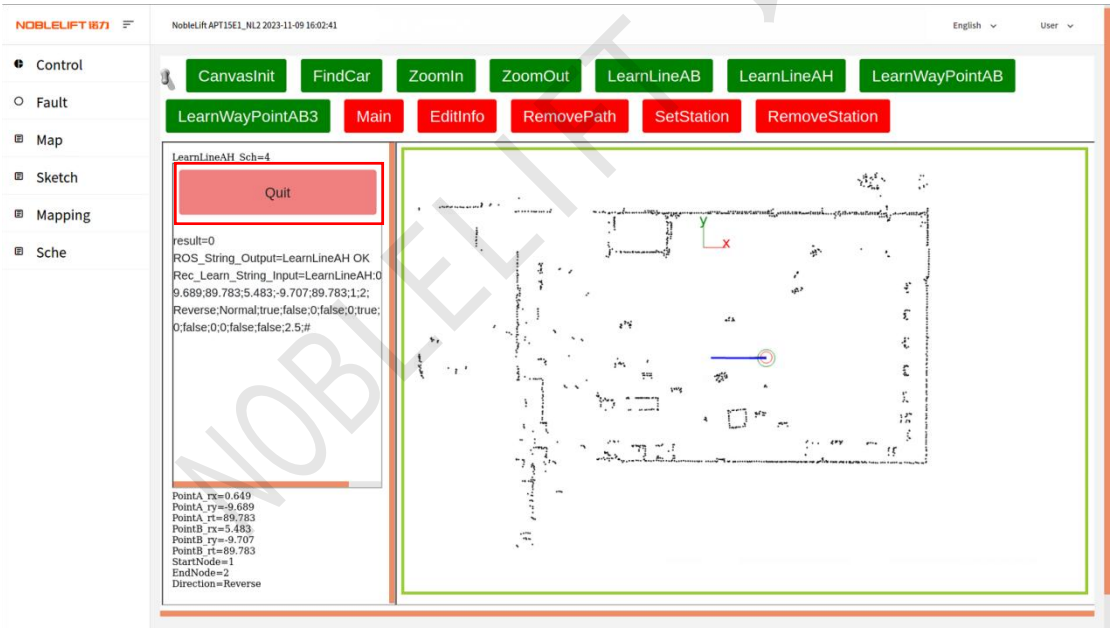

Figure 5-14

Click on the "Button_ExportPath" and then click "ExportPath" to complete the path output.You can see that the drawn straight line has already appeared in the map.

Figure 5-15

5.3 Teaching curve AB

Firstly, select the "Sketch" command in the left taskbar, click "LearnwaypointAB" in the upper toolbar.

Figure 5-16

Then click the green button "Button_GetPointA" on the left to confirm the starting point A.

Figure 5-17

Then manually pull the forklift to draw the line, and click “Button_ GetPointB ” after reaching the end.

Figure 5-18

You can see the information of the curve, and then click "Button_SetLinewayPathAB_Slow".

Figure 5-19

If there are no errors, click "OK".

Figure 5-20

After the information is loaded, click "Quit" to exit.

Figure 5-21

Click on the "Button_ExportPath" and then click "ExportPath" to complete the path output.You can see that the drawn straight line has already appeared in the map.

Figure 5-22

5.4 Teaching curve AB3

Firstly, select the "Sketch" command in the left taskbar, click "LearnwaypointAB3" in the upper toolbar.

Figure 5-23

Then click the green button "Button_GetPointA" on the left to confirm the starting point A.

Figure 5-24

Then manually pull the forklift to draw the line. The curve path drawn by this function is composed of several straight line segments, rather than a standard curve. Click “Button_ GetPointB” after finishing line. You can see the information of the curve.

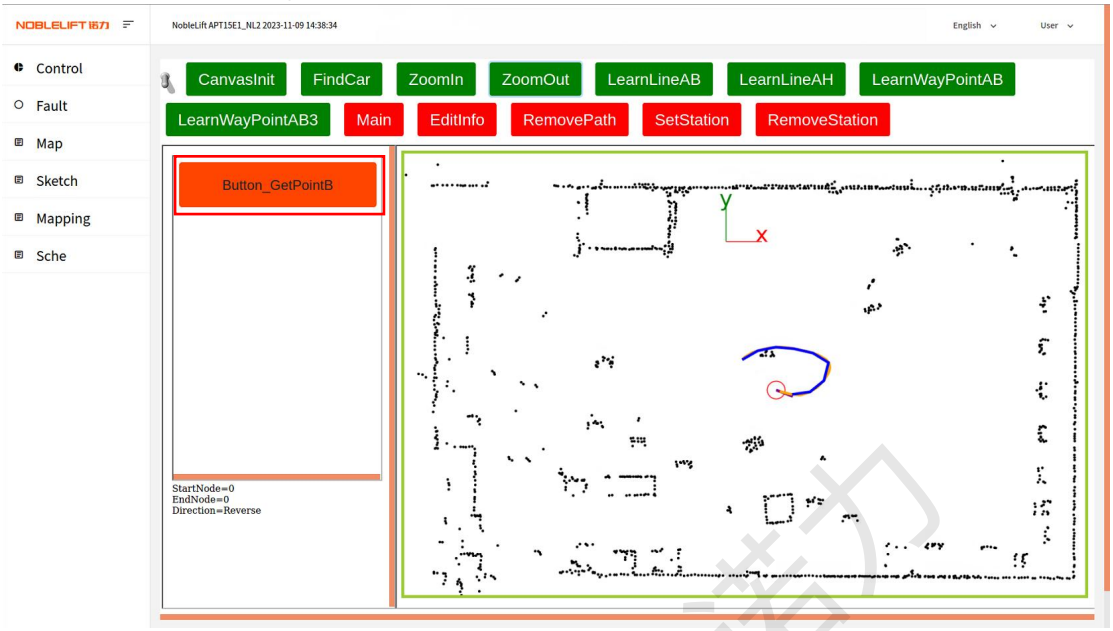

Figure 5-25

Then click "Button_SetLinewayPathAB3_Slow" .

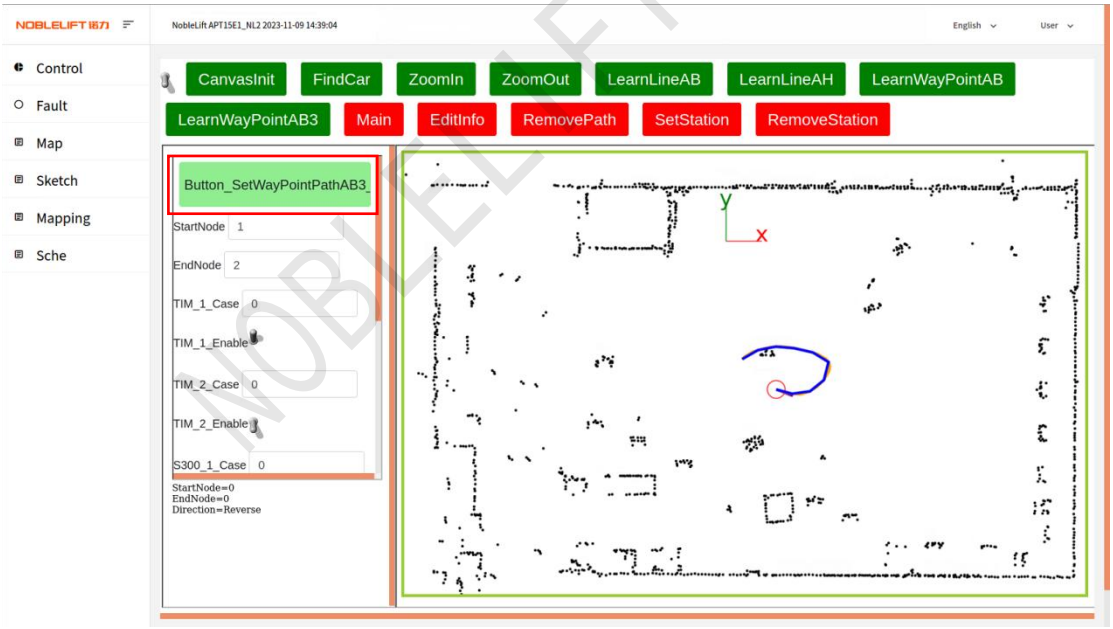

Figure 5-26

If there are no errors, click "OK".

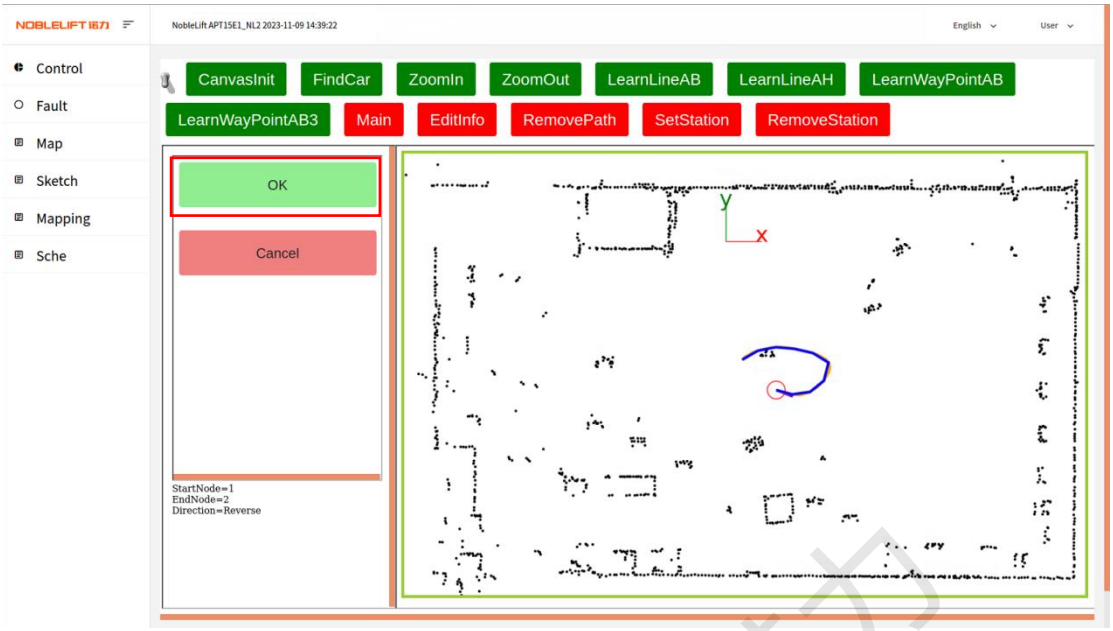

Figure 5-27

After the information is loaded, click "Quit" to exit.

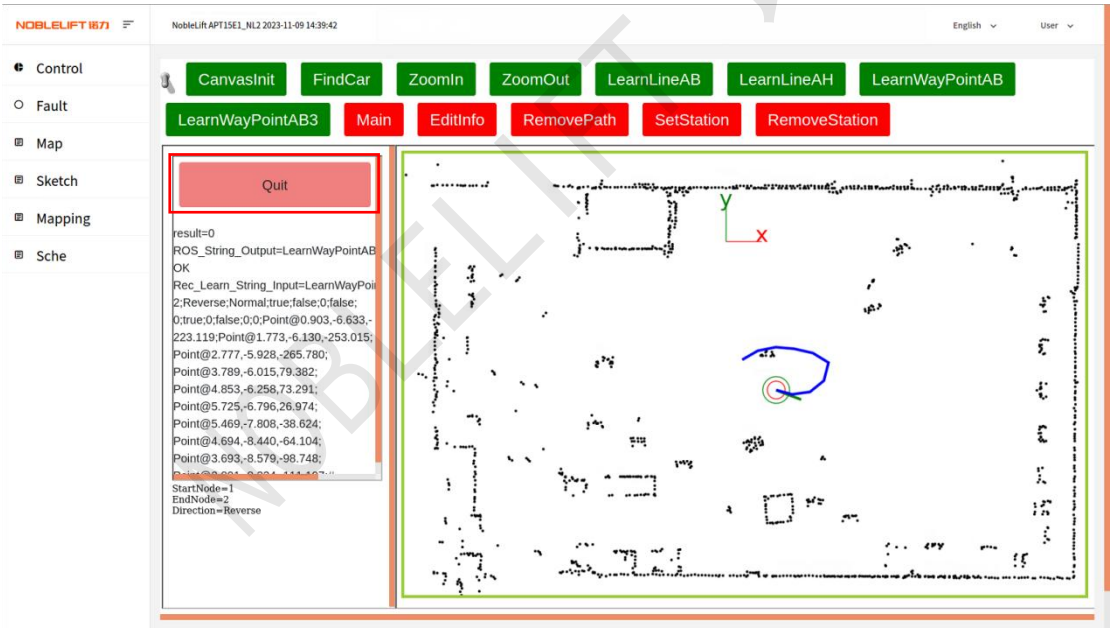

Figure 5-28

You can see that the drawn curve has already appeared in the map.After confirming that the path is correct, click "Button_ExportPath" , and then click “ExportPathOK” to complete the path output.

Figure 5-29

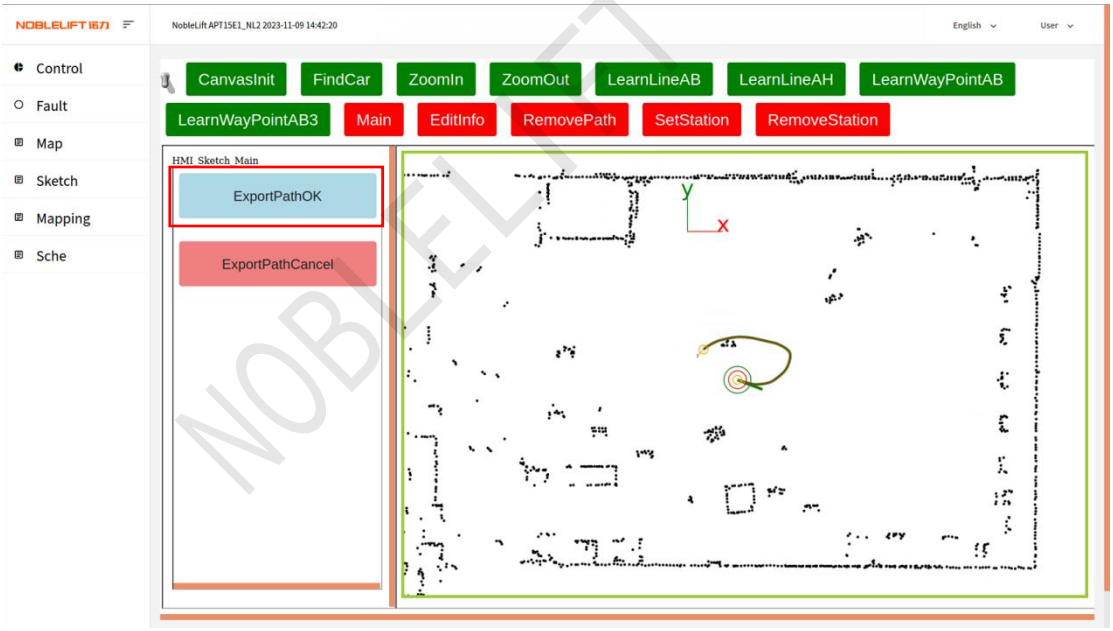

Figure 5-30

You can then view the path in the map on the left taskbar.

Figure 5-31

5.5 Teaching setup site

Firstly, select the "Sketch" command in the left taskbar, click "SetStation" in the upper toolbar.

Figure 5-32

Set the site name in the NodeName on the left, confirm that the NameID and other attributes are correct.Then click "Button_SetStation".

Figure 5-33

Click “OK” .

Figure 5-34

After the information is loaded, click "Quit" to exit.

Figure 5-35

Then click on the “Map” on the left taskbar to see that the site has been named successfully.

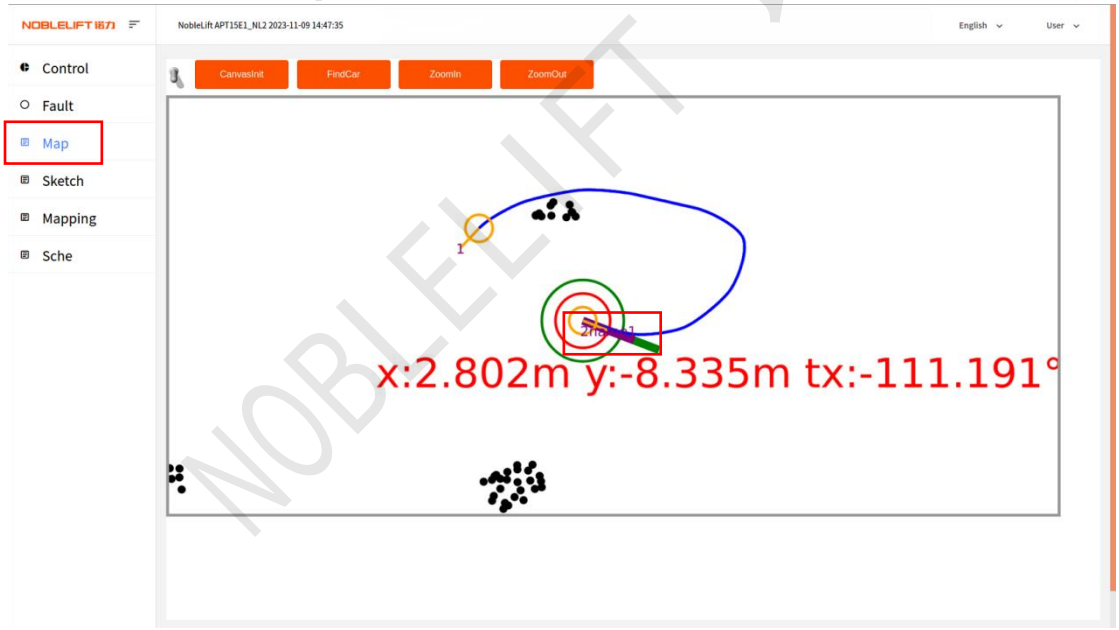

Figure 5-36

Click on the “Control” button on the left taskbar to see the newly set site button.

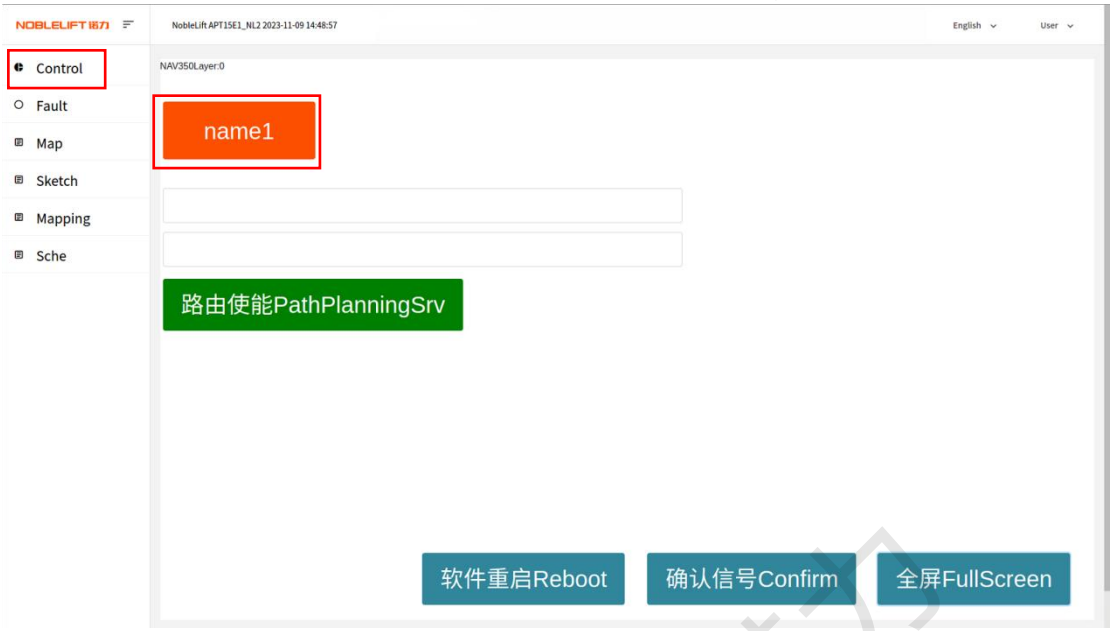

Figure 5-37

Next, you can use the same operation to move the forklift to the designated point, thereby setting up station 2.

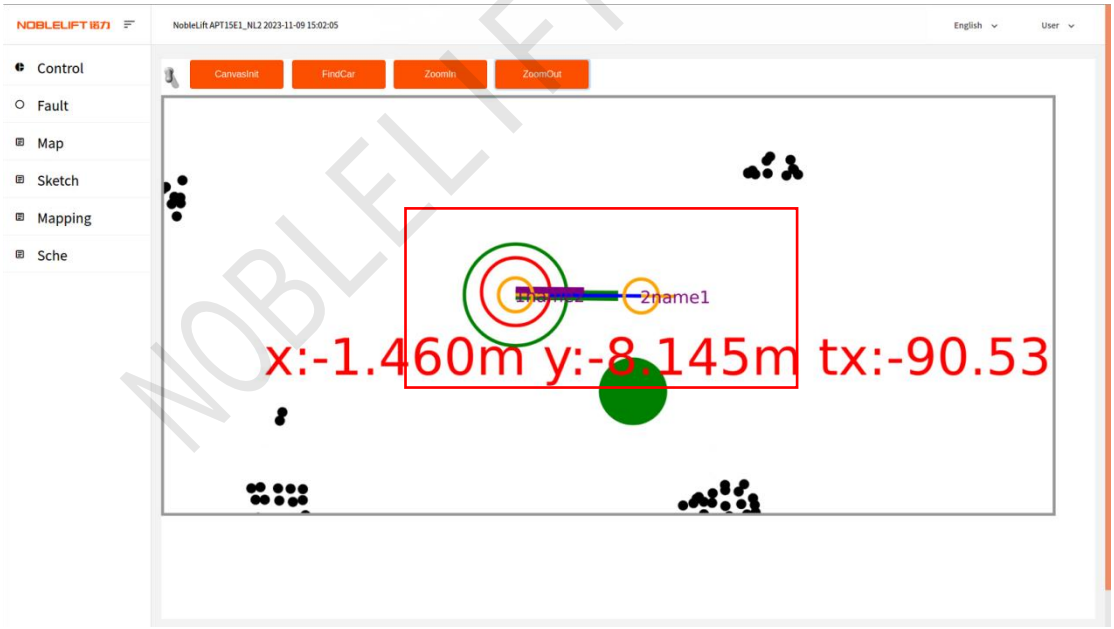

Figure 5-38

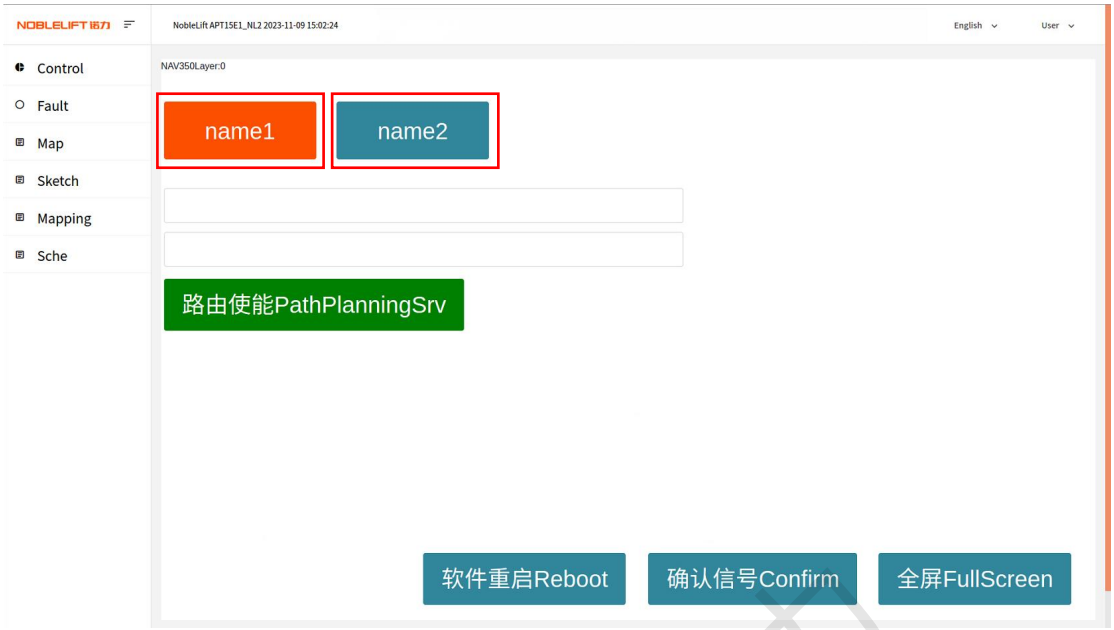

Figure 5-39

5.6 Delete site

Firstly, select the "Map" command in the left taskbar to view the current forklift location.

Figure 5-40

Then, select the "Sketch" command in the left taskbar,,click on the "RemoveStation" button in the upper toolbar.

Figure 5-41

Click on the "Button_RemoveSingleStation" button on the left.

Figure 5-41

Enter the NodeID to be removed.

Figure 5-42

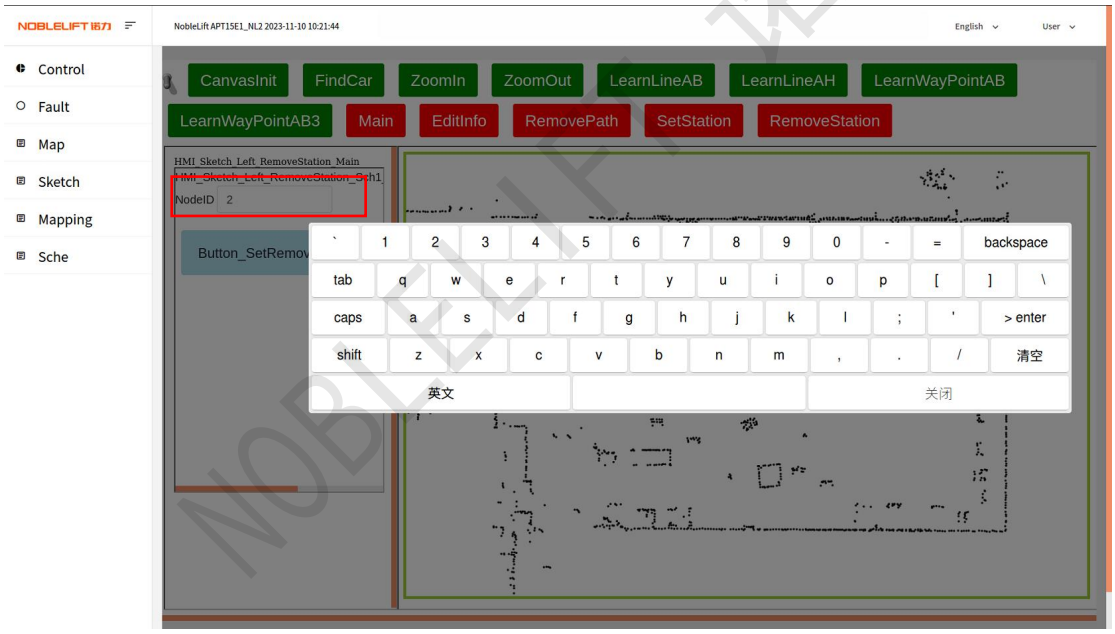

Figure 5-43

Click on the "Button_SetRemoveStation" button.

Figure 5-44

Then click "RemoveSingleStationOK" to complete the removal.

Figure 5-45

Select "Map" in the left taskbar, You can see that the corresponding point has been removed.

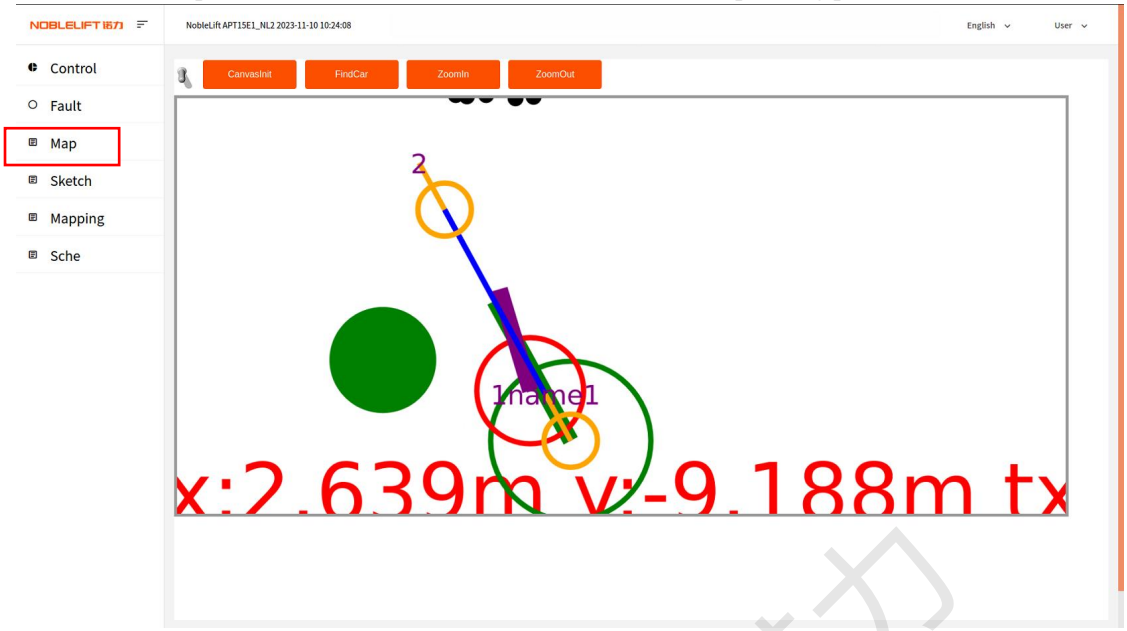

Figure 5-46

By selecting "control" in the left taskbar, you can see that the button for the corresponding site has disappeared.

Figure 5-47

If you want to delete all sites at the same time, choose the "sketch" command in the left taskbar, click "RemoveStation" in the upper toolbar.

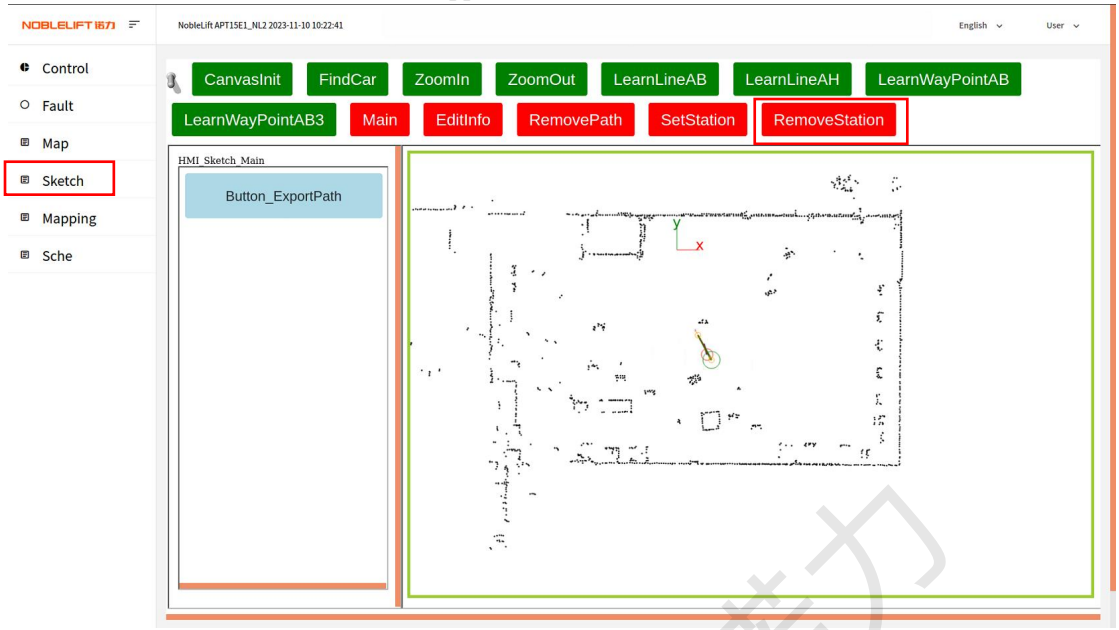

Figure 5-48

Click "Button_RemoveAllStation" .

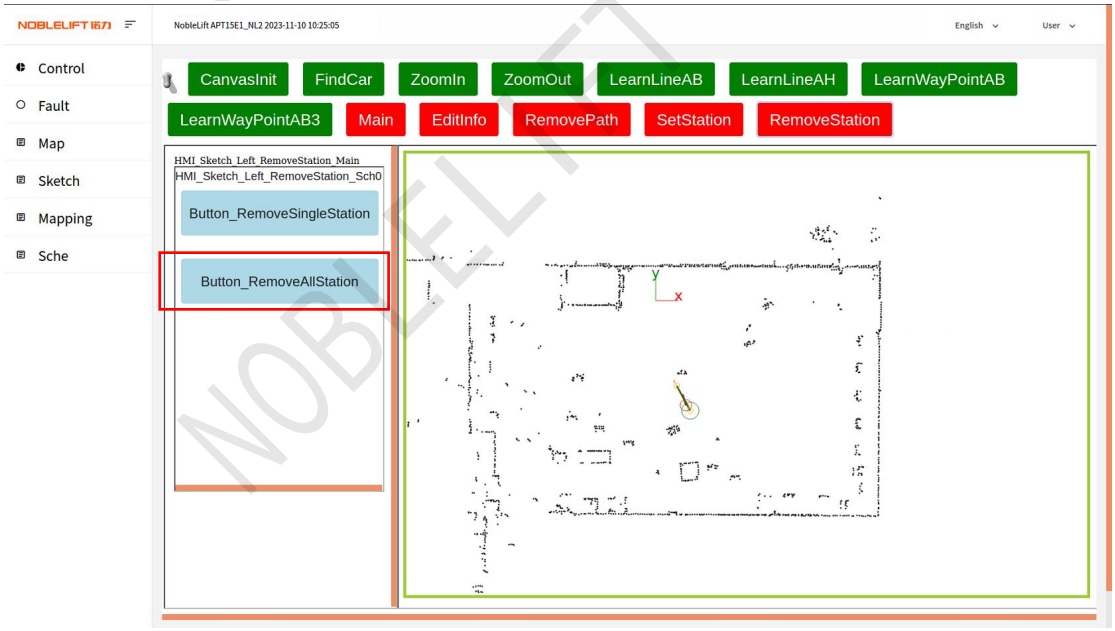

Figure 5-49

Then click "RemoveAllStationOK" to complete the deletion.

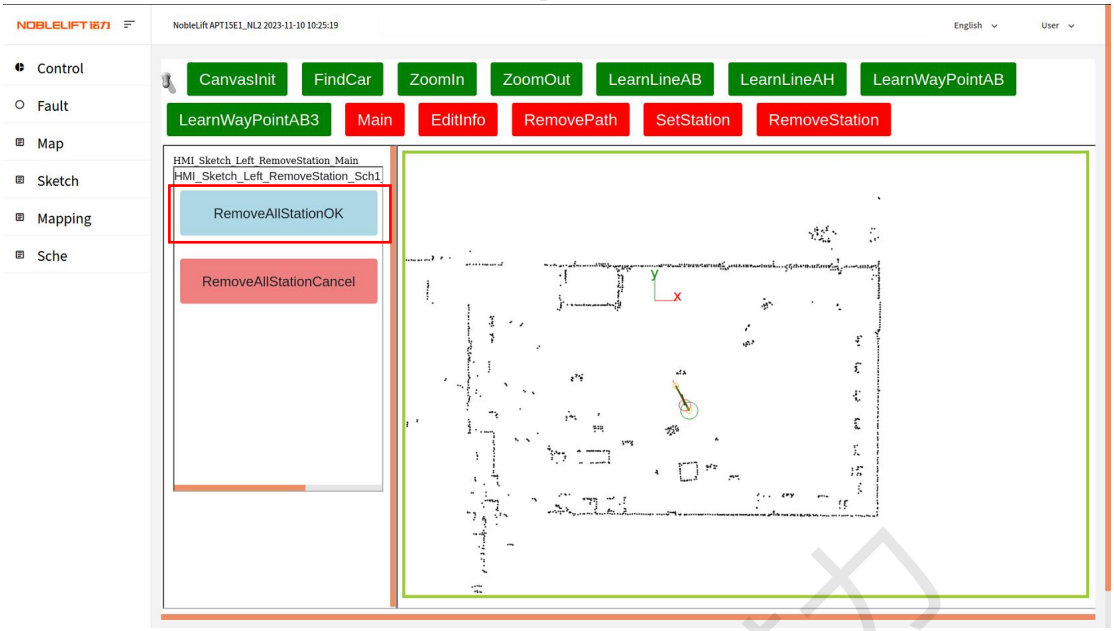

Figure 5-50

Then you can see that all sites have been deleted in the "map" and "control".

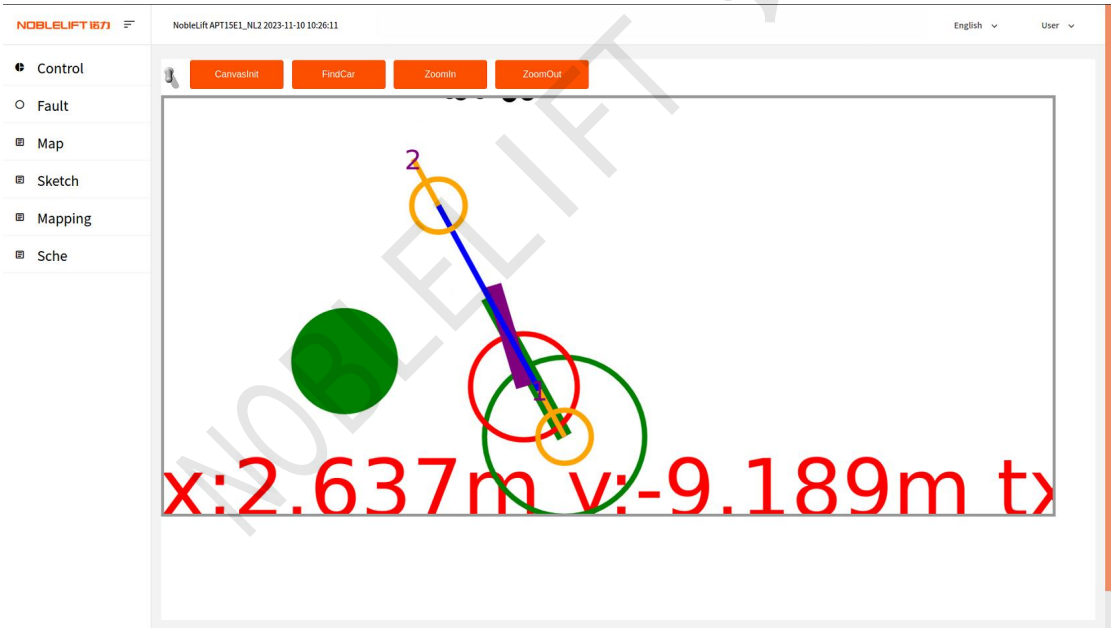

Figure 5-51

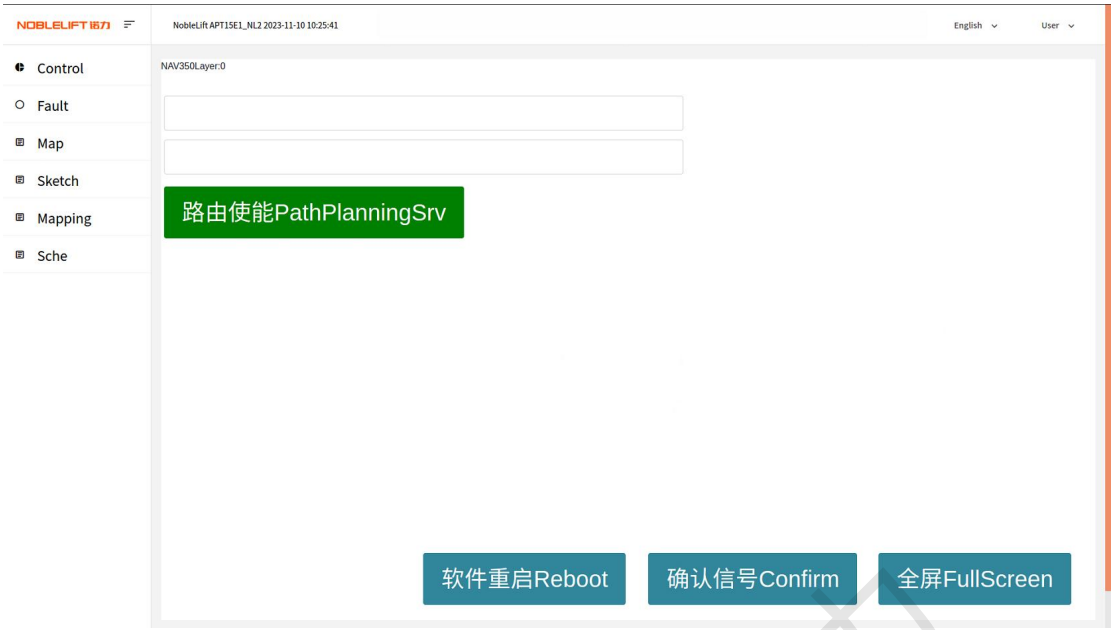

Figure 5-52

5.7 Delete path

You can see that two paths have been drawn in the "Map" interface.

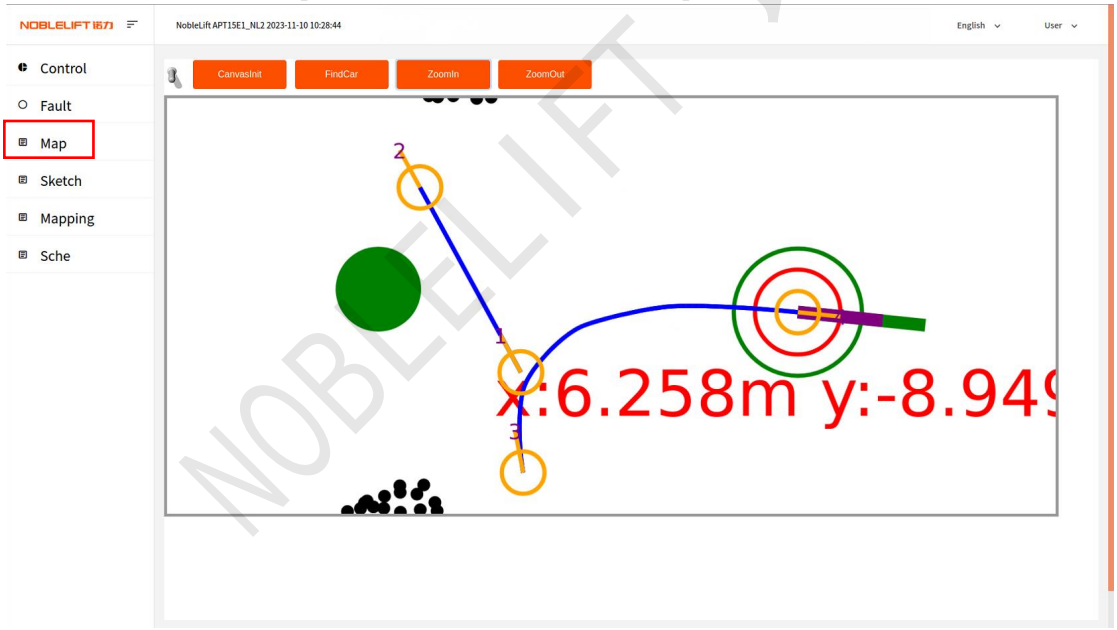

Figure 5-53

Click the "RemovePath" button above the "sketch" interface,

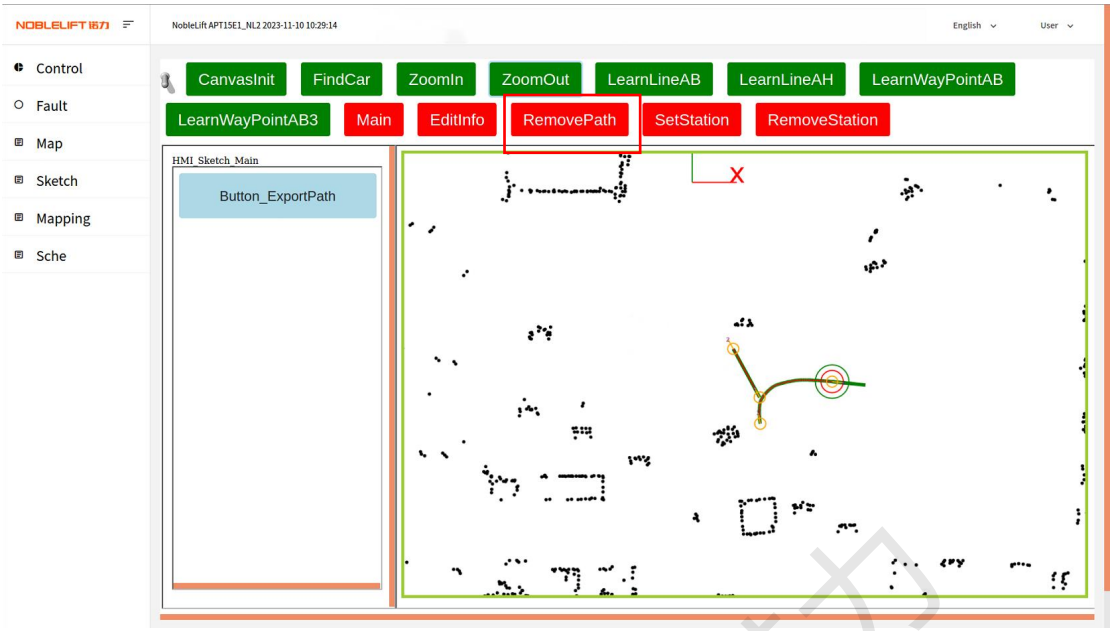

Figure 5-54

Click "Button_RemoveSinglePath".

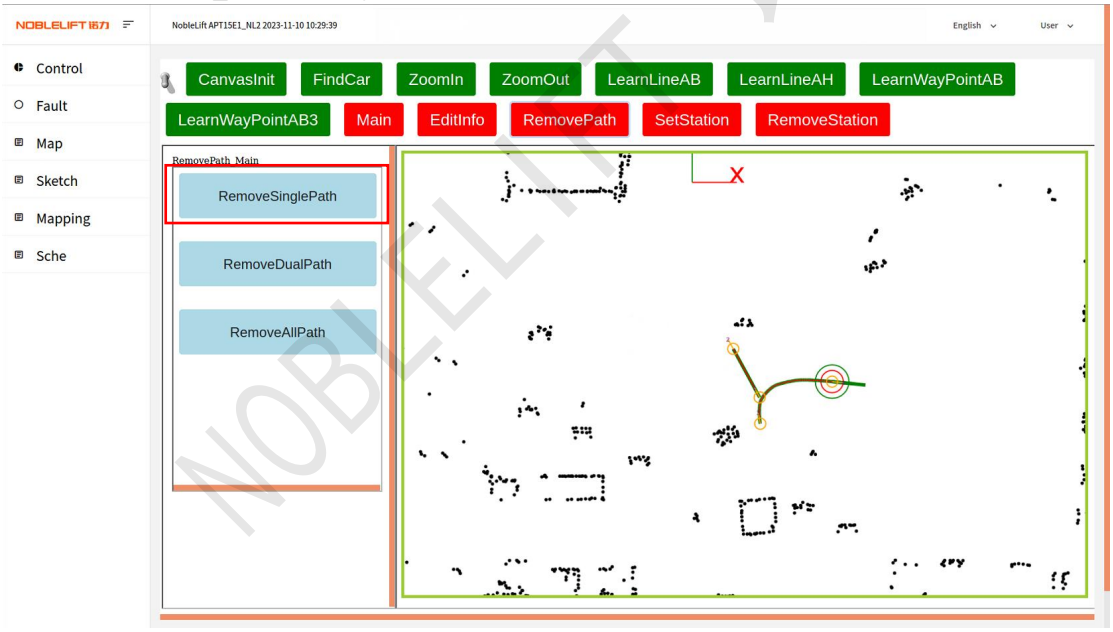

Figure 5-55

Set the starting and ending points of the route to be deleted.

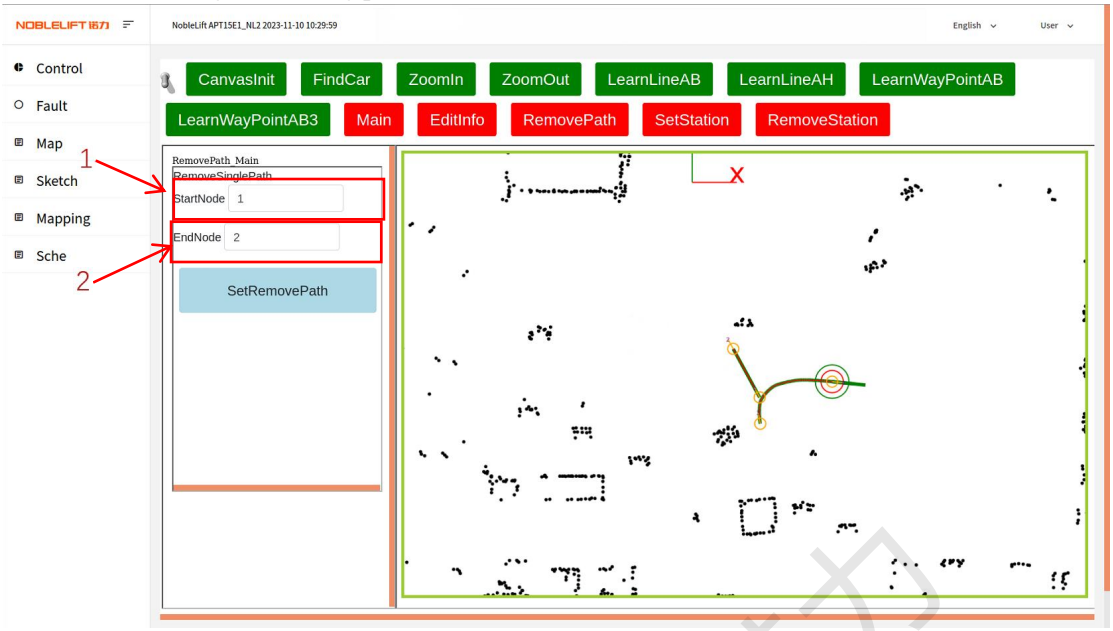

Figure 5-56

Click "SetRemovePath" and "OK" to confirm the settings, and you can see that the corresponding bidirectional path has been deleted.

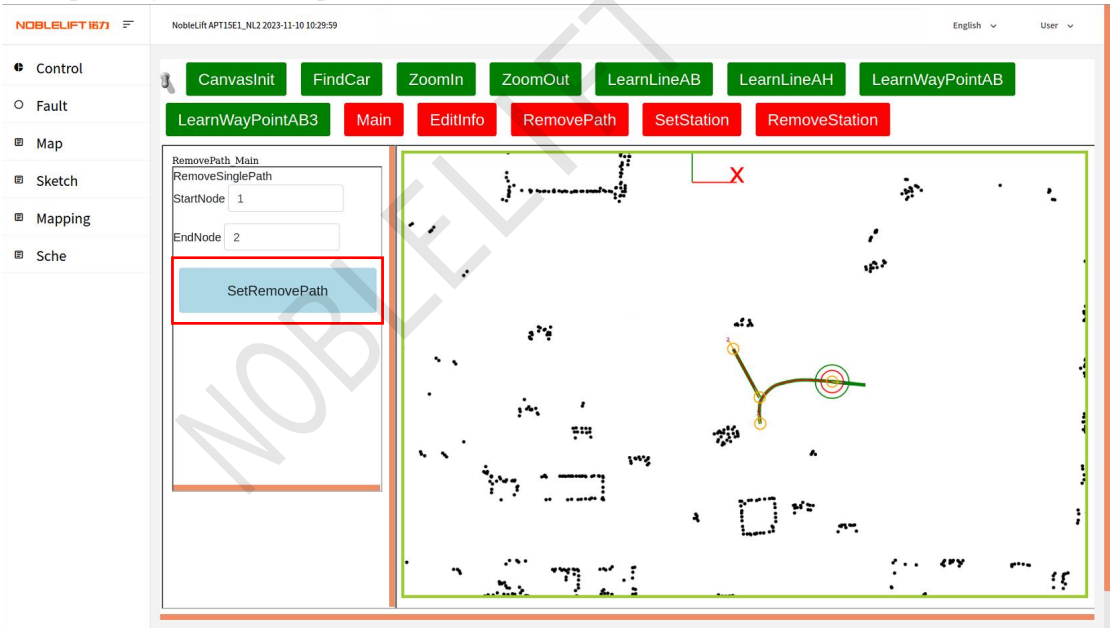

Figure 5-57

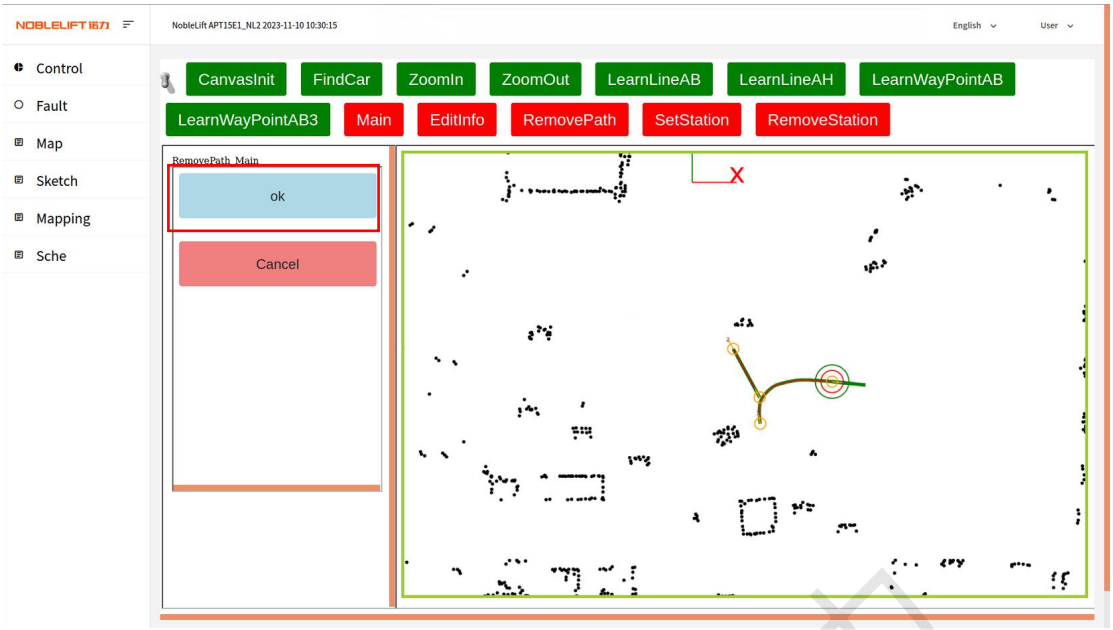

Figure 5-58

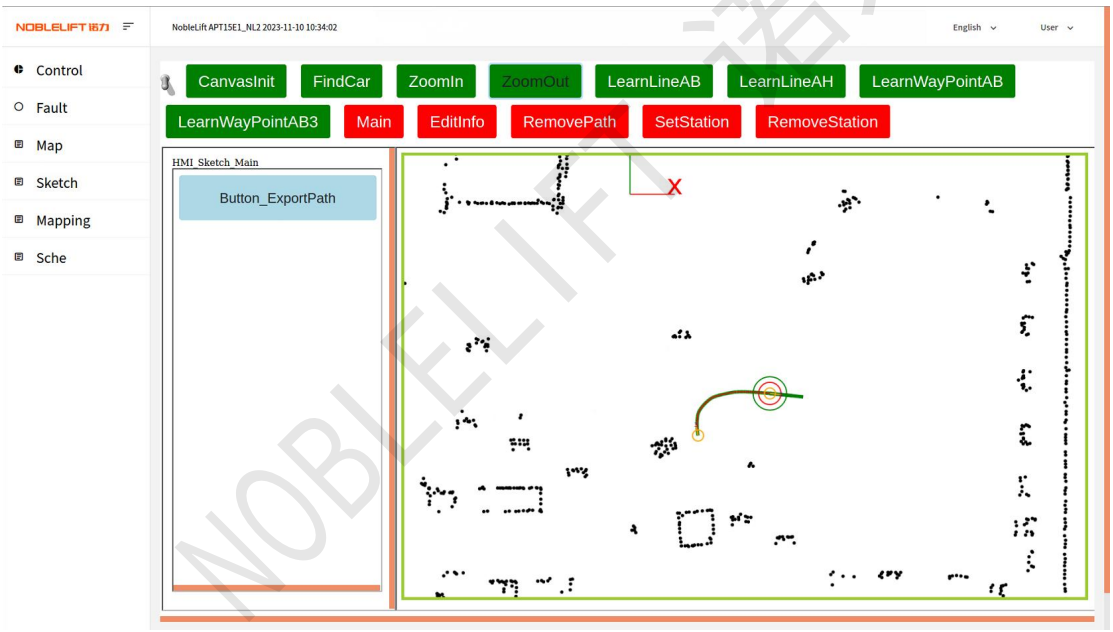

Figure 5-59

Click "Button_ExportPath" to complete the path output.

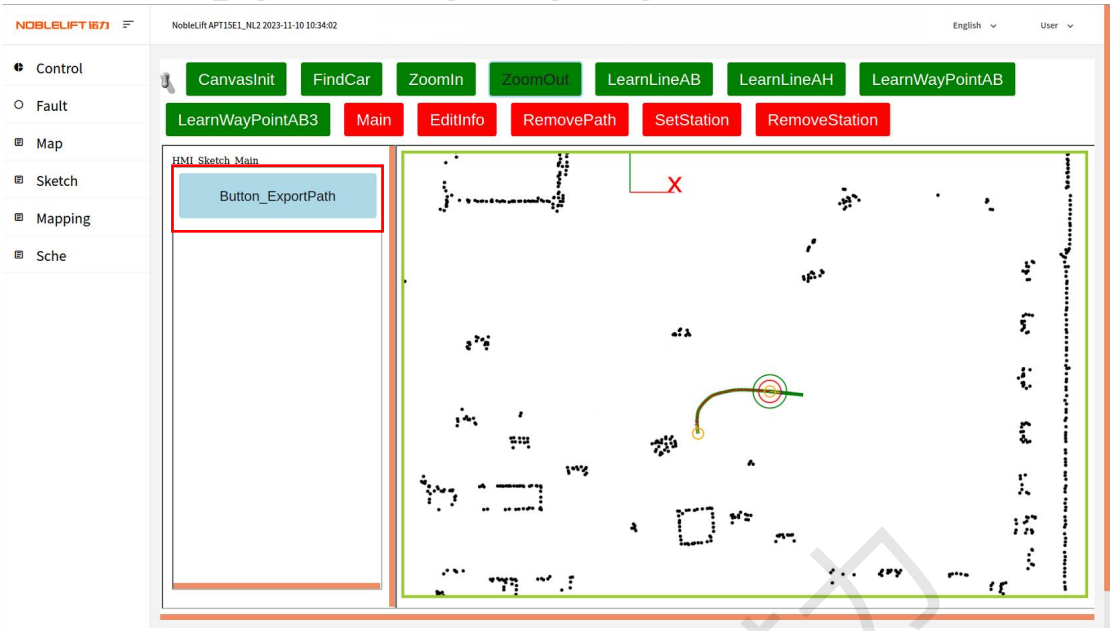

Figure 5-60

And if you need to delete all paths, you can click "RemoveAllPath".

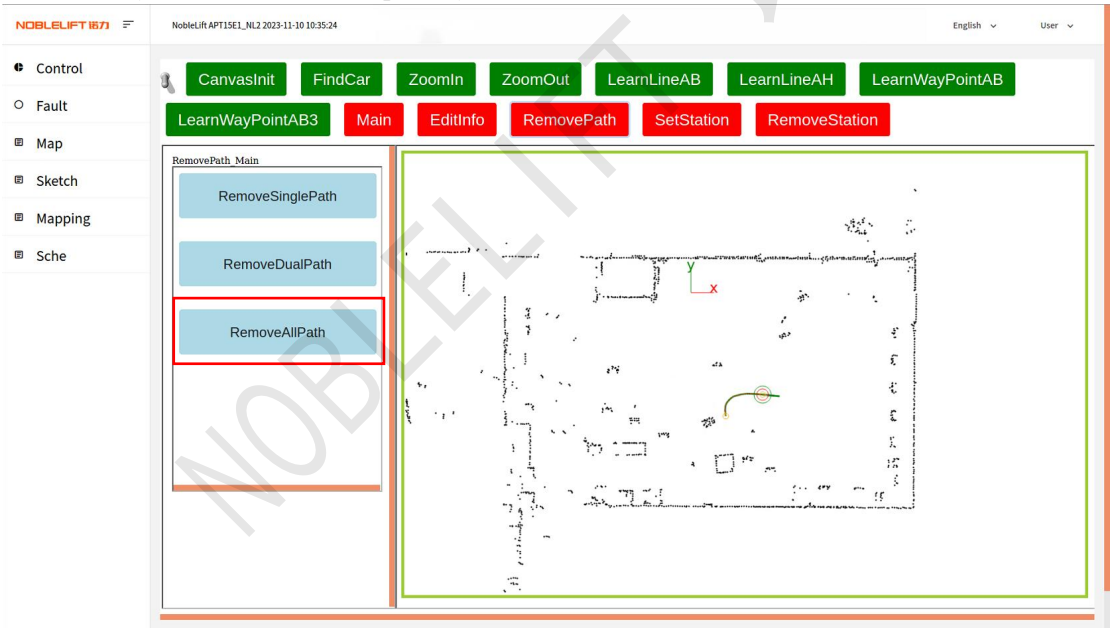

Figure 5-61

Then click "RemoveAllPathOK" to see that all paths in the "Sketch" interface have been deleted.

Figure 5-62

Click "Button_ExportPath" to complete the path output.

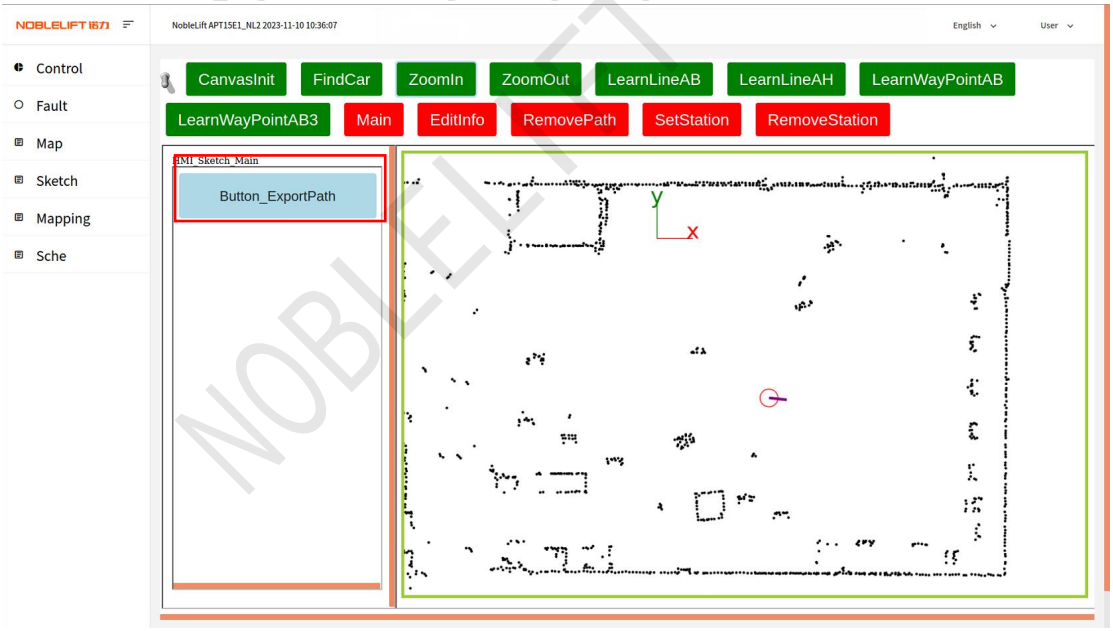

Figure 5-63

Then click "Map" to see that there are no longer any paths in the map.

Figure 5-64

5.8 Modifying route properties

Select the "Sketch" command , click "EditInfo".

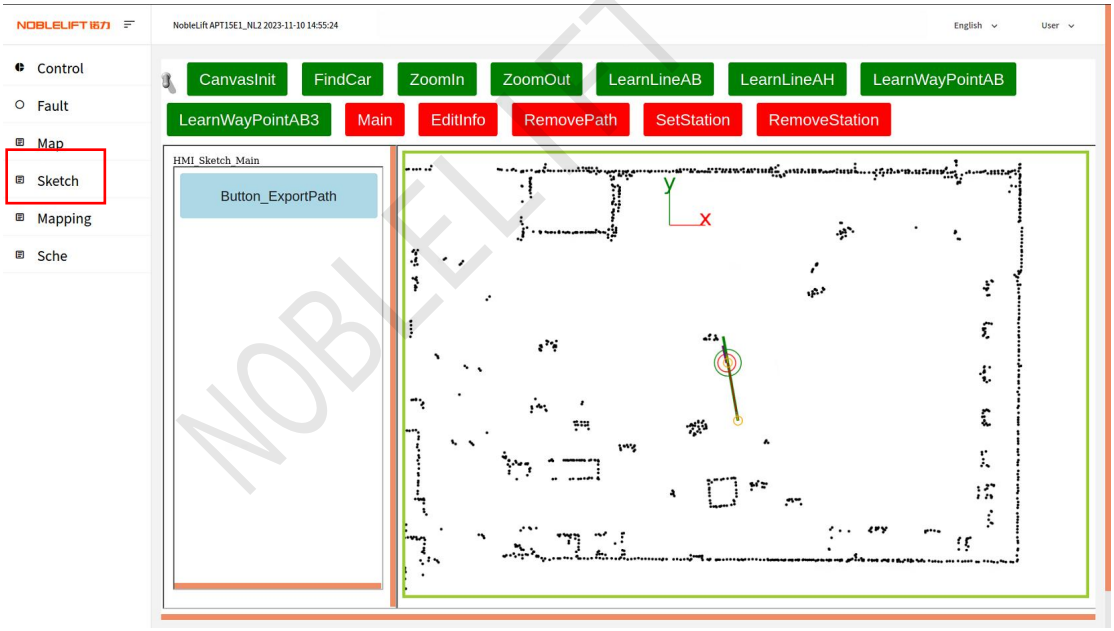

Figure 5-65

Click "Button_EditInfoSinglePath".

Figure 5-66

Select the corresponding path for the start and end points.You can freely modify the relevant parameters of this route.

Figure 5-67

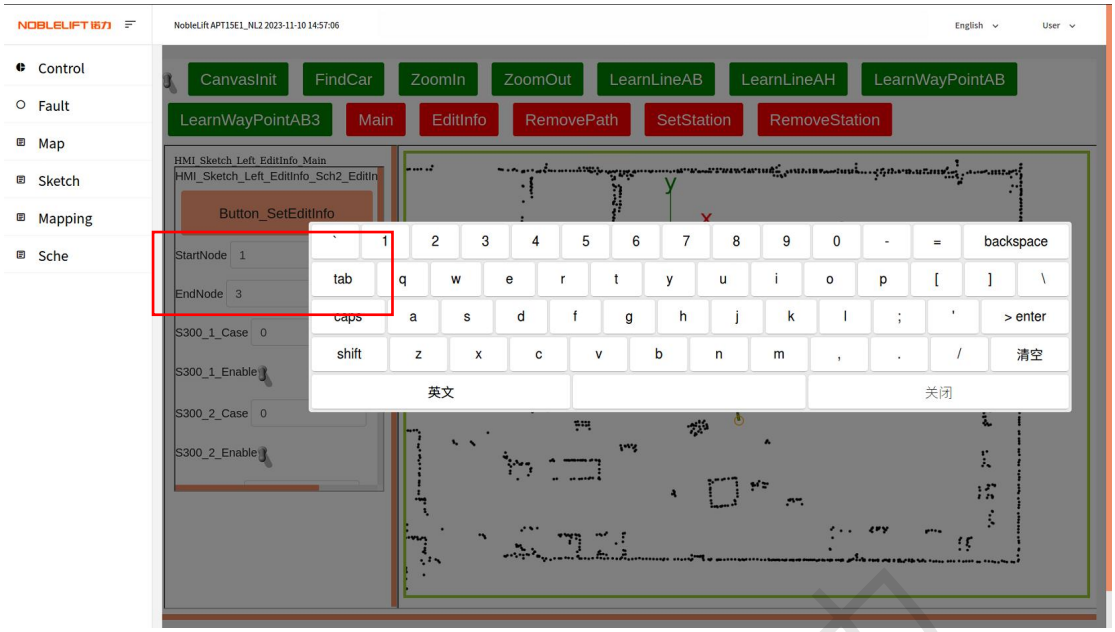

Figure 5-68

After making the modifications, click "Button_SetEditInfo"and "OK" to save the changes.

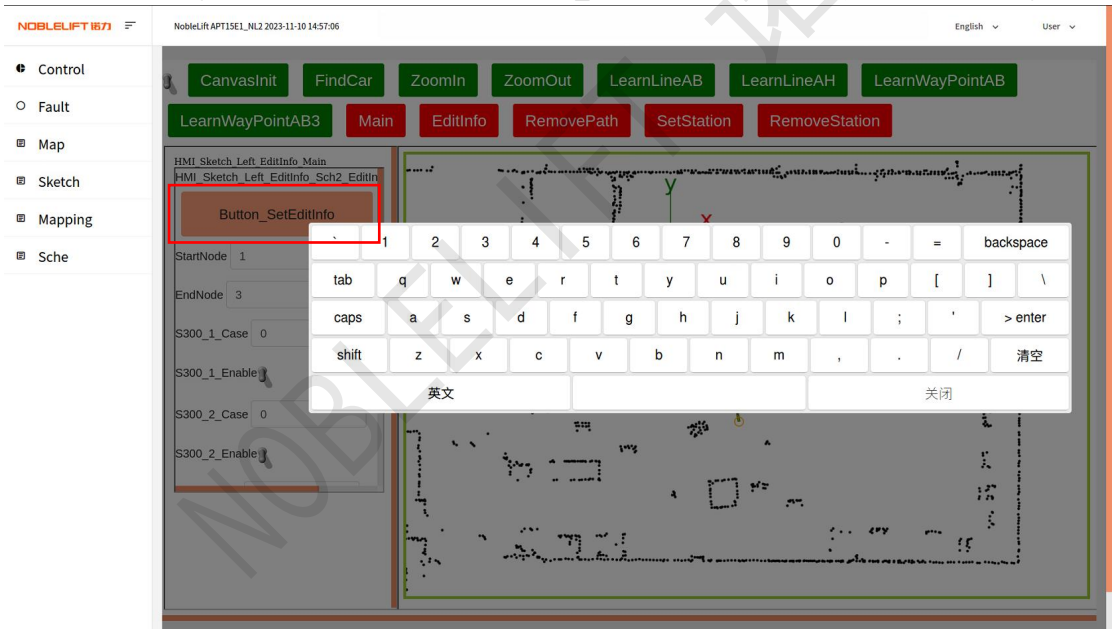

Figure 5-69

Click “Button_ExportPath”.

Figure 5-70

Then click ”ExportPathOK” to complete the path output.

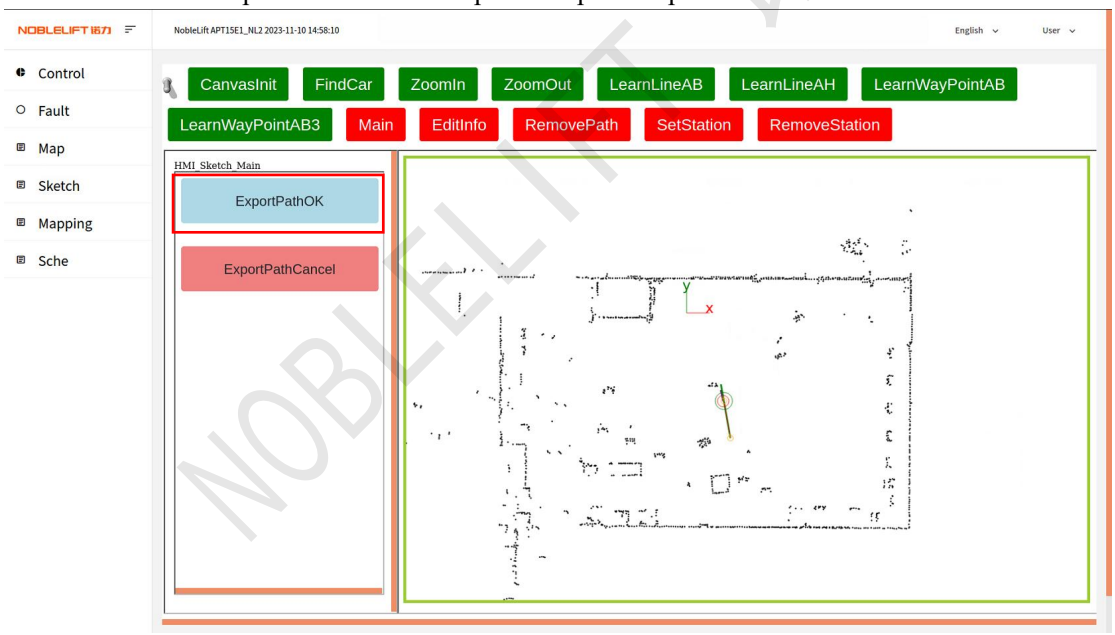

Figure 5-71

6 Vehicle shutdown and charging

(1)When the vehicle is shut down, first turn the key switch to point to "OFF". At this time, the display screen will turn off, and the navigation part will be shut down. Wait for 10 seconds before the entire vehicle is powered off. Do not perform any other operations while waiting. Press the "START" button once after the entire vehicle is powered off to completely shut down;

(2)When the vehicle needs to be charged, manually drive to the charging point, and then shut down as per step 1. After shutting down, plug in the charger plug-in and wait for the red light of the charger to flash evenly;

(3)The following table explains the flashing indicator light of the charger:

Table 6-1. Explanation of the flashing indicator light of the charger

Charger status	Indicator light status	Operating requirements for indicator lights	Notes
Normal charging state	Red light flashing		
POST status	Yellow light always on		
Battery fully charged state	Green light always on	After shutdown, use the precise SOC of BMS as the judgment condition	
Fault: BMS fault	The indicator light flashes alternately red and yellow, please refer to the BMS fault code for details Table: attachment	For example, in fault 2.1, the red light flashes twice with an interval of 0.5 seconds, then the yellow light flashes once with an interval of 2 seconds, and the process is repeated	
Fault: Charger fault	The indicator light flashes alternately yellow and green, please refer to the BMS fault code for details Table: attachment	For example, in fault 1.6, the yellow light flashes once with an interval of 0.5 seconds, then the green light flashes six times with an interval of 0.5 seconds, and then the interval is 2 seconds. Repeat this process	
Other statuses	Red light always on	EEPROM data abnormality or loss	