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Dr Robot[®] C# Advance Sentinel² Demo Program

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1 Prepare

To use Sentinel² Demo programs, you need download some support programs from Dr Robot and install or register them. Here is the list:

1. DRROBOTSentinelCONTROL.OCX

This ActiveX control component needs be copied to windows/system32 folder and use regsvr32 to register it.

2. WiRobotGatewayforWiFi.exe

You can copy it to your working folder.

3. DrRobotSensorMapBuilder.dll

This dll file provides some functions to build around sensor map for collision avoidance. It needs to be copied to "windows/system32" folder and use regsvr32 to register it.

4. DrRobotConstellation.dll

For Sentinel², you will need this file. This dll file provides some functions to local the robot position with DrRobot Constellation system. It needs to be copied to "windows/system32" folder and use regsvr32 to register it.

5. DrRobotP2PSpeedDrive.dll

This dll file provides some functions to make robot move form one point to another point. It needs to be copied to "windows/system32" folder and use regsvr32 to register it.

6. Install DirectX9.0C for Joystick control in program.


7. VitaminCtrl.dll


For I90 series, Sentinel² and Scout², you need to install camera control component. You can download VitaminDecoder.exe to install it.

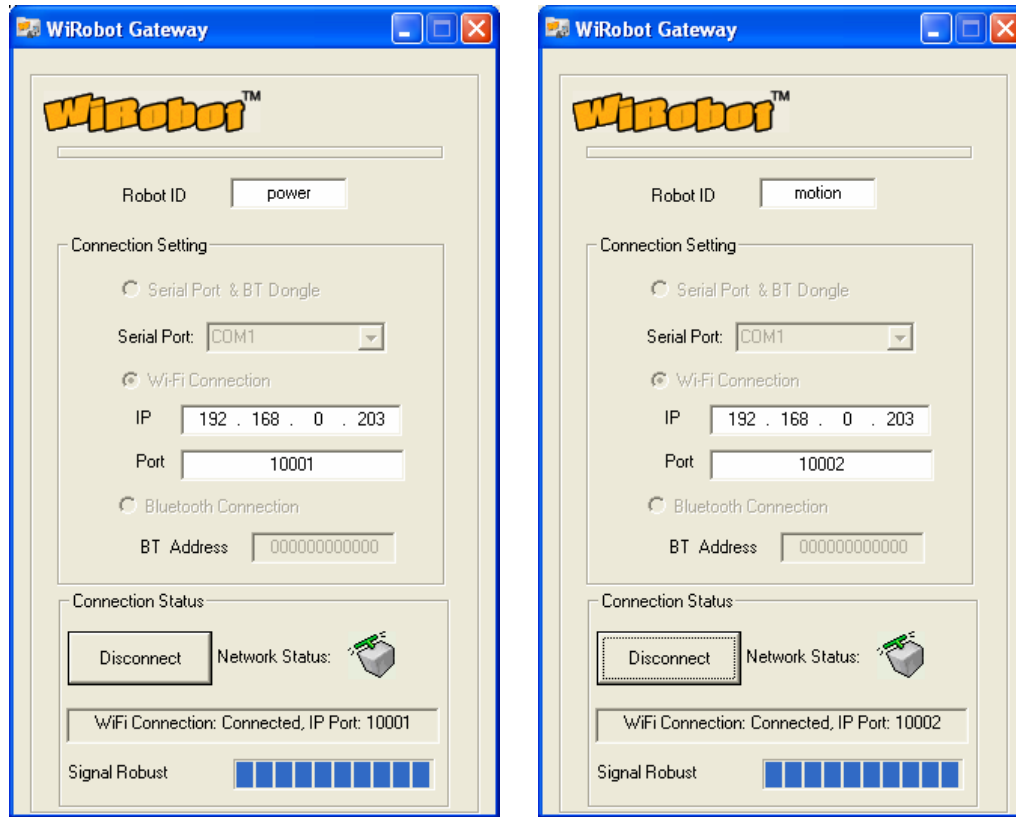
Note: For DRROBOTSentinelCONTROL.OCX, you can refer to Dr Robot SDK API User Manual.

2 User Interface

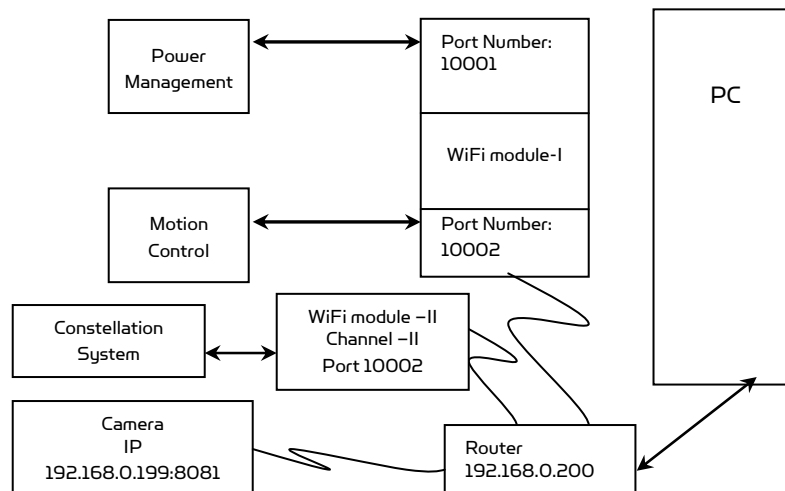
There are two DrRobotSentinelControl ActiveX controls in this program, and you need to run first one

WiRobotGatewayforWiFi.exe  program and set Robot ID as **"power"**, type in your robot IP and set Port as **"10001"** (default), and click "Connect" button. And then run second WiRobotGatewayforWiFi.exe

 program and set Robot ID as **"motion"**, type in your robot IP and set Port as **"10002"** (default)



WiRobotGatewayforWiFi.exe



Sentinel² Controller Boards Connection Diagram

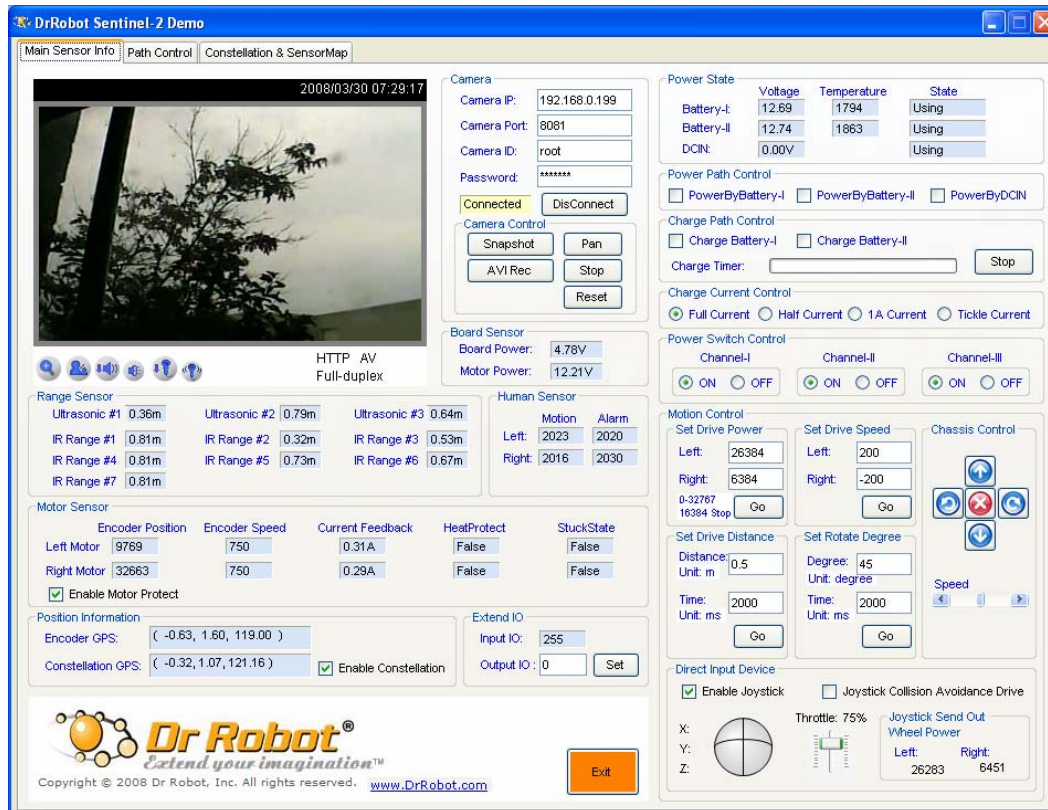


DrRobotSentinel-2Demo.sln
 Microsoft Visual Studio Solution
 Version: Visual C# Express 2008

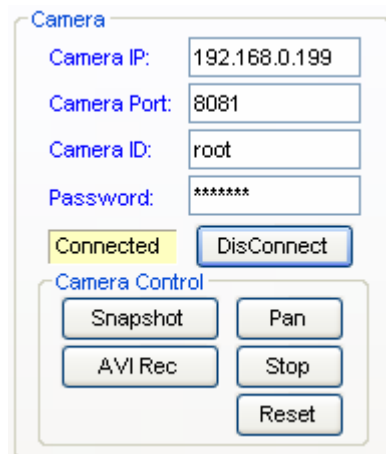
Open the

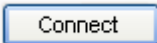
project and click F5 button to run the program.

Tag: Main Sensor Info

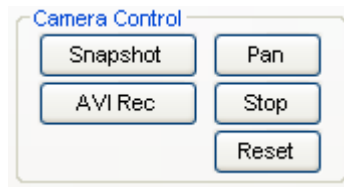


1. Camera



- Click  to connect to camera, yellow text box display currently connection status

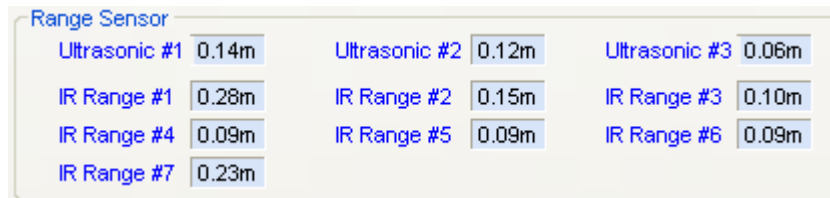
2. Camera Control



- Click , the image should be saved at c:\ drive as "templ.jpg", you can modify store path
- Click to store the video at "..\DrRobotSentinel-2Demo\bin\Debug\" folder with CLIP_YYYYMMDD-HHMMSS.avi, you can modify store path
- Click , the camera should pan
- Click to stop camera movement
- Click to set the camera to original initial position.

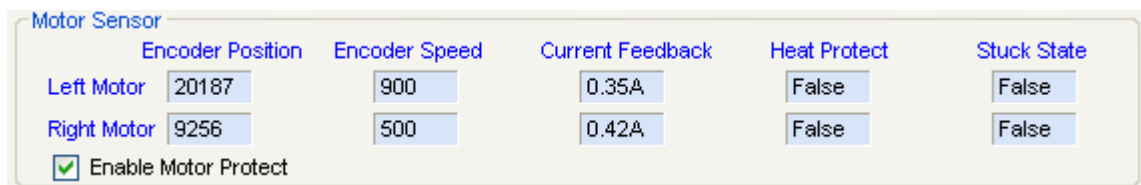
Note: For more camera function sample, please refer to CD's "\PTZ Camera SDK\" folder

3. Range Sensor



- List the sensor reading

4. Motor Sensor



- List Encoder reading
- Checked Enable Motor Protect option, the motor should automatic stop once the motor overheat or got stuck.

5. Position Information

Position Information

Encoder GPS: (-0.63, 1.60, 119.00)

Constellation GPS: (-0.32, 1.07, 121.16) Enable Constellation

- List currently position value from encoder and from constellation system
- Checked Enable Constellation to receive constellation position information

6. Board Sensor

Board Sensor

Board Power: 4.82V

Motor Power: 12.44V

- List the board and motor 's power voltage.

7. Human Sensor

Human Sensor

	Motion	Alarm
Left:	2012	2018
Right:	2013	2014

- List left and right human motion sensor reading

8. Extend IO

Extend IO

Input IO: 255

Output IO: 0

- List Input IO value
- Click to set the Output IO parameter, "0" for "00000000" and "255" for "11111111". For detail , refer to X80 User manual

9. Motion control -> Set Drive Power

Set Drive Power

Left: 26384

Right: 6384

0-32767
16384 Stop

- Drive robot via PWM value, value must between 0 ~ 32767, set 16384 to stop motor

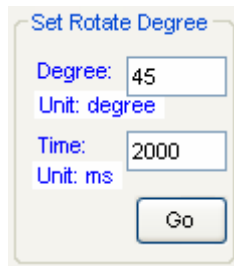
10. Motion control -> Set Drive Speed



The image shows a control panel titled "Set Drive Speed". It contains two input fields: "Left:" with the value "200" and "Right:" with the value "-200". Below these fields is a "Go" button.

- Drive robot via encoder speed

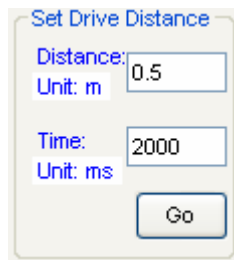
11. Motion Control -> Set Rotate Degree



The image shows a control panel titled "Set Rotate Degree". It contains three input fields: "Degree:" with the value "45", "Unit:" with the value "degree", and "Time:" with the value "2000". Below these fields is a "Go" button.

- Set "Degree" to "45", robot should turn left 45°, set "-45", robot should turn right 45°, set "720", robot should turn 2 circle.

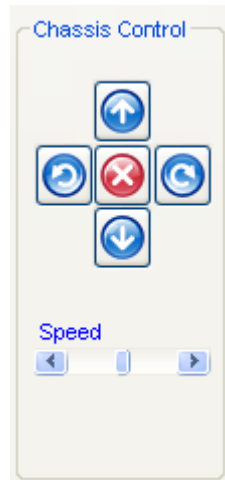
12. Motion Control -> Set Drive Distance



The image shows a control panel titled "Set Drive Distance". It contains two input fields: "Distance:" with the value "0.5" and "Unit:" with the value "m". Below these fields is another set of input fields: "Time:" with the value "2000" and "Unit:" with the value "ms". At the bottom is a "Go" button.

- Drive robot to designed distance, unit is meter.

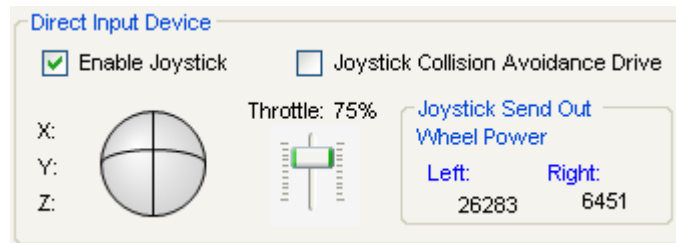
13. Motion Control -> Chassis Control



- Click the arrow button to drive robot "Forward", "Backward", "Turn Left", "Turn Right" and "Stop"
- Adjust Speed Scroll bar to change the motion speed.

Note: If you can not find the perfect speed for your robot, you can modify this scroll bar's **maximum** value.

14. Motion -> Direct Input Device



- Check Enable Joystick, drive the robot via Joystick, push the handheld stick forward, the robot drives forward, for faster speed, just push bigger range.
- Click Joystick Collision Avoidance Drive to active "Collision Avoidance" function when you drive robot via Joystick.

15. Motion -> Direct Input Device -> Joystick send out Wheel Power



- Display currently PWM value for driving robot

16. Power State

Power State			
	Voltage	Temperature	State
Battery-I:	12.71	1881	Using
Battery-II	12.76	1936	Using
DCIN:	0.00V		Using

- Display 2 battery packs currently state, include voltage and temperature
- When you plug in the charger plug into robot, the DCIN should display charger voltage.

17. Power Path Control

Power Path Control

PowerByBattery-I
 PowerByBattery-II
 PowerByDCIN

- Checked PowerByBattery-I , the robot only use battery – I
- Checked PowerByBattery-II , the robot only use battery –II
- Checked PowerByDCIN , the robot power by charger unit
- By default, robot uses both battery packs

18. Charge Path Control

Charge Path Control

Charge Battery-I
 Charge Battery-II

Charge Timer:

- Checked Charge Battery-I to only charge battery –I
- Checked Charge Battery-II to only charge battery -II
- By default, both battery packs should be charged
- Charge Timer: display the charger process status
- Click to stop charger task
- If the temperature of battery packs is high, the charger task should automatic stop. The charger process status bar should stop.

19. Charge current Control

Charge Current Control




Full Current
 Half Current
 1A Current
 Tickle Current

- Selected Full Current option for full current charge
- Selected Half Current option for half current charge

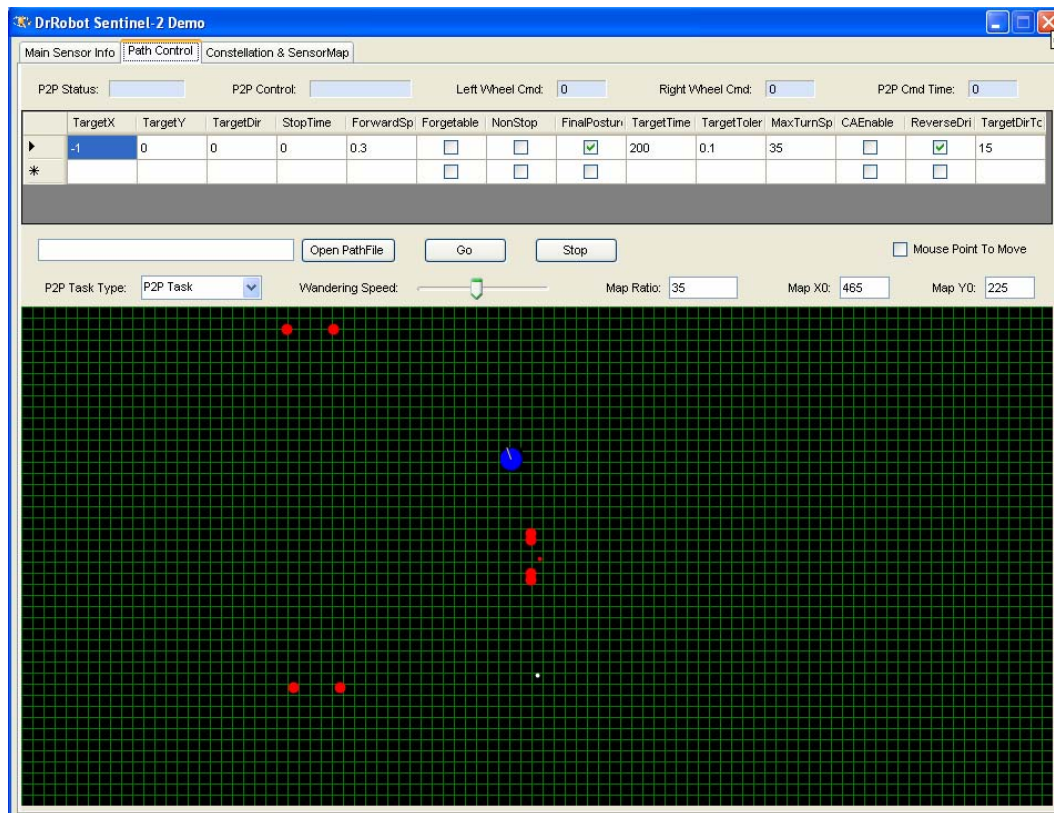
- Selected 1A Current option for 1A current charge
- Selected Tickle Current option for 300mA charge

20. Power Switch Control



-  Selected ON/OFF for Channel – I , this should reset Camera power
-  Select ON/OFF for Channel – II, this should reset motion power
-  Select ON/OFF for Channel – III, this channel is reserved

Tag: Path Control



1. Robot Path Control Information

TargetX	TargetY	TargetDir	StopTime	ForwardSp	Forgettable	NonStop	FinalPostun	TargetTime	TargetToler	MaxTurnSp	CAEnable	ReverseDri	TargetDirTc
1.39	-2.34	-11.23	0	0.15	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	200	0.1	35	<input checked="" type="checkbox"/>	<input type="checkbox"/>	15
*					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>	

2. Path Control Panel

P2PStatus: P2PGo P2P Control: SpeedControl Left Wheel Cmd: -360 Right Wheel Cmd: 334 P2P Cmd Time: 3000

P2P Task Type: Wander Task Wandering Speed: Map Ratio: 35 Map X0: 465 Map Y0: 225

- Open PathFile to select Path file
- Click Go to execute the task
- Click Stop to stop robot movement
- P2P Task Type: Wander Task for select the task,

when you select **“Wander Task”**,

the robot will wandering with collision avoidance. To implant this function, the program will set the target point just at 1m front of current position in tmrControl.

Almost same for Joystick control with Collision avoidance, it also is implemented by calling P2P drive function and always set the target point at the 1m front of current position.

There is simple map display at the interface. You can change the mapratio and map center(0,0) position to display the robot position.

If you checked Mouse Point to Move, you choose the target point by click the mouse on the map area, and the program will display the point at the map and you can click button to drive the robot.

When you select **“P2P task”**,

Point to Point, robot will drive to points one by one and stop at the last point. you need to provide the path file, if there are 3 points in your file, robot should start from point 1 and access point 2 and arrive point 3 and

stop. Selected this option, and then you can click button to drive the robot.

When you select **“Charge Task”**,

You need to write a charge path for charge station. Usually it has at least 4 points before the charge station. The last point should be behind the charge station around 20 cm. and the last second point should be at the 10cm front of charge station. You can get the point information by

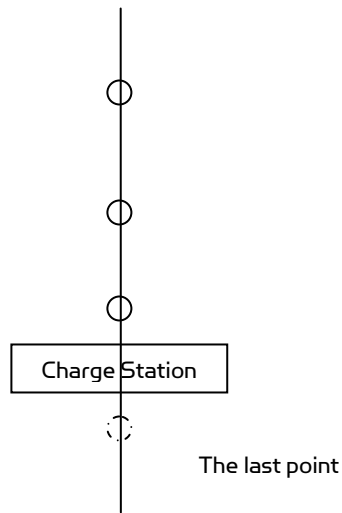
putting the robot at the desired points and writing down the position data in the charge path file.

There are more detection and output in tmrControl function to detect the chagestation(input IO bit 0 is zero) and set the output IO bit 0 as high to enable the charge station output the power.

And at the last three points you need to switch transponder to Chagestation transponder, to improve the accuracy for estimate.

You can read the source code to get more details.

You can write you own code to plan the path and in big area auto switch the transponder and detect the battery power to implement a auto go to charge station function.

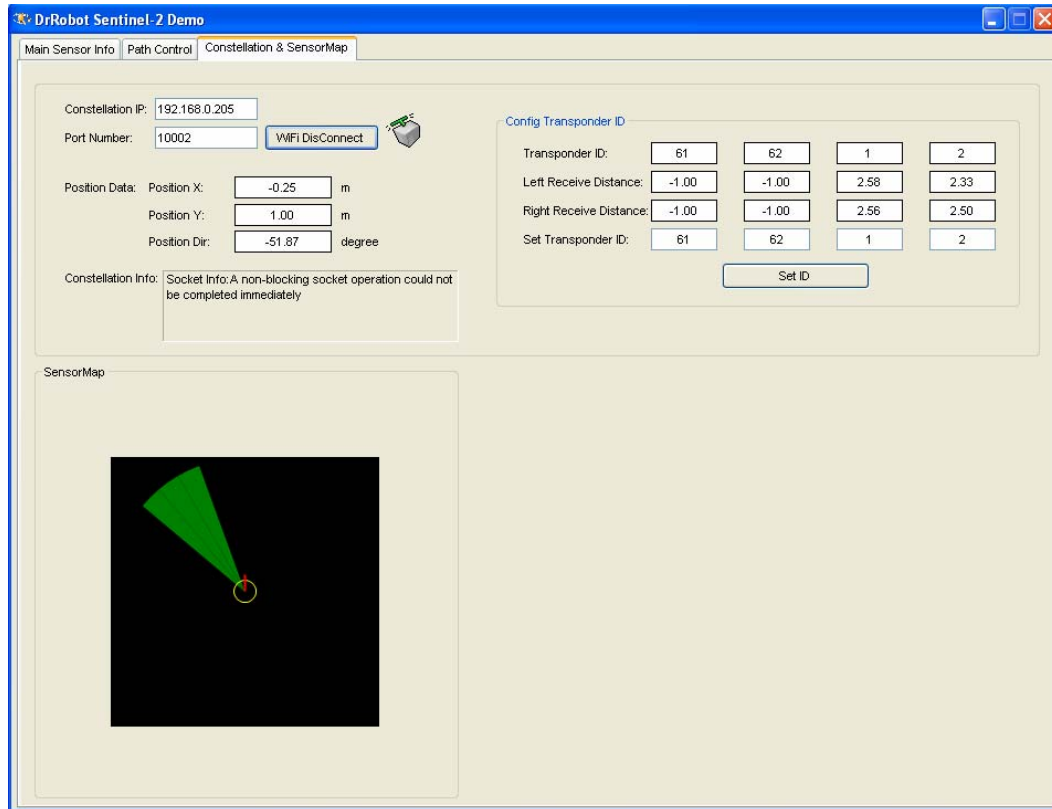


When you select "Patrol Task"

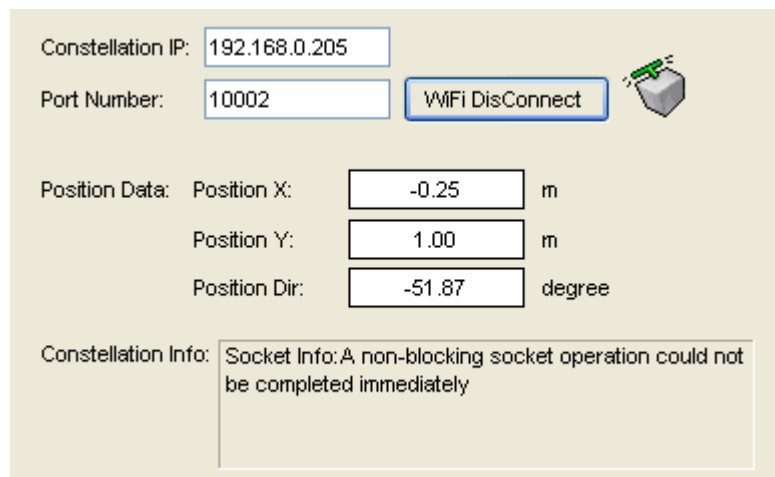
Point to Point, robot will drive to points one by one and robot will not stop at the last point, it will run to the first the point. You need carefully to write the patrol path file. if there are 3 points in your file, robot should start from point 1 and access point 2 and point 3 and return to point 1 and run again and again until you click .

- Wandering Speed: for adjust the speed
- Map Ratio: for zoom in or zoom out map, increase value should zoom out the map.
- Map X0: Map Y0: for set the location of control point (Red dot) in the picture
- checked Mouse Point to Move option, use mouse to click on map, a "Target Point" (White dot) should present on the map, the robot should run to this target point.

Tag: Constellation & SensorMap



21. Constellation System Connection



- Click **WiFi Connect** to connect constellation system, once successful connect to constellation, the position information should display.
- Currently constellation info also display as above picture.

22. Configure teansponder ID

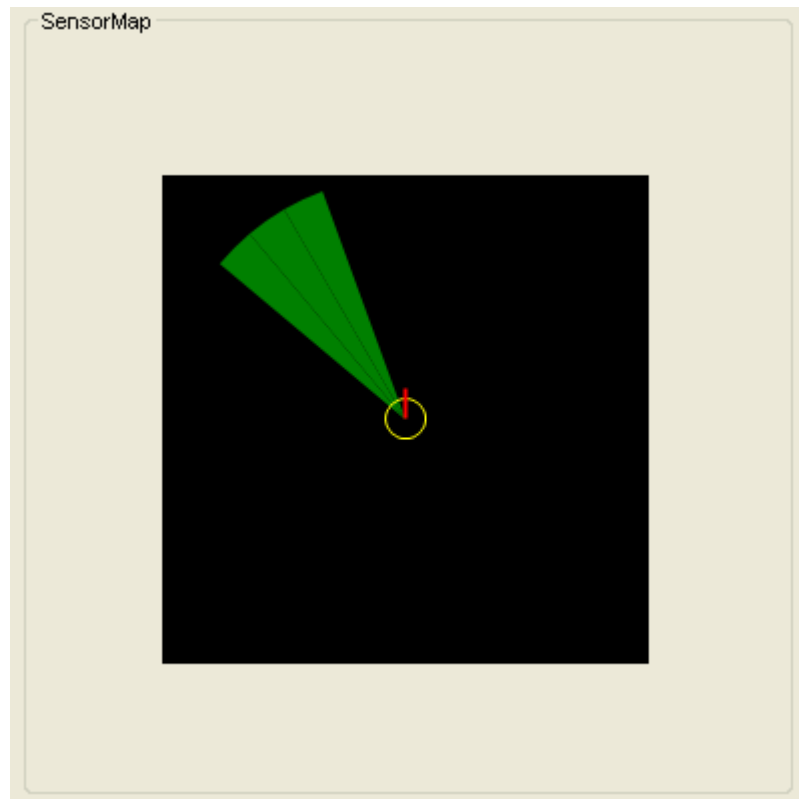
Config Transponder ID

Transponder ID:	61	62	1	2
Left Receive Distance:	-1.00	1.03	0.22	2.57
Right Receive Distance:	-1.00	1.20	0.05	2.50
Set Transponder ID:	61	62	1	2

Set ID

- Click  to config the transponder ID, for detail information, please refer to Sentinel² User manual

23. SensorMap



- Display currently obstacle status which detected by range sensors (Ultrasonic & IR Sensors)