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Dr Robot[®] C# Advance Sputnik Demo Program

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1 Prepare

To use Sputnik 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. DrRobotP2PSpeedDrive.dll

This dll file provide 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.

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

6. Due to sputnik robot has an animated head system, so that the program need a ServoConfig.xml with 5 servos configuration parameter, for configure the servo movement command range, you need test the movement range and its initial position for each servo, and set those parameters into ServoConfig.xml file.

In this file, you need to define the minimum, maximum and init value for each servo like below:

```
<ServoConfigDataTable>
    <Min>2168</Min>
    <Ini>2550</Ini>
    <Max>3400</Max>
    <ID>0</ID>
</ServoConfigDataTable>
```

Servo ID	Movement
0	Head Tilt
1	Head Pan
2	Mouth open/close
3	Not Used
4	Eye Tilt
5	Eye Pan

Note: Once you finished ServoConfig.xml file modification, you need to copy it into below folders:

..\DrRobotSputnikDemo\DrRobotSputnikDemo\DrRobotSputnikDemo\

..\DrRobotSputnikDemo\DrRobotSputnikDemo\DrRobotSputnikDemo\bin\Debug\
..\DrRobotSputnikDemo\DrRobotSputnikDemo\DrRobotSputnikDemo\bin\Release\


7. For power management, there is no charge current for Sputnik.
8. For Sputnik, there is a LCD display on robot, so that you can send a 128*64 mono bmp file to robot, and display as image on LCD.
9. Same as X80 robot, there is no constellation on robot, so you only can use encoder sensor to estimate position.


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

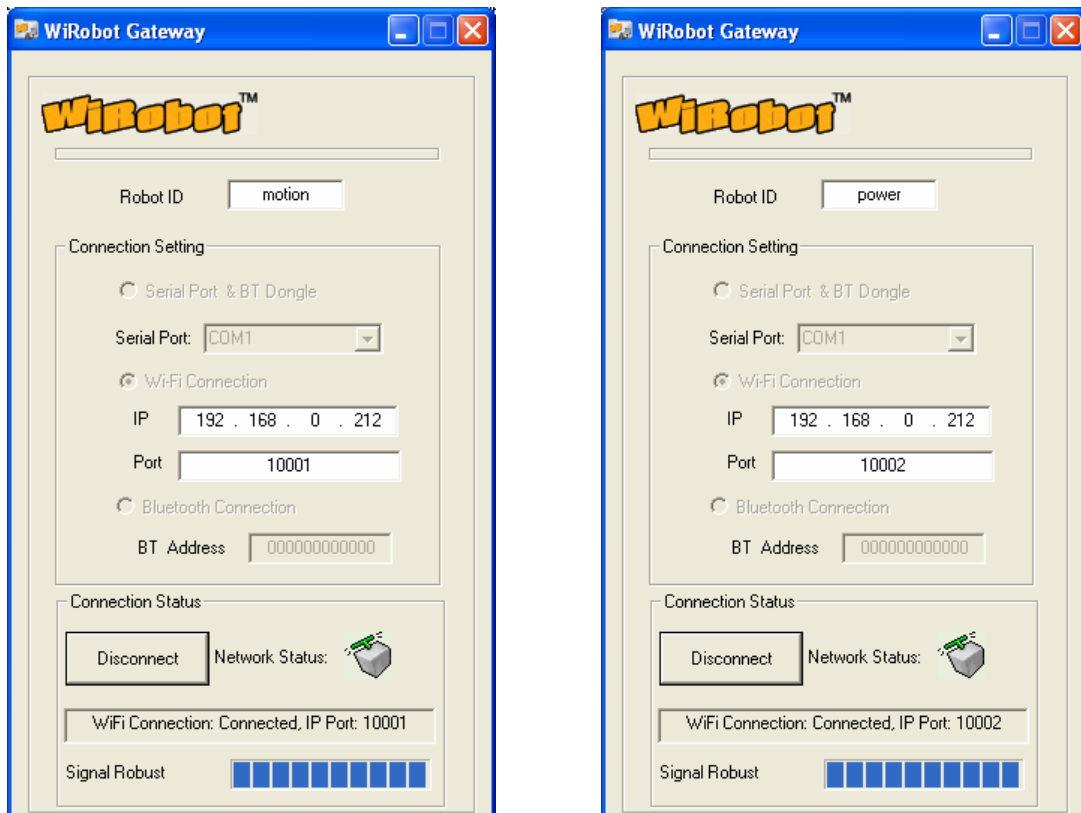
2 User Interface

The Sputnik is a robot with a head on the X80 chassis and a power management.

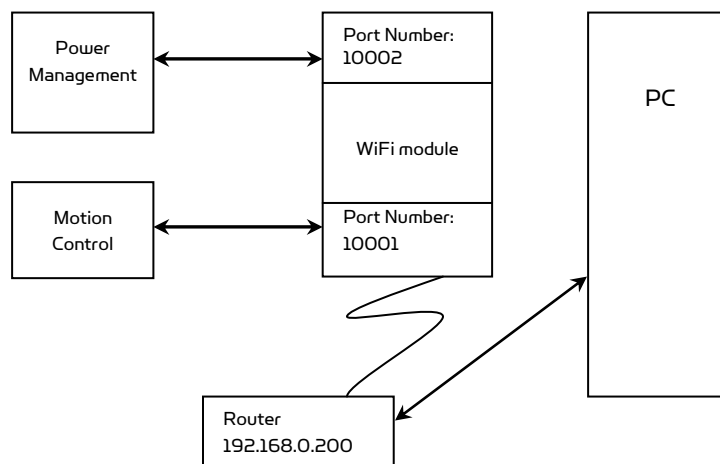
There are two DrRobotSentinelControl ActiveX controls in this program, and you need to run first one

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

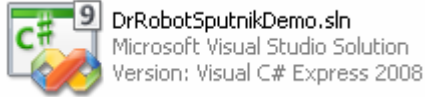
 program and set Robot ID as "power", type in your robot IP and set Port as "10002" (default)



WiRobotGatewayforWiFi.exe



Controller Boards Connection Diagram



Open the

project and click F5 button to run the program.

Tag: Main Sensor Info & Sensor Map

DrRobot Sputnik Demo

Main Sensor Info & Sensor Map | Path Control

Multimedia

Save Image

Play Music

Head Motion Control

Head Pan: [Slider]

Head Tilt: [Slider]

Eye Pan: [Slider]

Eye Tilt: [Slider]

Interval: 2000 ms

Reset

Demo

Mouth: [Slider]

SensorMap

[Sensor Map Visualization]

Power State

	Voltage	Temperature	State
Battery-I:	12.75	1867	Using
Battery-II:	12.81	1907	Using
DCIN:	0.00V		Using

Power Path Control

Power By: Battery-I Battery-II DCIN

Charge Path Control

Charge Battery-I: Charge Battery-II:

Charge Timer: [Slider] Stop

Power Switch Control

Channel-I: ON OFF

Channel-II: ON OFF

Channel-III: ON OFF

LCD Display

C:\wirobot128.bmp Display

Range Sensor

Sensor	Distance
Ultrasonic #1	0.58m
Ultrasonic #2	0.58m
Ultrasonic #3	2.55m
IR Range #1	0.49m
IR Range #2	0.67m
IR Range #3	0.81m
IR Range #4	0.81m
IR Range #5	0.81m
IR Range #6	0.16m
IR Range #7	0.54m

Human Sensor

Motion	Alarm
Left: 2021	2023
Right: 2055	2036

Motor Sensor

Encoder Position	Encoder Speed	Current Feedback	Heat Protect	Stuck State
Left Motor: 20187	900	0.35A	False	False
Right Motor: 9256	500	0.42A	False	False

Enable Motor Protect

Position Information

Encoder GPS: (-2.27, 1.84, 62.43)

Set Position

Extend IO

Input IO: 255

Output IO: 0

Set

Board Sensor

Board Power: 4.73V

Motor Power: 12.45V

Motion Control

Set Drive Power: Left: 26384, Right: 6384

Set Drive Speed: Left: 200, Right: -200

Set Drive Distance: Distance: 0.5, Unit: m

Set Rotate Degree: Degree: 45, Unit: degree

Time: 2000, Unit: ms

Go

Chassis Control

Speed: [Slider]

Direct Input Device

Enable Joystick Joystick Collision Avoidance Drive

Throttle: 75%

Joystick Send Out Wheel Power: Left: 26867, Right: 6242

X: [Joystick]

Y: [Joystick]

Z: [Joystick]

Exit

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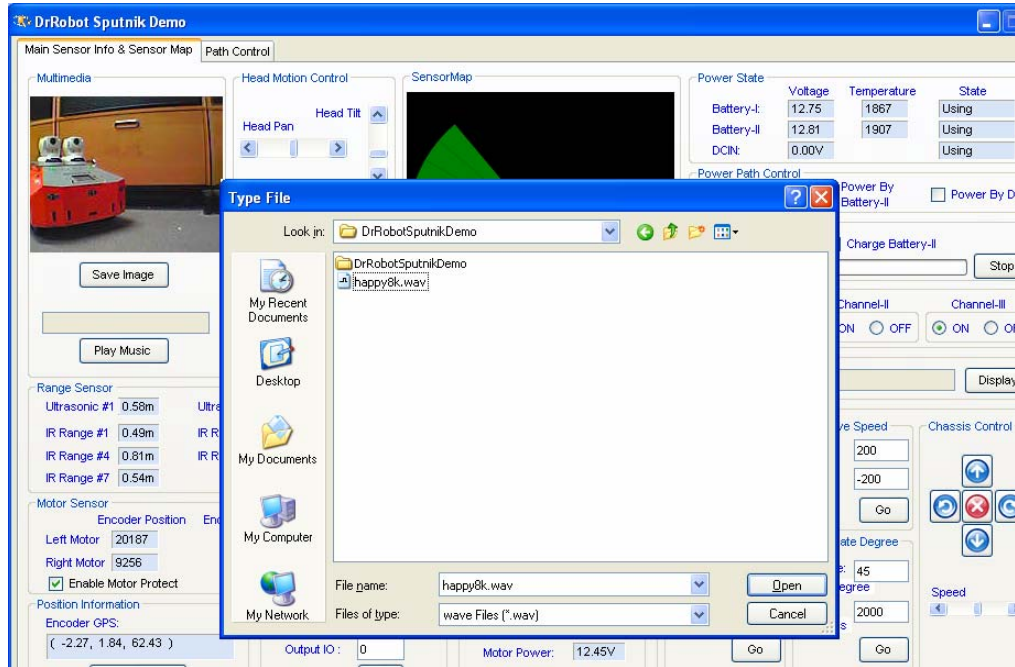
1. Multimedia

Multimedia

Save Image

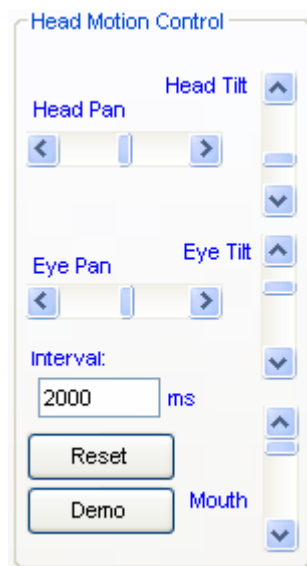
Play Music

- Click **Save Image**, the image should save at DrRobotSputnikDemo\bin\Debugphoto.bmp, you can modify store path
- Click **Play Music**, the “Open File” dialog form should present,select “happy8k.wav” to play this music.



Note: If you can not hear the music, copy this happy8k.wav to your C:\, and try again. You can select any 8K 16-bit Mono .wav file to play.

2. Head Control



- Adjust Pan or Tilt scroll bar to controll head, eye and mouth movement

- Modify "Interval" value to change movement finish time, the unit is milsecond (ms)
- Click , to set the head to original initial position.
-

Note: If you find the head is not in the central position, you can modify the ServoConfig.xml to get correct position. Please refer to "Prepare" section

- Click , the head should demonstrate "Up-Down" twice, "Left-Right" twice and "Stop" movement.

3. Range Sensor

Range Sensor

Ultrasonic #1	<input type="text" value="0.58m"/>	Ultrasonic #2	<input type="text" value="0.58m"/>	Ultrasonic #3	<input type="text" value="2.55m"/>
IR Range #1	<input type="text" value="0.49m"/>	IR Range #2	<input type="text" value="0.67m"/>	IR Range #3	<input type="text" value="0.81m"/>
IR Range #4	<input type="text" value="0.81m"/>	IR Range #5	<input type="text" value="0.81m"/>	IR Range #6	<input type="text" value="0.16m"/>
IR Range #7	<input type="text" value="0.54m"/>				

- List the sensor reading

4. Motor Sensor

Motor Sensor

	Encoder Position	Encoder Speed	Current Feedback	Heat Protect	Stuck State
Left Motor	<input type="text" value="20187"/>	<input type="text" value="900"/>	<input type="text" value="0.35A"/>	<input type="text" value="False"/>	<input type="text" value="False"/>
Right Motor	<input type="text" value="9256"/>	<input type="text" value="500"/>	<input type="text" value="0.42A"/>	<input type="text" value="False"/>	<input type="text" value="False"/>

Enable Motor Protect

- 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:

- List currently position value
- Click to reset this value to (0.00, 0.00, 0.00)

6. Board Sensor

Board Sensor

Board Power: 4.73V

Motor Power: 12.45V

- List the board and motor 's power voltage.

7. Human Sensor

Human Sensor

	Motion	Alarm
Left:	2021	2023
Right:	2055	2036

- List left and right human motion sensor reading

8. Extend IO

Extend IO

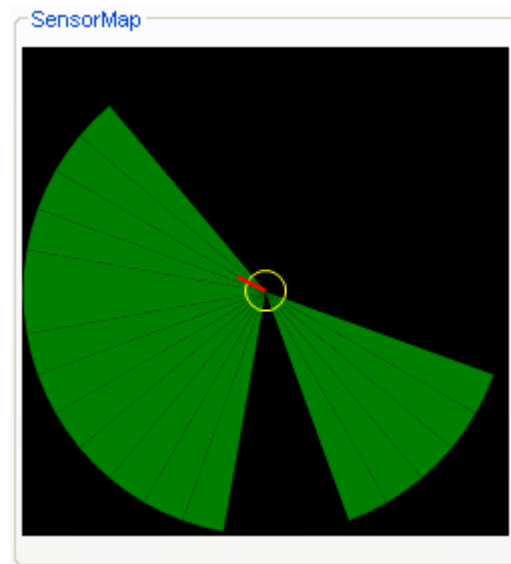
Input IO: 255

Output IO : 0

Set

- 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. SensorMap



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

10. Motion control -> Set Drive Power

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

11. Motion control -> Set Drive Speed

- Drive robot via encoder speed

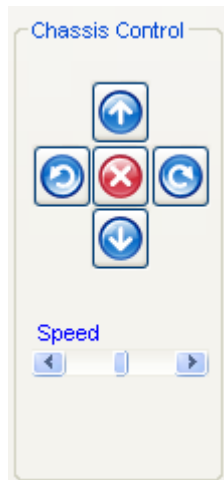
12. Motion Control -> Set Rotate Degree

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

13. Motion Control -> Set Drive Distance

- Drive robot to designed distance, unit is meter.

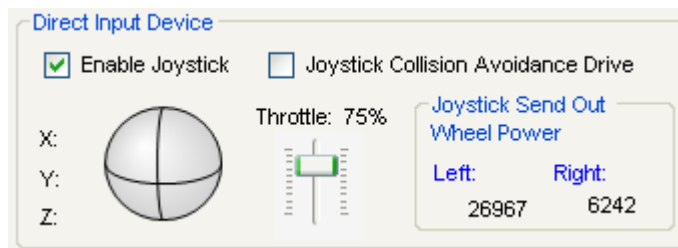
14. Motion Control -> Chassis Control



- 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.

15. 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.

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



- Display currently PWM value for driving robot

17. Power State

Power State			
	Voltage	Temperature	State
Battery-I:	12.75	1867	Using
Battery-II	12.81	1907	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.

18. power Path Control

Power Path Control

Power By Battery-I
 Power By Battery-II
 Power By DCIN

- Checked Power By Battery-I , the robot only use battery - I
- Checked Power By Battery-II , the robot only use battery -II
- Checked Power By DCIN , the robot power by charger unit
- By default, robot uses both battery packs

19. 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.

20. Power Switch Control

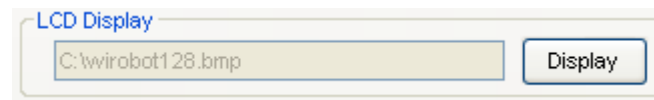
Power Switch Control

Channel-I Channel-II Channel-III

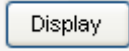
ON OFF
 ON OFF
 ON OFF

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

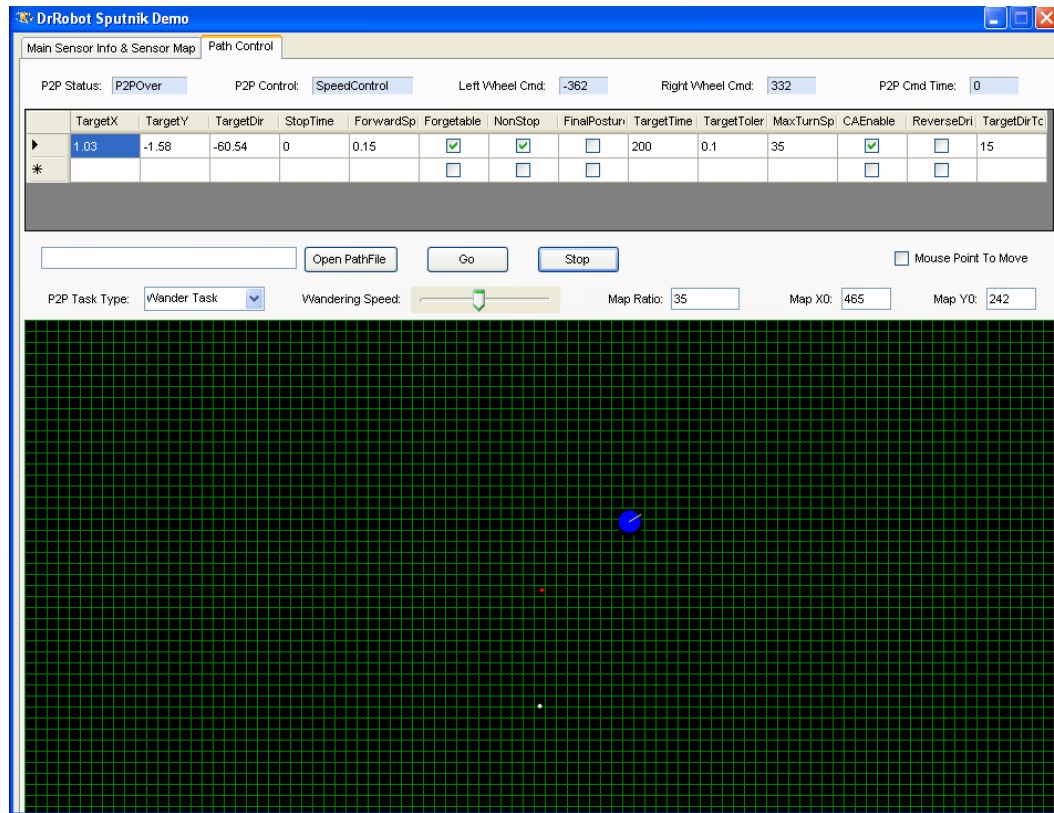
21. LCD Display



The LCD Display control panel features a text input field containing the file path 'C:\wirobot128.bmp' and a 'Display' button to the right of the field.

- Click  to select 128x64 Mono BMP file, and send to robot's LCD

Tag: Path Control



1. Robot Path Control Information

TargetX	TargetY	TargetDir	StopTime	ForwardSp	Forgetable	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"/>	

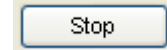
2. Path Control Panel




- 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", and then click Go, the robot should auto wandering around the environment.

When you select "P2P task", 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.

When you select "Patrol Task", you also 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 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.

Note: The robot position is based on encoder information. You can reset it to any position. Then robot will estimate position based on it.