WiFi Mobile Robot Development Platform
with High Resolution Pan-Tilt-Zoom Camera

X80SV

Quick Start Guide

WARNINGS

Do NOT power on the robot before reading and fully understanding the operation procedures explained in this manual.

Neither the robot, nor the program is bug free, accidence could happen; you have to make sure that the robot always maintains a safe distance from people during operation.

The robot should be turn off (i.e. the power switch should be on OFF position) when not in used. Battery should be fully charged before storage. Battery pack should be recharged every two weeks while in storage.

Failure to follow these warnings could cause serious injury or death and/or damage to the robot.

Copyright Statement

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Introduction

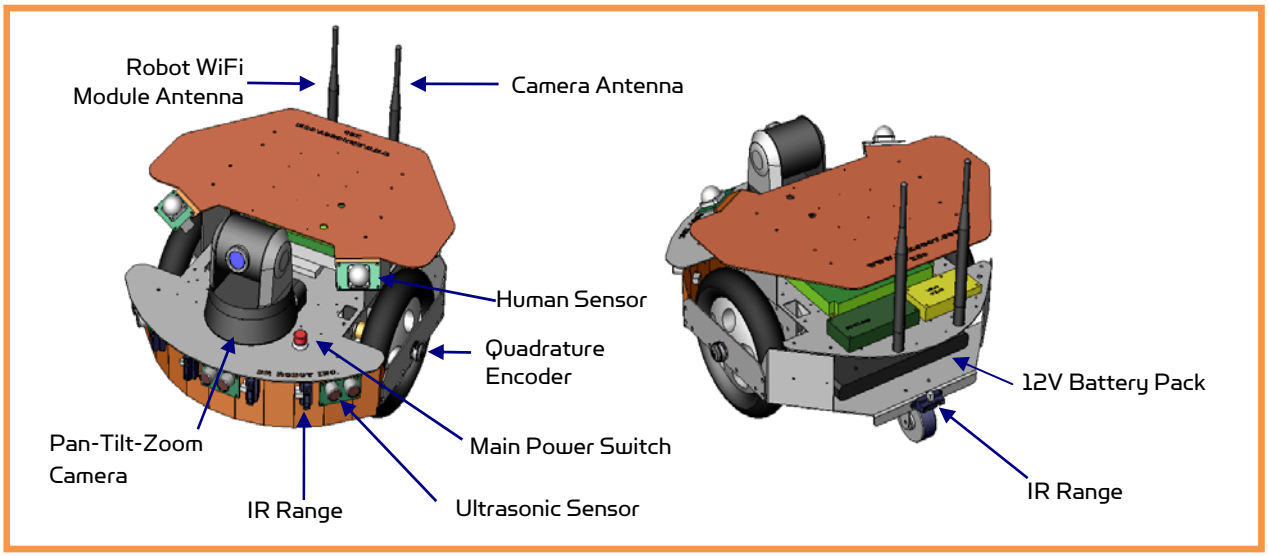
X80SV is designed and built on X80 robot base, featuring high resolution Pan-Tilt-Zoom camera.

Key Features

- *High resolution Pan-Tilt-Zoom Camera with two-way audio capability*
- *Two 12V motors with over 300oz.-inch (22kg.cm) torque each*
- *Fully wireless networked 802.11g*
- *OS independent application development tools*
- *Max speed of 1 m/sec*
- *128x64 graphic LCD, Display image, message or sensor data*
- *Collision detection sensors include 3 Ultrasonic range sensors and 7 IR range sensors*
- *2 Pyroelectric Human Motion Sensors*
- *Comprehensive circuit protection*
- *Max payload 10 kg (optional 40 kg) with robot weight of 3 kg*
- *Dimension 38cm (L) x 35cm (W) x 28cm (H)*
- *Extended operating time. 3 hours nominal operation time for each recharging*
- *Upgrade options:*
    - *Supplementary sonar sensors, temperature sensors, acceleration/tilting sensor, or customized sensors can be added.*
    - *Vision-landmark base indoor localization (indoor GPS, position/orientation) sensor and the landmarks together provide precise position and direction information covering every inch of the floor.*
    - *Laser scanner.*
    - *Power and battery systems for 6-hour operation time are available.*

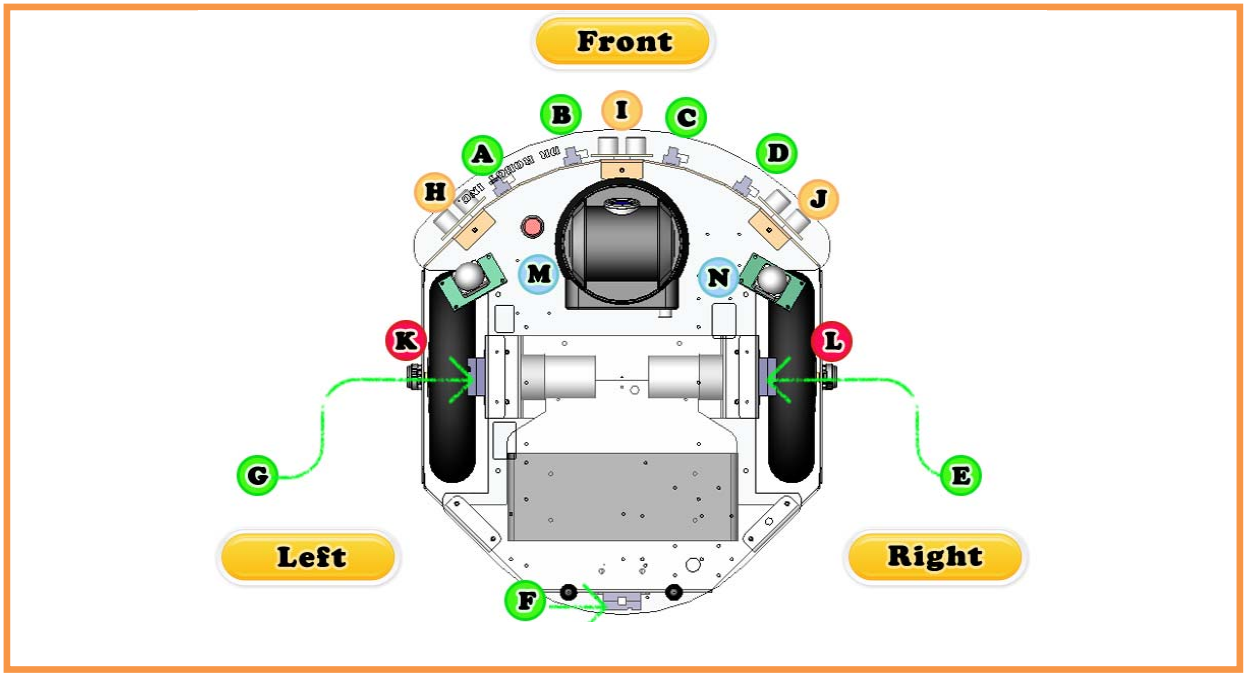
Sensors and External Components

The figure below illustrates the key functional components you will identify on the outside of X80SV robot.



X80SV Overview

The robot comes with 3 ultrasonic range sensors and 7 IR range sensors. These range sensors are for environment detection and collision avoidance.



X80SV Sensor Module Location (Top View)

Sensor Module	Location
Ultrasonic #1	H – Left front
Ultrasonic #2	I – Middle front
Ultrasonic #3	J – Right front
Human Sensor #1	M – Left front
Human Sensor #2	N – Right front
Infrared Range Sensor #1	A – Front left
Infrared Range Sensor #2	B – Front middle
Infrared Range Sensor #3	C – Front middle
Infrared Range Sensor #4	D – Front right
Infrared Range Sensor #5	E – Right
Infrared Range Sensor #6	F – Rear
Infrared Range Sensor #7	G – Left
Quadrature Encoder #1	K - Left , use channel 1
Quadrature Encoder #2	L - Right, use channel 2

Operation Scenario

Diagram below shows the typical operation scenario. The X80SV is a wireless networked robot. It connects to the wireless AP or router via IEEE 802.11b/g network. The Local PC running the X80SV Control program could connect to this network via either:

- Network cable – Connect the host PC to one of the LAN ports on the back of the router (DO NOT connect to the WAN port), or
- Wireless – To connect the Local PC to the wireless router, configure the Local PC's wireless settings using the default wireless configuration settings found in the Network Connection session of this manual.

Typical Operation Scenario

Note: The Local PC could also be mounted on the robot instead off the robot if your application requires so.

User could be able to control the robot, see, talk and listen through the robot via the Dr Robot® Control program.

Software Installation

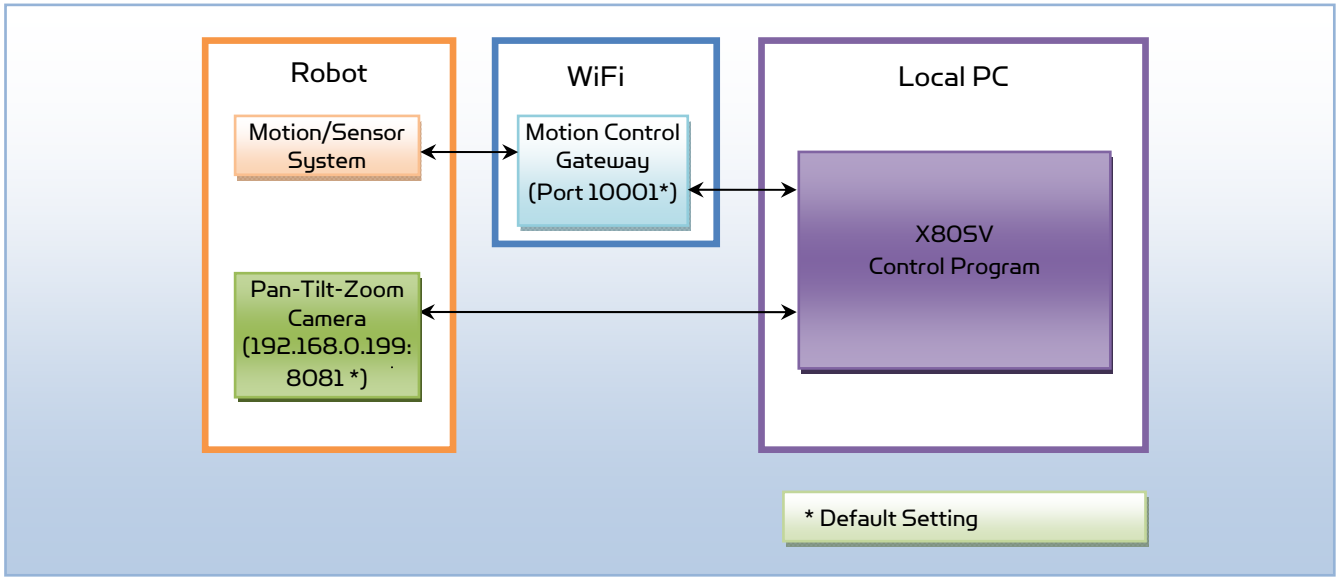
You should install the "X80SVControl" program from the installation CD.

After program installation, you will find the following programs under the "Start-All Programs" list, and they are installed under the "Program Files" folder.

Dr Robot Inc – X80SV Control

Dr Robot Inc – WiRobotGateway.exe

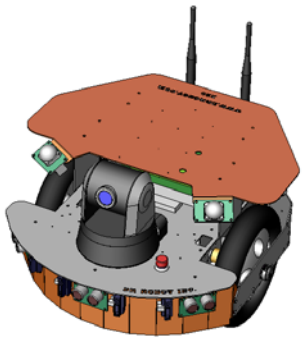
"SourceCode" folder contains a copy of X80SV sample code for Visual Studio 2008. It is locate under default installation folder (such as "C:\Program Files\Dr Robot Inc\Dr Robot X80SV Control Program\")



* DirectX ® SDK is required. You could download it from Internet

* Microsoft® .Net 3.5 Framework is required. You could download it from

Robot Operations

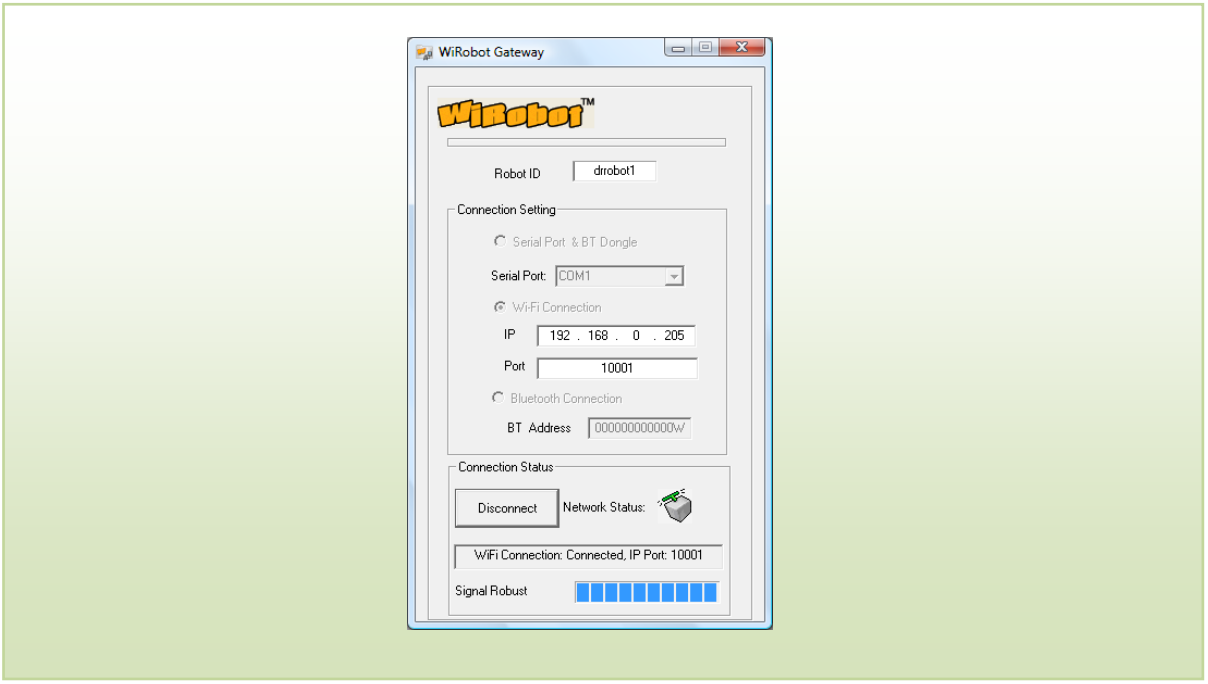


Step 1: If you have not installed the demo and support programs, insert the installation CD to CDROM and run the "Setup.exe" program that is under "X80SV Control Installation" folder.

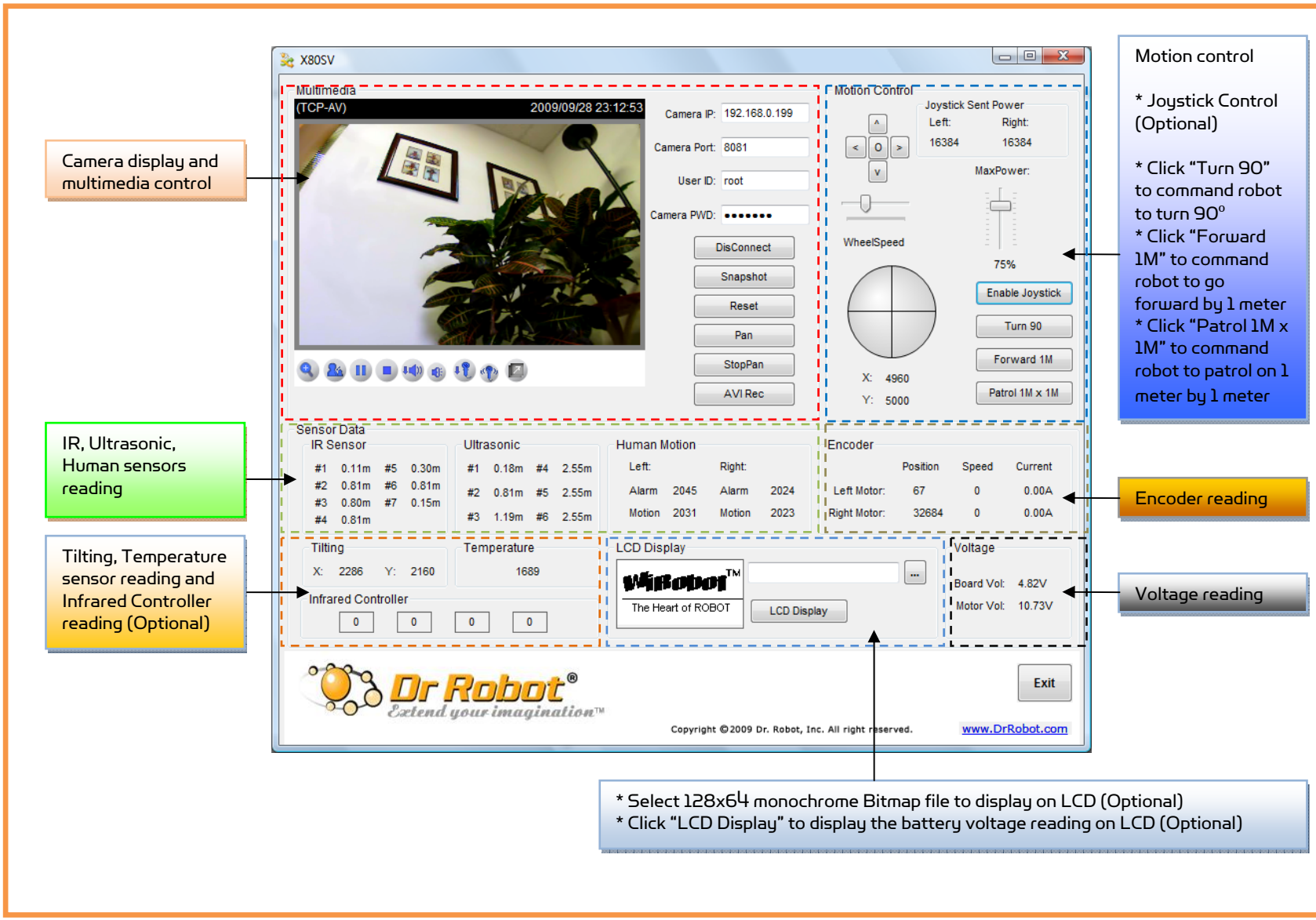
Step 2: Connect the PC to the wireless router (one of the LAN ports) (the router has IP 192.168.0.200) included in the package.

Step 3: Push red power switch on the front to turn on the robot.

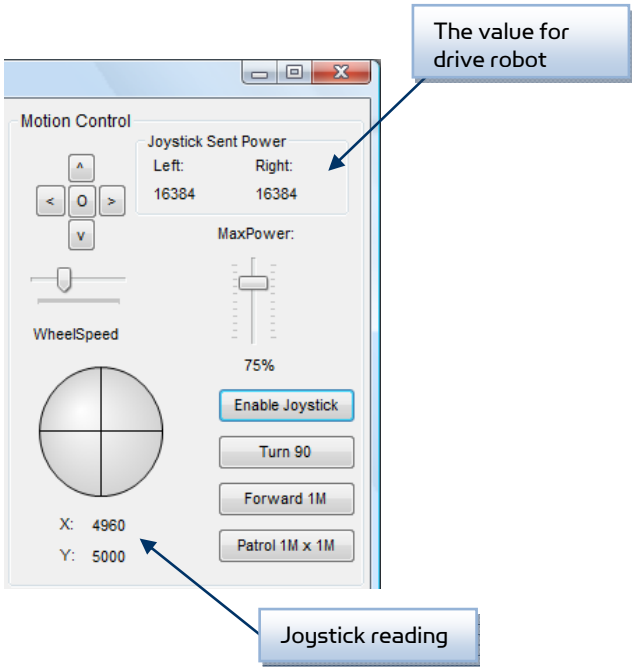
Step 4: Run the "WiRobotGatewayforWiFi.exe" from Start -> All Programs -> Dr Robot Inc -> WiRobotGateway.exe, Use "drrobot1" as robot ID, enter your robot IP address to "IP" textbox, "10001"as "Port", and then click "Connect".

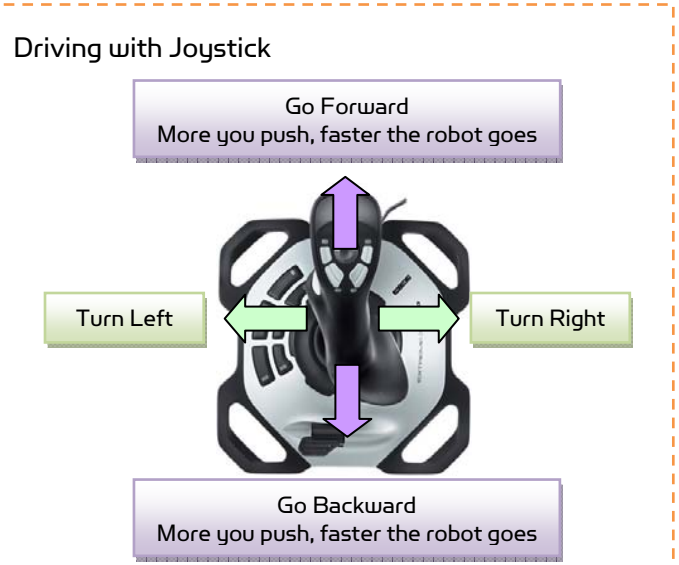


Step 5: Run the "X80SV.exe" from Start -> All Programs -> Dr Robot Inc -> X80SV Control. Once the GUI popup, enter the camera login information, and then click "Connect".



Joystick Control (Optional)





Recharging

To keep the battery at ideal condition, we recommend recharging the robot at least once every two weeks during storage (e.g. robot is not in use).

Open the Sample Source Code

Open "C:\Program Files\Dr Robot Inc\Dr Robot X80SV Control Program\SourceCode" folder, run "X80SV.csproj" to open project in Microsoft® Visual Studio 2008.

Further Development & Programming

The X80SV Control program is written with C# program with Visual Studio 2008 express under .Net 3.5 framework. You could download the development tools (Visual Studio 2008 express under .Net 3.5 framework) free from Microsoft. Please refer to the "Dr Robot Application Development Notes on C# Programming for Robot Control" for further information.

The control program uses the supporting components and libraries that should have been installed when you install the control programs from the installation CD:

1. **DRROBOTSentinelCONTROL.OCX:** Please refer to "WiRobot SDK API Reference Manual.pdf" for detail.
2. **WiRobotGatewayforWiFi.exe**
3. **VitaminCtrl.dll**
4. **DirectX®** SDK
5. **Microsoft® .Net 3.5 Framework**

For support on development using Microsoft Robotics Studio, development on operation system other than MS Windows, or obtaining raw communication protocol, please contact support@DrRobot.com.

Network Connection and Login Information

Network Settings

The included pre-configured wireless 802.11 b/g router has the following pre-set settings:

SSID	dri	**Router LAN**	192.168.0.200
WEP	128bits	**Login ID**	admin
KEY	11223344556677889 9AABBCCDD	**Password**	drrobot
Key Type	Open Key		

WiFi module connects to two serial devices through channel I and II (TCP/IP port 10001 and 10002 respectively). They are pre-configured as below:

Name	Robot WiFi Module	**IP**	192.168.0.205
Channel-I (10001)	115200, 8,N,1, flow control, UDP, Datagram 01, remote IP:0.0.0.0	**Channel-II (10002)**	115200, 8,N,1, flow control, UDP, Datagram 01, remote IP:0.0.0.0

Advanced Network Settings

It's possible to use different network settings (e.g. IP) for the server PC, but the "Virtual Server" settings on the router must also be changed accordingly in order for the Internet remote monitoring feature to work properly.

You could also change the router settings such as IP and SSID etc. If you need to do so, you are required to change the network settings on the WiFi modules on the robot by following the guidelines as illustrated on the WiFi Module manual.

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