

User Guide

RWRemote v2

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TECHNICAL FEATURES

- **Power consumption:** 200mA @ Roomba Battery Voltage (17V approx.)
- **iRobot Roomba interface:**
 - **Physical Layer:** MINI-DIN 7 PINS - PS/2.
 - **Application Layer:** SCI iRobot Roomba Protocol in standalone mode or defined by user's software in Gateway Mode.
- **User Interface:**
 - **Physical Layer:** Wi-Fi IEEE 802.11b
 - **Application Layer:**
 - **Web Server** through HTTP TCP Port (80)
 - **TCP Socket Server** for client-server applications
 - **Supported Protocols and Standards:**
 - **XML:** Read-only with data refresh of 500ms.
 - **JSON:** Read-only with data refresh of 500ms.
 - **AJAX Request** through GET Calls and text format output.
- **Operating Systems & Compatible devices:**
 - Android >=2.0
 - iOS >=3.1
 - Blackberry
 - WebOs
 - Windows Phone
 - Linux
 - MacOS
 - Windows.
- **Wi-Fi 802.11 Interface**
 - **IEEE Std. 802.11-compliant RF Transceiver**
 - **IEEE Std. 802.11 b/g/n compatible**
 - **ISM Band 2.400-2.484 GHz operation**
 - **External antenna option** with ultra miniature coaxial connector
 - **Range:** Up to 400m.
 - **Baud rate:** 1 and 2 Mbps.
 - **Encryption:** AES128.
 - **Supports 802.1x, 802.1u security:**
 - **Open** for self generation and external Wi-Fi connections
 - **WPA-PSK Personal** for external Wi-Fi connections
 - **WPA2-PSK Personal** for external Wi-Fi connections
 - **Radio regulation certification:**
 - **FCC** for EUA
 - **IC** for Canada
 - **ETSI** for Europe
 - **ARIB** for Japan

COMPATIBLE OS AND DEVICES

- **Smartphones and Tablets with iOS:**
 - iPhone 3GS, 4, 4S, 5.
 - iPad, iPad 2, iPad3
 - iPod Touch 2
- **Smartphones and Tablets with Android 2.0 o later ***
- **Desktop, netbooks and laptops with Linux & MAC operating systems with next web browsers:**
 - Mozilla Firefox (recommended)
 - Google Chrome (recommended)
 - Opera
 - Apple Safari
- **Desktop, netbooks and laptops with Windows operating systems with next web browsers:**
 - Internet Explorer (version >=7)
 - Mozilla Firefox (recommended)
 - Google Chrome (recommended)
 - Opera
 - Apple Safari

** By default Android devices not allowed to connect to Ad-Hoc infrastructures, to do this first connection needed to be Root (not recommended) or configure the device using a laptop, PC, Mac,... After the home Wi-Fi network configuration process you could access to the device completely*

CONNECTING THE WI-FI REMOTE TO THE ROBOT

It's important to follow the next steps to avoid making any short circuit when connecting the **RwRemote** board through the PS/2 connector of your robot.

Connecting the board to the robot is very simple. Each Roomba (all versions) has a PS/2 port. It is usually located on the top of the robot. Sometimes it is protected with a plastic (500 series), sometimes it is underneath a cover and sometimes it is not hidden by any protection. Each **RwRemote** board has a PS/2 connector to plug it directly to your robot. In the next images you can see some examples:



500 series



700 series

Once the board is placed correctly the **RwRemote** board will start working.

WORKING WI-FI MODES

RwRemote has different working modes. Don't worry if you didn't configure well the connection or if you changed your home router or location. **RwRemote** is able to detect wrong configurations and it will restore itself to default values.

RwRemote can work in two different states. Also has an extra transitory state just for configuration.

HOTSPOT MODE

RwRemote generates his own Wi-Fi network (Ad-Hoc). This configuration mode allows users to connect directly to the **RwRemote**. In this mode the device is totally autonomous from other Wi-Fi network and doesn't have Internet connection.

To be sure you are in this operation mode check if the LED blinks every second.

HOME WI-FI MODE

RwRemote is connected through a domestic/home Wi-Fi network. This mode allows users several new ways to connect to the device:

- You can access to the **RwRemote** from outside your local network. So, users will be able to control their robots from the Internet.
- Control the robot from any device that has a web browser connected to the local net.

To be sure you are working in this mode check if the LED blinks every three seconds.

RECONFIGURATION MODE (TRANSITORY)

RwRemote has a state that indicates when it is trying to configure itself and connect to a domestic/home Wi-Fi network generated from a router. The LED will blink faster, more or less three times per second. This process can last up to 2 minutes and 30 seconds.

If any error occurs during the process of the router configuration, then **RwRemote** will go back to the initial state, the default configuration (HOTSPOT mode) and the Wi-Fi configuration web page of the internal Web Server will show the possible issue during the connection process.

OPERATION BY FLASHING LED

As explained in previous points **RwRemote** has a LED to show users in which state the device is working on.

In the following table find attach the different working modes looking at the blinking frequency.

FLASHING LED	WORKING MODE
1 time per second	The RwRemote is creating his own hotspot network. This operation mode doesn't have internet connection.
3 times per second	The RwRemote is connecting to your domestic Wi-Fi. The RwRemote will retry the connection during 2.5 minutes. If the connection fails after this time, the RwRemote will create a Hotspot network.
Every 3 seconds	The RwRemote has connected successfully to the domestic Wi-Fi. The internet connection will be dependant on the router configuration.

RESTORING THE DEFAULT HOT-SPOT MODE

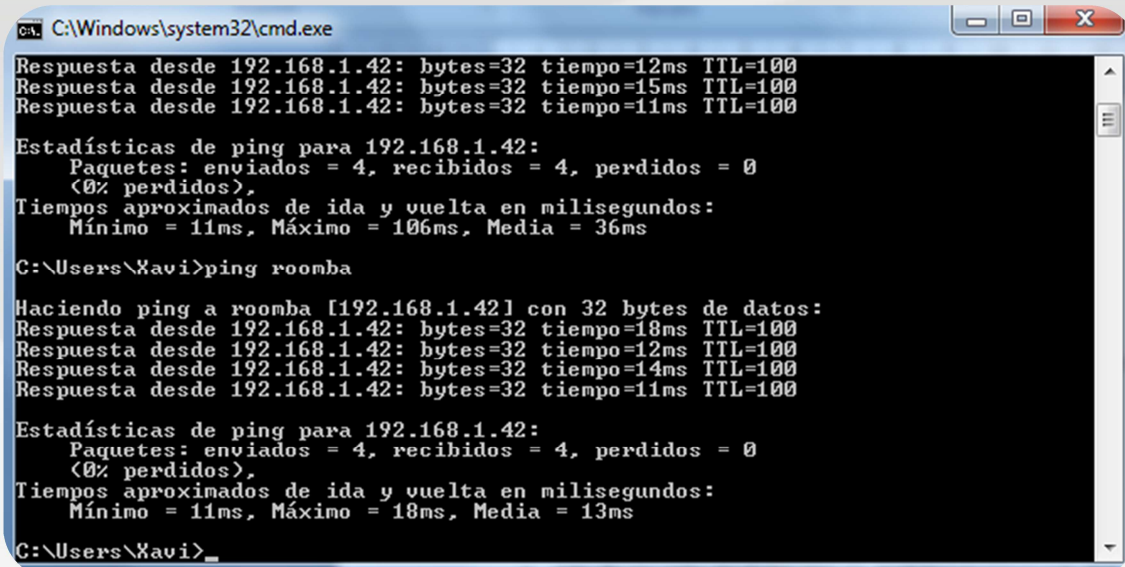
The **RwRemote** enables you to restore the default Wi-Fi mode (Hot-Spot) manually if any problem exists during the connection or other.

To restore the default Wi-Fi parameters only need to push the button over the **RwRemote** during 6 seconds. After this event will see how the Led is blinking 1 time per second. This procedure doesn't change the user/password properties of the webserver.

CHECKING THE CONNECTION WITH A PC OR MAC

RwRemote has an internal ICMP server. This allows the user check if the **RwRemote** is connected properly. Just open your terminal and use the **ping** command. There are two different ways to use the **ping** command:

- >> ping <name_of_the_device>
- >> ping <device_IP>



```
C:\Windows\system32\cmd.exe
Respuesta desde 192.168.1.42: bytes=32 tiempo=12ms TTL=100
Respuesta desde 192.168.1.42: bytes=32 tiempo=15ms TTL=100
Respuesta desde 192.168.1.42: bytes=32 tiempo=11ms TTL=100

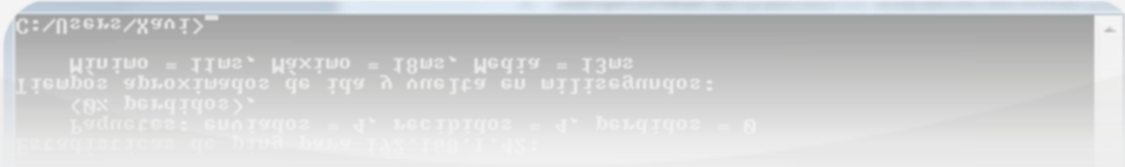
Estadísticas de ping para 192.168.1.42:
    Paquetes: enviados = 4, recibidos = 4, perdidos = 0
    (0% perdidos),
    Tiempos aproximados de ida y vuelta en milisegundos:
        Mínimo = 11ms, Máximo = 106ms, Media = 36ms

C:\Users\Xavi>ping roomba

Haciendo ping a roomba [192.168.1.42] con 32 bytes de datos:
Respuesta desde 192.168.1.42: bytes=32 tiempo=18ms TTL=100
Respuesta desde 192.168.1.42: bytes=32 tiempo=12ms TTL=100
Respuesta desde 192.168.1.42: bytes=32 tiempo=14ms TTL=100
Respuesta desde 192.168.1.42: bytes=32 tiempo=11ms TTL=100

Estadísticas de ping para 192.168.1.42:
    Paquetes: enviados = 4, recibidos = 4, perdidos = 0
    (0% perdidos),
    Tiempos aproximados de ida y vuelta en milisegundos:
        Mínimo = 11ms, Máximo = 18ms, Media = 13ms

C:\Users\Xavi>
```



```
C:\Users\Xavi>
Mínimo = 11ms, Máximo = 18ms, Media = 13ms
Tiempos aproximados de ida y vuelta en milisegundos:
(0% perdidos)
Paquetes: enviados = 4, recibidos = 4, perdidos = 0
Estadísticas de ping para 192.168.1.42:
```


STEP-BY-STEP INSTALLATION

We recommend use Google Chrome or Mozilla Firefox web browser due its load speed in webpages coded with HTML5. Some routers can decrease the refresh speed when using DHCP, so using Google Chrome will compensate this lack of time.

1. Connect the **RwRemote** to the iRobot Roomba and wait until the LED blinks once each second.
2. Search a Wi-Fi network named **ROOMBA WR**
3. Connect to the Wi-Fi and wait until the connection is properly done.
 1. With mobile devices this step may take more time than when it is done from a PC or laptop.
 2. Check your IP address if isn't 10.0.0.2, write manually these parameters: IP-10.0.0.2, Gateway-10.0.0.1, and Netmask-255.255.255.0.
4. Open the web browser and:
 1. Windows OS: Write the address <http://roomba/> in your browser
 2. Others: write the address <http://10.0.0.1/> in your browser
 3. User information:
 - i. User: **admin**
 - ii. Password: **roombawifi**
5. Wait until the web has been totally loaded and click on "Setup Wi-Fi Configuration" of the main menu.
6. Configure the parameters of your Wi-Fi network. (Remember to disable the option that enables an own Wi-Fi and be sure that all parameters are entered correctly). Once all the parameters are entered Accept with the Save/Reboot button and accept the popup dialog box. (We recommend DHCP checked for the first connection)

If you choose the option to connect to the **RwRemote** through another Wi-Fi:

- Connect to your local Wi-Fi. Wait until the device LED stops blinking in little intervals and starts doing it every 3 seconds.
 - a. *NOTE: If after 3 minutes the LED starts blinking every 2 seconds some error occurred. In this case the device will start again in default mode and you can start again with the first step making sure that all entered parameters are correct.*
 - b. *Once you have configured your **RwRemote** it's not necessary to follow the above steps if the scenario doesn't change anymore. This is possible because all the values are stored in the internal ROM of the microcontroller.*

REMOTE CONTROL FROM WINDOWS

The **RwRemote** device has **NBNS** to make name addressing through Windows Operating Systems.

Thanks to this property you can connect directly to the **RwRemote** interface using directly the device name without the need of his IP. To be able to use this feature follow the next steps:

1. Open your web browser.
2. In the navigation bar write: http://device_name/
 - a. *NOTE: roomba is the default name of the device*
3. Add this link to your favourites bar.

REMOTE CONTROL FROM OTHER PLATFORMS

If you are not using a Windows Operating System the NBNS feature has no effect if any special software was installed previously. In these cases follow the steps:

1. Open your web browser.
2. In the navigation bar write: http://ip_address_of_your_device/
3. Add this link to your favourites bar.

TRANSPARENT MODE - GATEWAY

RwRemote is an easy way to start developing applications to communicate with a device using standard TCP / IP Sockets. User completely forgets about the physical layer and accesses directly the robot through software developed (or not) by himself to send the SCI commands.

When **RwRemote** module is working, it waits for a remote connection on TCP port 9001 (independently of the connection status with web server). When the connection is established, the web interface controls are disabled and the **Wi-Fi Remote** module becomes a Gateway between application and your iRobot Roomba like through the SCI interface directly.

Using the Gateway Mode, **Wi-Fi Remote** stops being Transparent only when it detects a Wake-Up command.

From the user side, to make a Wake-Up command to the robot it just has to send a unique Wake-up command. In this moment, the robot starts the process to be able to receive the next commands.

NOTE 1: Wi-Fi Remote uses an 115200 link to communicate with the iRobot Roomba. If this value has been modified, be sure to reboot Roomba with the Clean button or rebooting the Socket to let the iRobot reconfigure the transmission rate automatically. (Read SCI Manual from iRobot).

NOTE 2: Please read the SCI iRobot Specification because some specific SCI commands put the robot in idle modes disabling the correct operation of Clean, Spot and Dock functions when the buttons are pressed. If you want to manage your iRobot Roomba using the embedded web server remember to close the TCP/IP Socket.

DEFAULT VALUES

- **Wi-Fi Mode:**
Hot-Spot (Ad-Hoc) / own Wi-Fi: By default, RwRemote creates an own Ad-hoc network. The RwRemote different configuration will be performed through a web.
- **Wi-Fi Network Name:**
ROOMBA WR.
- **Wi-Fi security:**
Open (without authentication).
- **Wi-Fi security key:**
None
- **NBNS Name:**
roomba
- **Web server access parameters:**
User: admin
Password: roombawifi
- **Network configuration:**
 - **MAC:**
 - Serial number.
This property is not modifiable.
 - **DHCP Client:**
 - Disabled.
 - **IP Address:**
 - 10.0.0.1
 - **Gateway:**
 - 10.0.0.2
 - **Netmask:**
 - 255.255.255.0
 - **Primary DNS:**
 - 80.58.61.250.
This property it's only useful when the device is connected through the Internet.
 - **Secondary DNS:**
 - 80.58.61.254.
This property it's only useful when the device is connected through the Internet.