Quick Start Guide

Thank you for choosing the **Wifibot Lab** platform for your robotic application.

- Before using the platform, please read with care this manual
- Keep this manual in a safe place for any future reference
- For updated information about this product visit the official site of wifibot http://www.wifibot.com

Index

Package contents

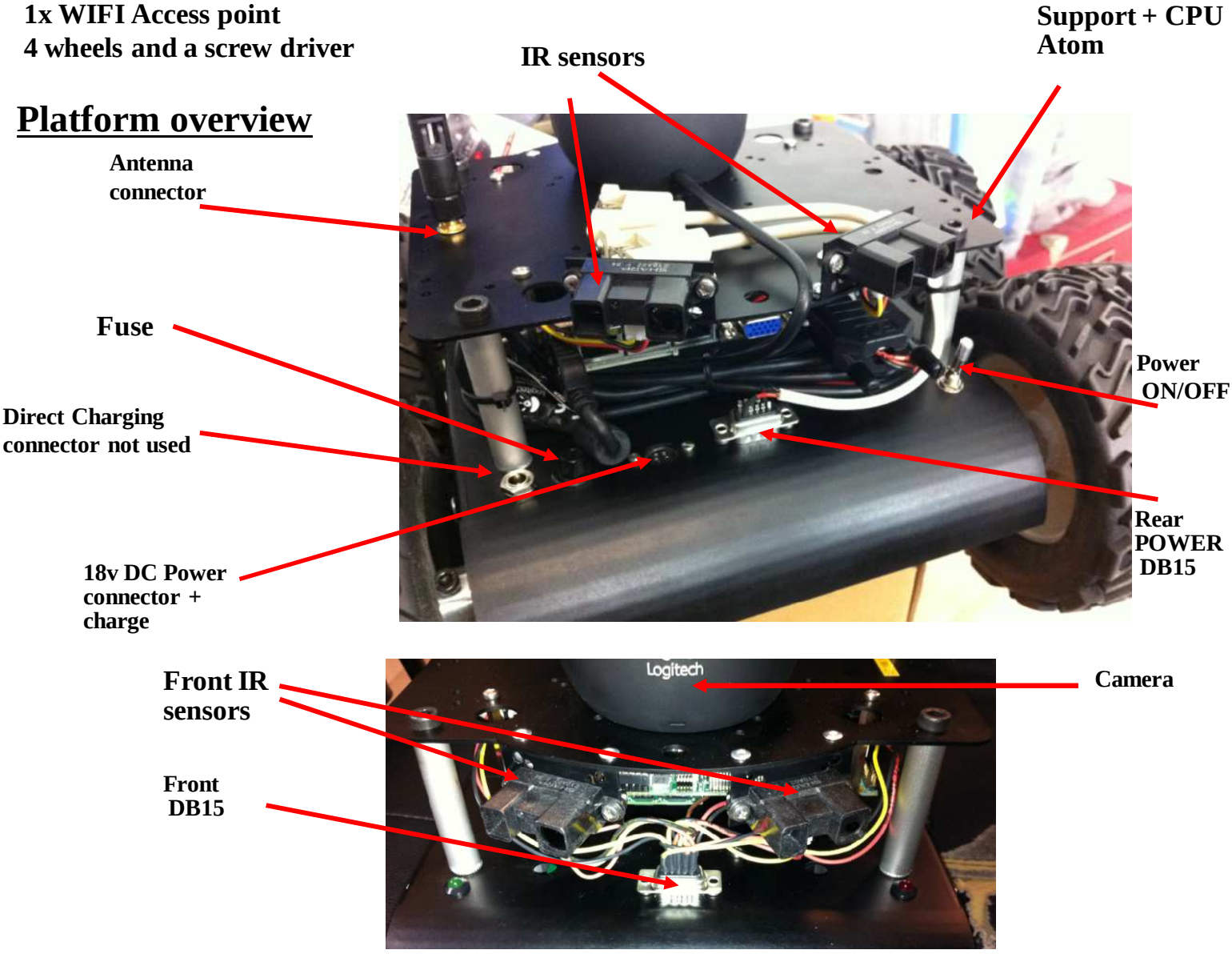
Make sure to be in possession of all the articles mentioned below. If any of them should be missing, contact your reseller as soon as possible.

Platform + CPU Board
Pan & Tilt IP camera or Web Cam
DC Power adapter or charger
Wifibot CDROM
1x WIFI Access point
4 wheels and a screw driver

Quick start

1- Install Simple GUI (see page 11).
Copy folder
\default_robot_software\Control_software\new_protocol
2- Switch ON the robot
3- Switch On the Access point (ssid wifibotlabap)
4- Set you IP settings (see page 12) for example:
192.168.1.25 mask 255.255.255.0 or use DHCP server installed on the Wifi AP
5- The robot connect automatically to the AP , the IP is on a label on the robot.
6- Launch GUI for controlling the robot
WIFIBOT_GUI_RAW_5_0_30A .exe

Platform overview

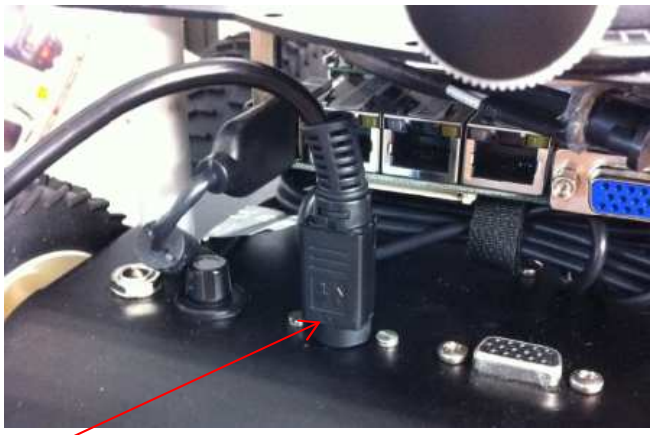


Interfaces

DSUB15 Rear power output:

A Ground and a non regulated 12V (18V when dc is plugged).
Pin 1-2 are 12V (18V) and 6-7-8-9-10 are GND output respectively. 12v an can give a maximum of 6A. An incorrect use of this connector beyond those values (short circuit or other) can provoke a malfunction of the platform or of the DC/DC converter and even damage it.
Pin 3, pin 4-5, pin 11-12, pin 13-14 are a 12v (18V) controlled from the RS232 or PC (please see RS232 protocol). Other pin are available for future options (see next pages).

Connector to plug-in the embedded CPU



Jack 2.1mm for direct charging
Do not use if the robot is ON use with a special LIFEPO4 charger in option

4 Pin Power Din connector :

This connector is on the rear left of the robot.
The battery charger is inside robot on the LAB V4.
When you plug the 18V dc power we have a special circuit that smoothly switch the power from the battery to the dc power, so the battery can be charged using the embedded charger.
With this system you can work on the robot continuously without switching off the robot.

Green Led for charging indicator
End of charge, in the wifibot lab v4,
This led are controlled from the dspic, so
To see the status of charge the robot need to be switched ON. This information is also available in the RS232 Protocol.

Power Red Led

The ON/OFF switch:

The platform is switched ON and OFF by the interrupter located on the right at the back of the platform.

The Fuse:

The 10 Amp fuse is located on the left at the back of the platform.

Interface connector:

This DSUB-15 **male** front connector presents a mix of input-output signals. The pin out is describe on next pages.

The antenna connector:

This is the wi-fi antenna connector. Screw the antenna carefully on the connector till the end.

If you use the optional fast charger:

First make sure the platform and the charger are OFF, then connect the plugs of the charging cable (first on the charger and after on the robot) and finally switch the charger ON, check if your are in LIFE mode and press the green button for 5 second. The charger will stop automatically.

Caution:

Charge the robot at 3.8A on regular use.

Never discharge deeply the robot (around 0v), you have in this case special cisrcuit that cut off the batteries.

Charge the robot on a open area away from inflammable objects.

Do not let the battery without charging for more then 6 months, if so they can become dangerous.

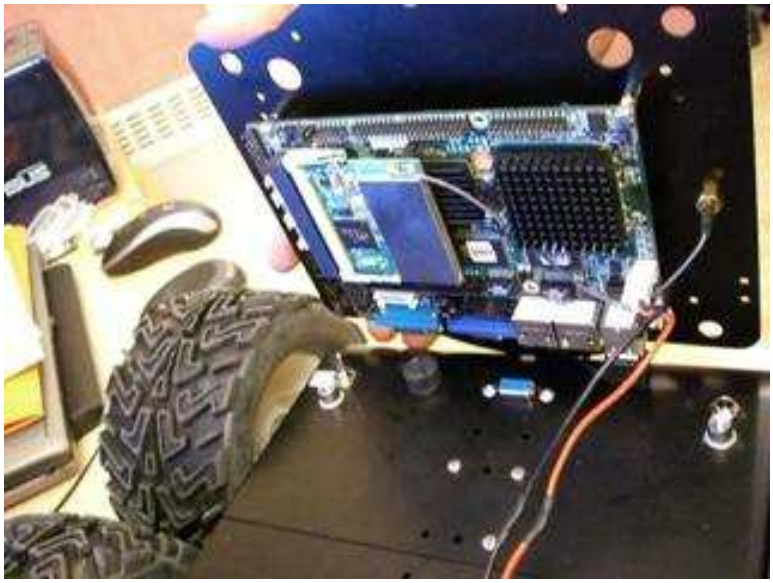
Computer and camera installation

The platform is sold with an **Pan & Tilt IP camera or webcam and an embedded computer** which model can vary depending of the version. Those are independent elements from the platform which can be replaced by any other model. For more information about your particular camera and embedded computer please refer to their respective manuals included in the CD ROM of the robot. The top aluminium support witch is **already mounted** on the platform, has been thought for the fixation of those and other user components.

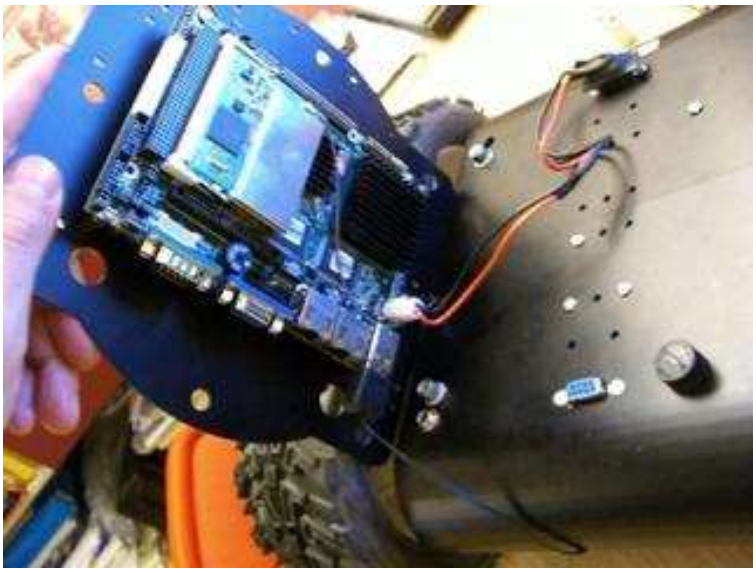
Their installation takes place as follows:

The upper aluminium support can be Unscrew :

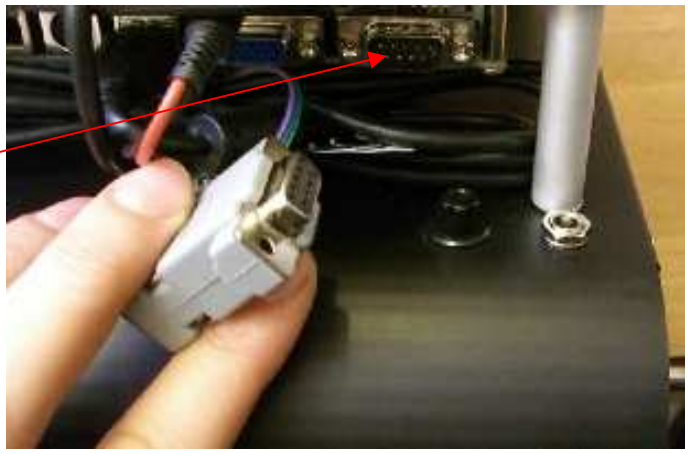
The embedded computer is fixed on the down part of the support :



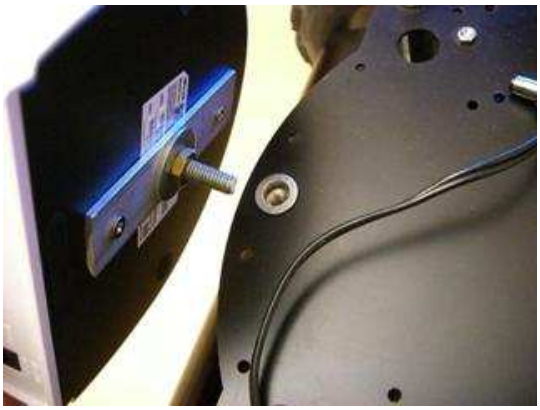
The power cable of the computer is connected to the appropriate connector (rear) DSUB15:



The Control Command RS232connector is connected to the computer.

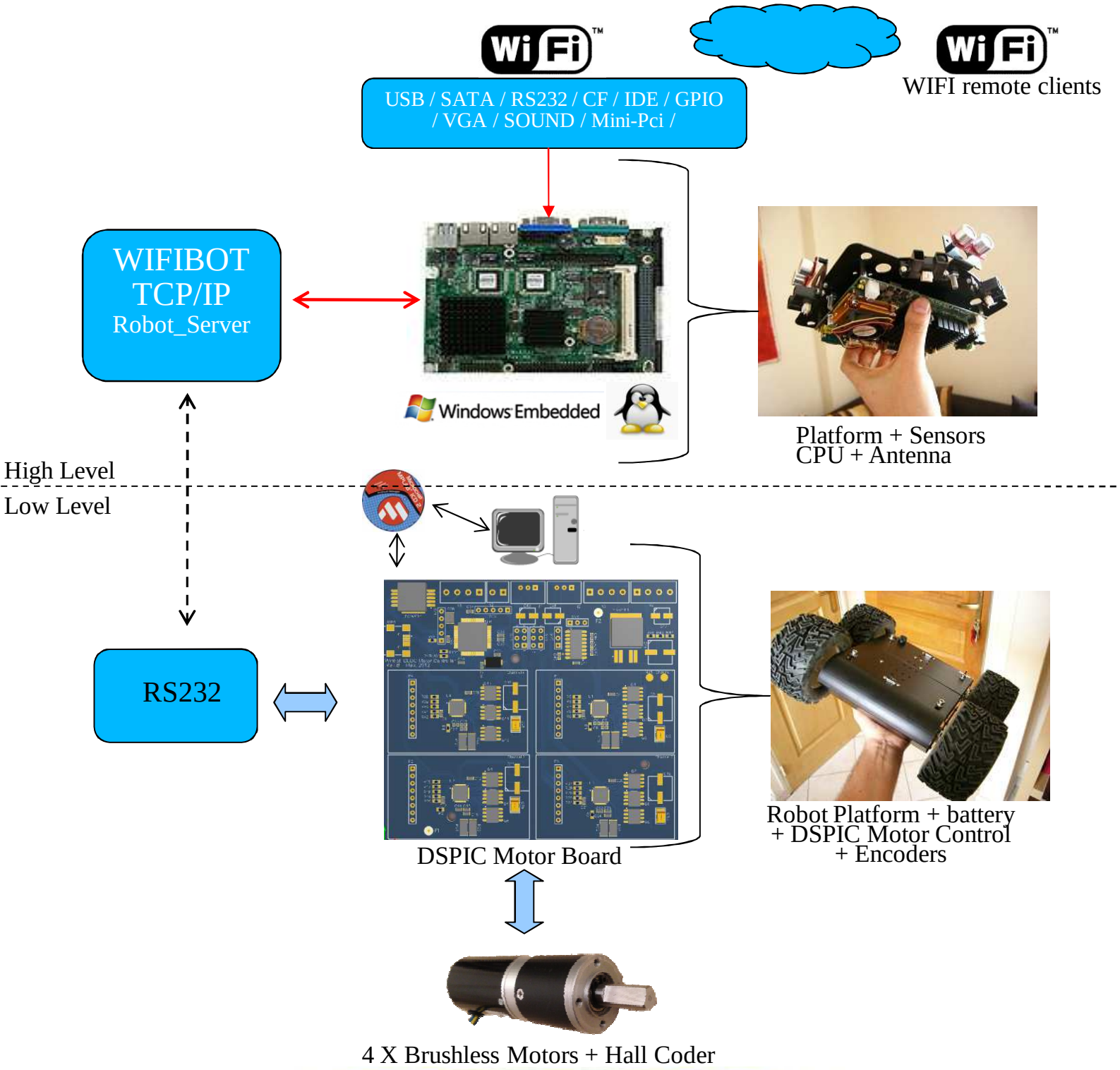


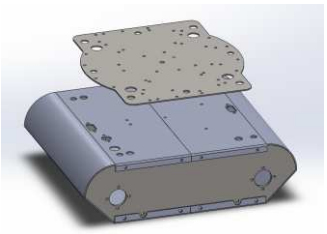
Screw back the aluminium support on top of the platform and screw the IP camera on top of the support or plug the webcam.

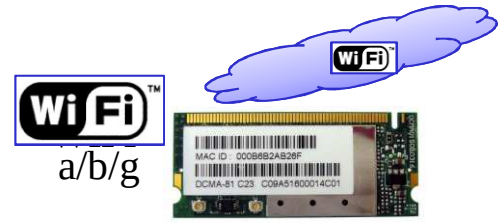


System architecture:

This architecture is composed by 2 Parts : The **high level** composed by the sensors and the CPU (or other custom devices), and the **low level** composed by a ICD2 capable DSPIC motor board controller. A RS232 port is the link between the CPU and the low level.
Once plugged, Linux or windows can send and received data from serial port and control the wheels or receive sensors data. **The protocol another document.** A simple TCP/IP gateway is provided with source code to see how it is simple to control the robot using WIFI.







a/b/g

Remote HMI

Robot deck

MJPEG Web Server

Embedded CPU Under Robot platform

Mini-PCI

USB

USB

Camera

Other Sensors

4m Lidar

Robot chassis

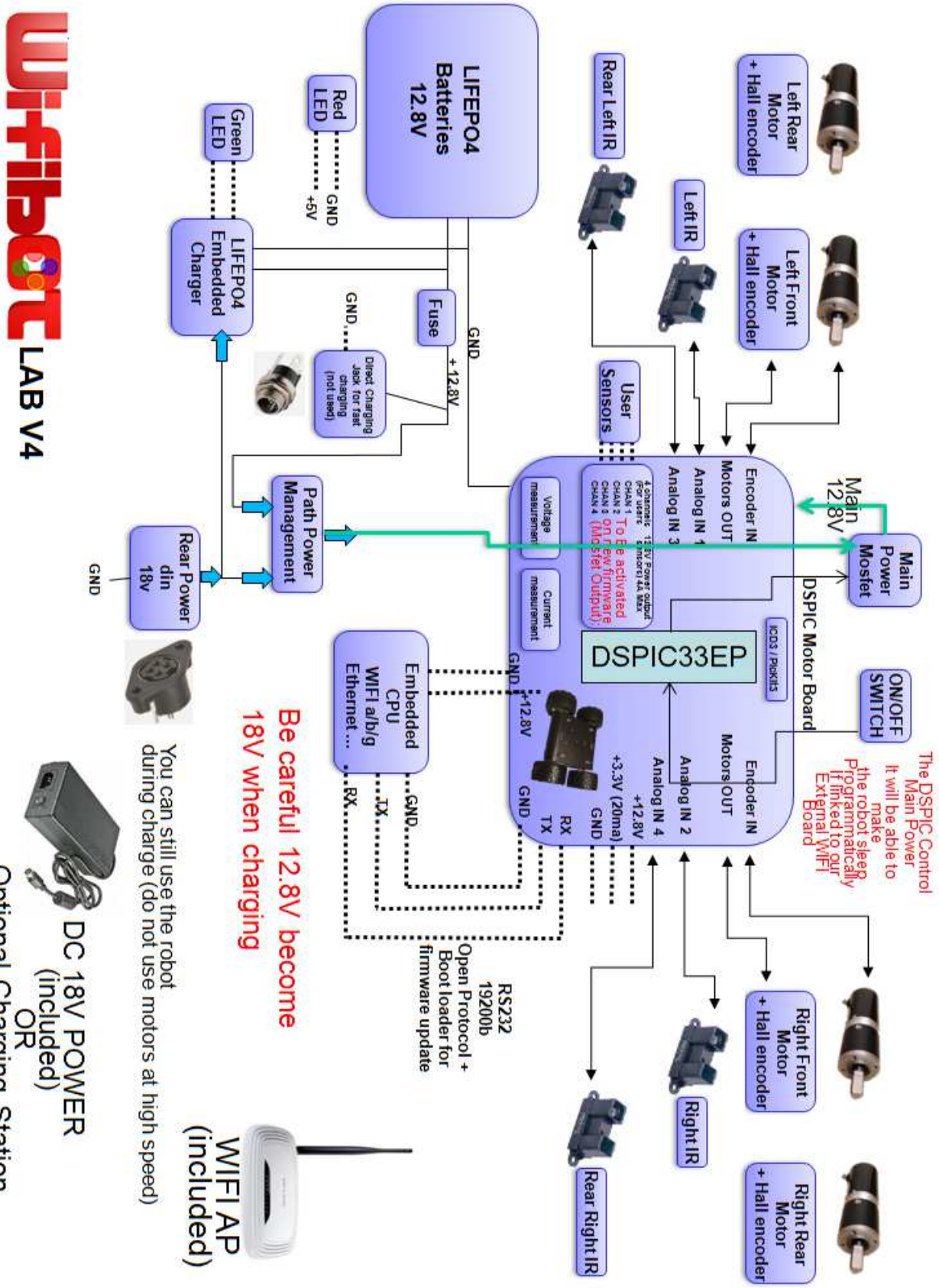
RS232
(Speed command
Battery level
Main Current
Odometer
Speed
....)

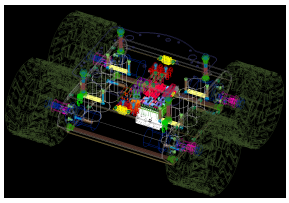
4 Static Relay 4A

3 x free signal
Can be IO
Rs232, i2C, SPI ...

4 x IR Sensors

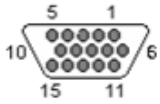
Low Level Architecture





Low Level Architecture (DSUB15 on the robot)

DSUBF



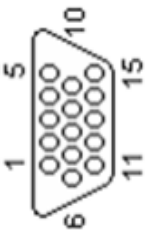
HD-D-sub-15 Female

Be careful 12.8V become 18V when charging so check that your device is18V tolerant or use a DC/DC

DsubF-1 et 2 -> +12.8V (8A Max, embedded PC, other device)
DsubF-6 à 10 -> GND
DsubF-15 -> 12.8V (Linked to the Main Switch, 300mA)

Power Mosfet Output :
DsubF-3 -> Channel 1 : +12.8V (4A)
DsubF-4 et 5 -> Channel 2 : +12.8V (4A)
DsubF-11-12 -> Channel 3 : +12.8V (4A)
DsubF-13-14 -> Channel 4: +12.8V (4A)

DSUBM



HD-D-sub 15 Male

Serial port for Embedded PC:

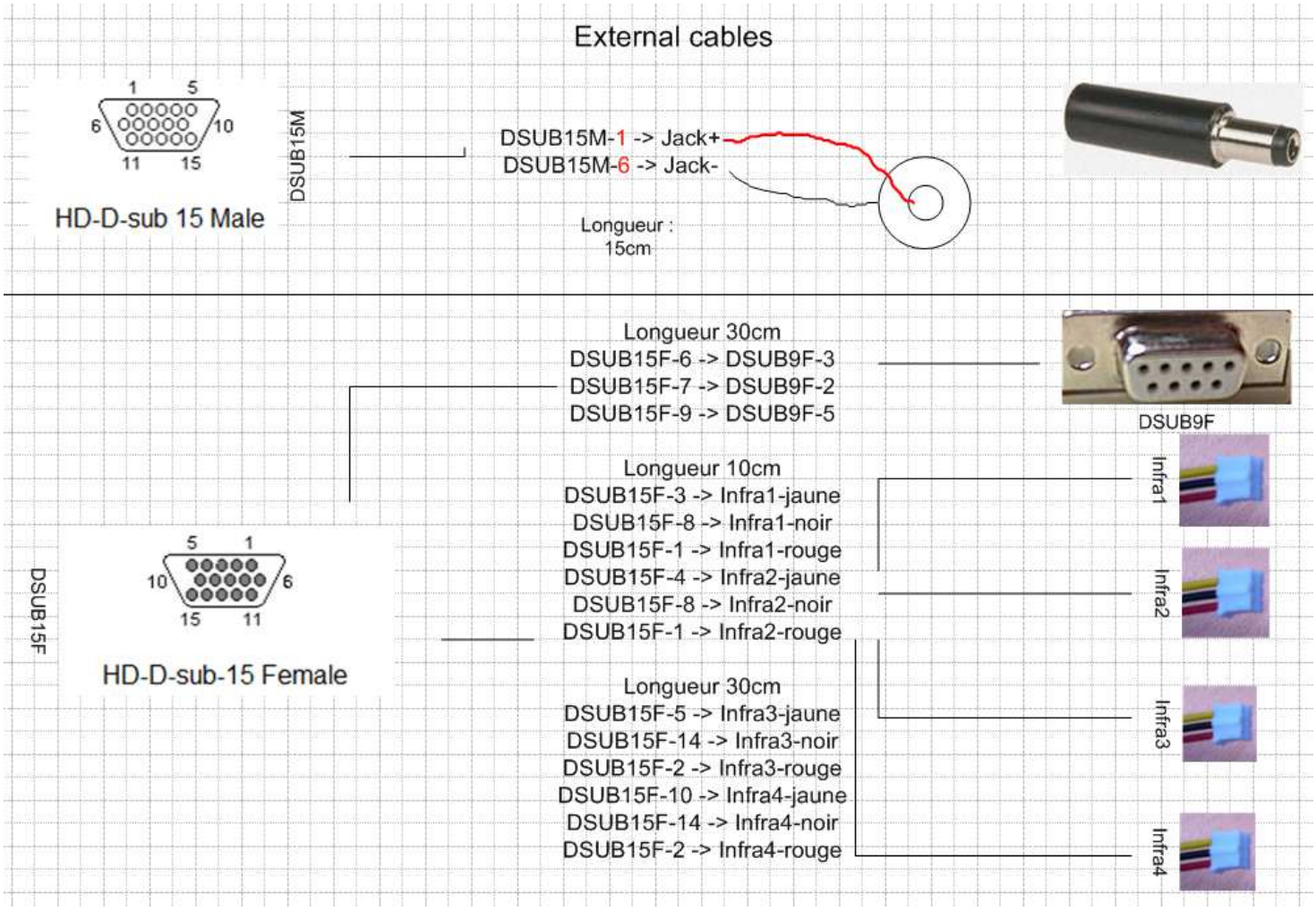
DSUB15M-6 -> DSUB9F-3 TX
DSUB15M-7 -> DSUB9F-2 RX
DSUB15M-9 -> DSUB9F-5 GND

Infrared Sensors:

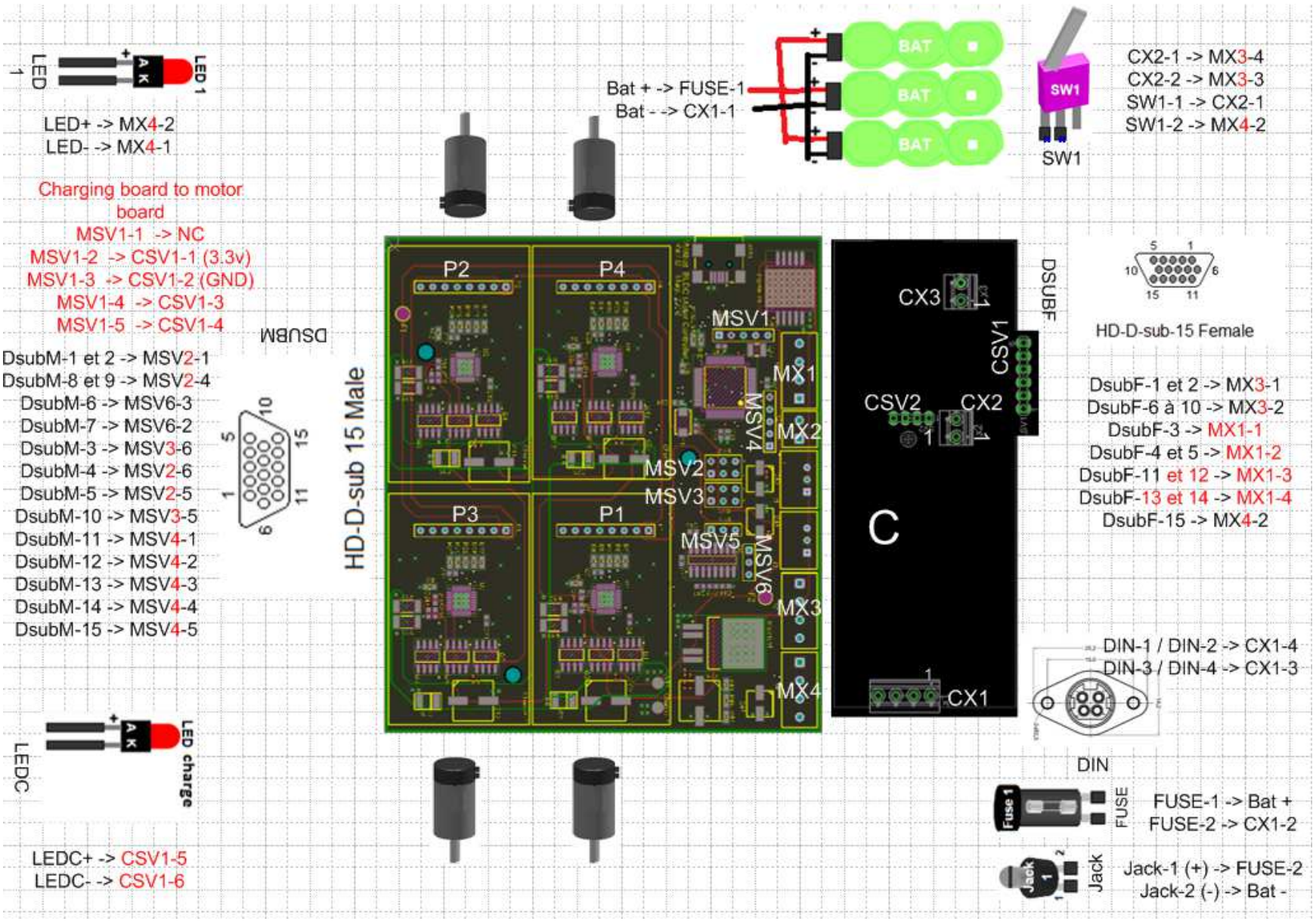
DSUB15M-3 -> Infra1-data
DSUB15M-8 -> Infra1-gnd
DSUB15M-1 -> Infra1-+5V
DSUB15M-4 -> Infra2-data
DSUB15M-8 -> Infra2-gnd
DSUB15M-1 -> Infra2-+5V
DSUB15M-5 -> Infra3-data
DSUB15M-14 -> Infra3-gnd
DSUB15M-2 -> Infra3-+5v
DSUB15M-10 -> Infra4-data
DSUB15M-14 -> Infra4-gnd
DSUB15M-2 -> Infra4-+5V

FUTURE USE:
DsubM-11 -> free dspic IO (future use)
DsubM-12 -> free dspic IO (future use)
DsubM-13 -> free dspic IO (future use)
DsubM-14 -> GND
DsubM-15 -> 3.3V (20mA)

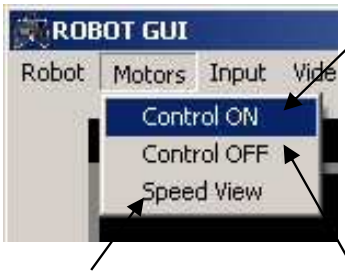
Low Level Architecture



Low Level Architecture (wiring)



The control software (TCP/UDP) Simple GUI:



Motor Control ON: Activates the speed control, Input_Left and Input_Right set on the dialog will be applied.

Speed View: Plots in real time the speed signal from the code wheels.

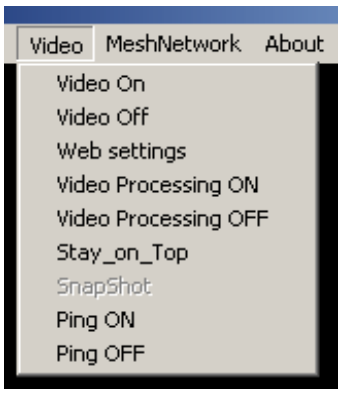
Motor Control OFF: Deactivates the speed control.

The control software:

The control software can be found in the «WIFIBOT_GUI_RAW_5_0_30A.exe » **\default_robot_software\Control_software\new_protocol**

- Install if necessary the **Video Decoder** present in the same folder (no codec for webcam).
- Launch the **WifibotGUI** program.
- Click on **Robot** then **Settings**. The **Robot Settings** window appears.
- Set the **Control Server IP** and the **Control Server Port** which by default is **15020**.
- Set the **Camera IP** and the **Camera Port** which for the image is by default **8080**.
- Select the proper **Camera Type**.
  If the camera type is not present use **Firefox or Internet explorer at port 8080 to view the image**.
- Click on **Video**, then select **VideoOn**. The image from the camera will appear.
- Click on **Robot** then **Connect.**
- Click on **Input** then select **Joystick** or **Virtual_joy**. The robot can now be operated.

Input Selections (control panel for calibrating the joystick)



Video selections: Allows to configure and control some options of the camera.

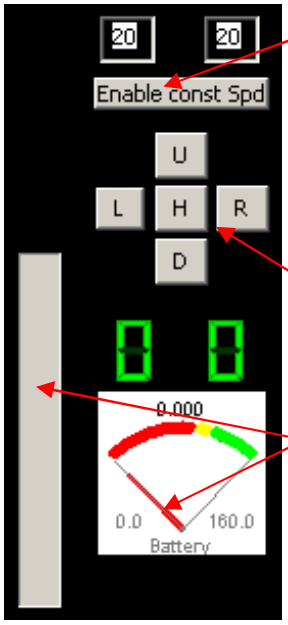
The menu options:

Robot: Starts the communication with the Control Server.

RobotOK: Stops the communication with the Control Server.

Camera: Starts the communication with the camera Server.

CameraOK: Stops the communication with the camera Server.

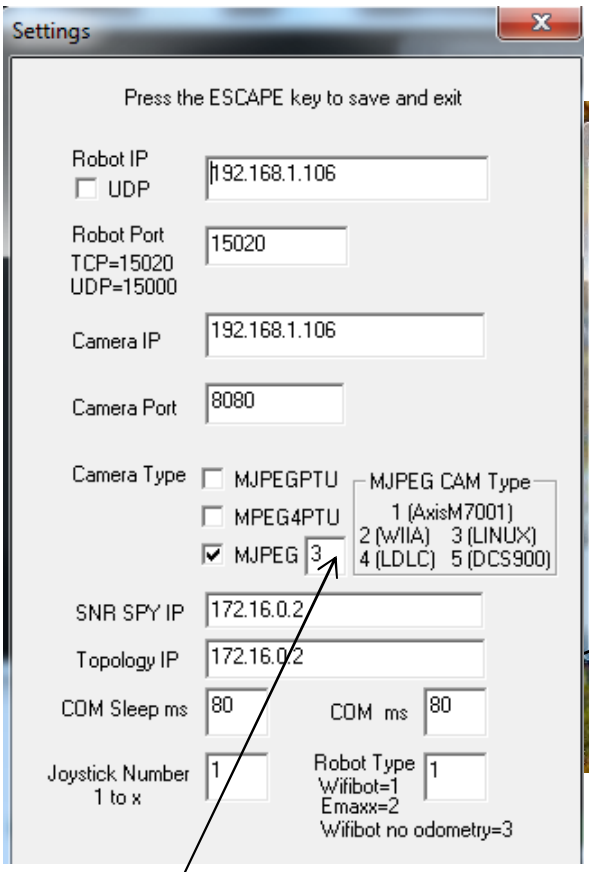


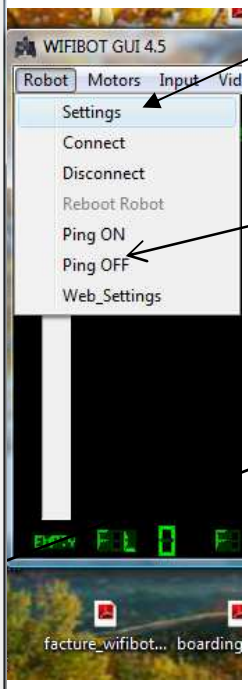
Current input: shows the current input or allows to set it manually with keyboard.

Pan-Tilt camera control: The red button takes the camera to the default position. You can click on the image too for moving the camera.

Sensor feedback: shows the data retrieved from the range sensors, the battery level,

The control software (TCP)
Simple GUI:





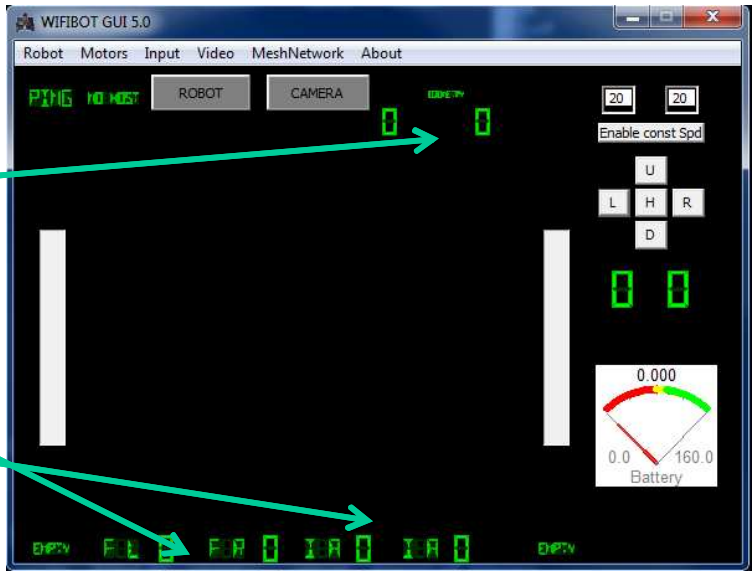
Settings menu
Set IP & port of robot
IP & port camera

Ping Robot

Robot Type
Set robot type
1 WIFIBOT LabV3
2 Emaxx 4wd
3 WIFIBOT SC/4G

Camera Type

1 Axis MJPEG Server M7001
2 MJPEG WIA Server (robot windows)
3 MJPEG Streamer (robot linux)
4 LDLC Camera
5 DCS900



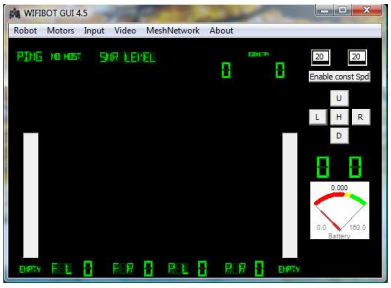
Odometry

robot current and the speed of the robot in tics.

Camera Type and software clients compatibility:

By default

AXIS COMMUNICATIONS

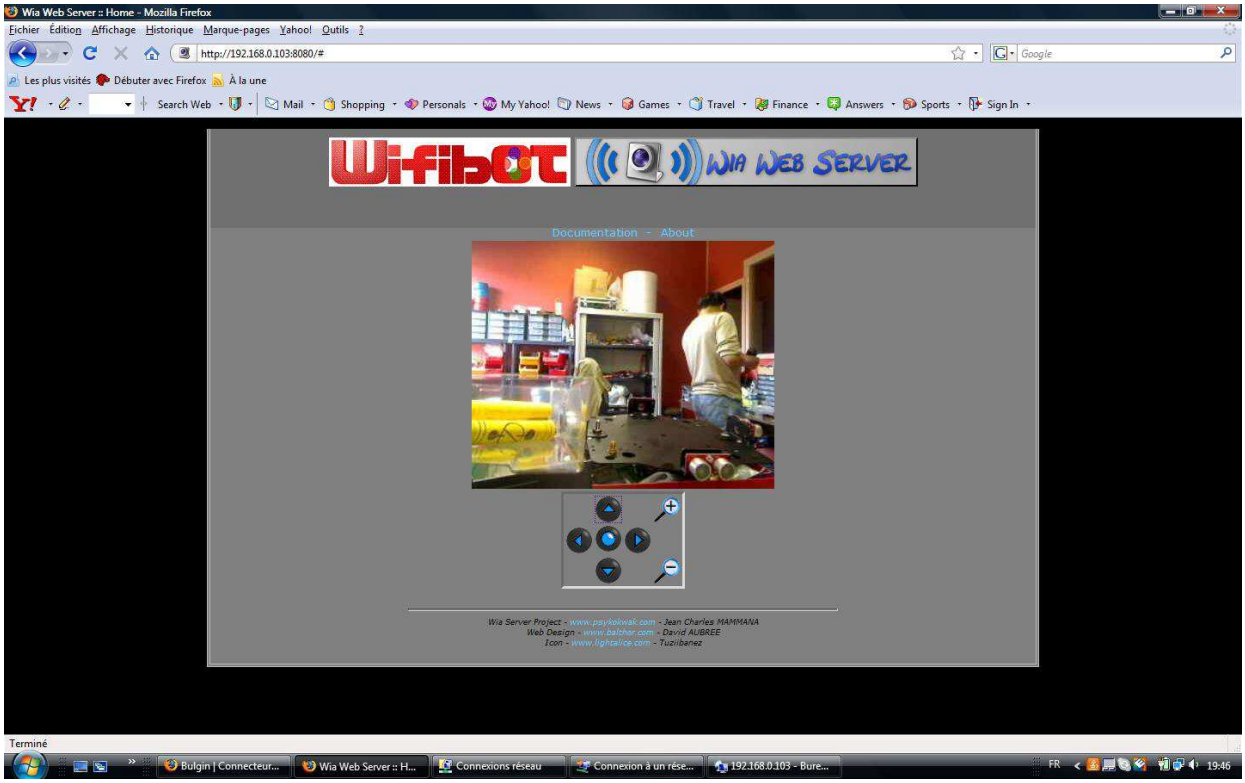


Simple GUI

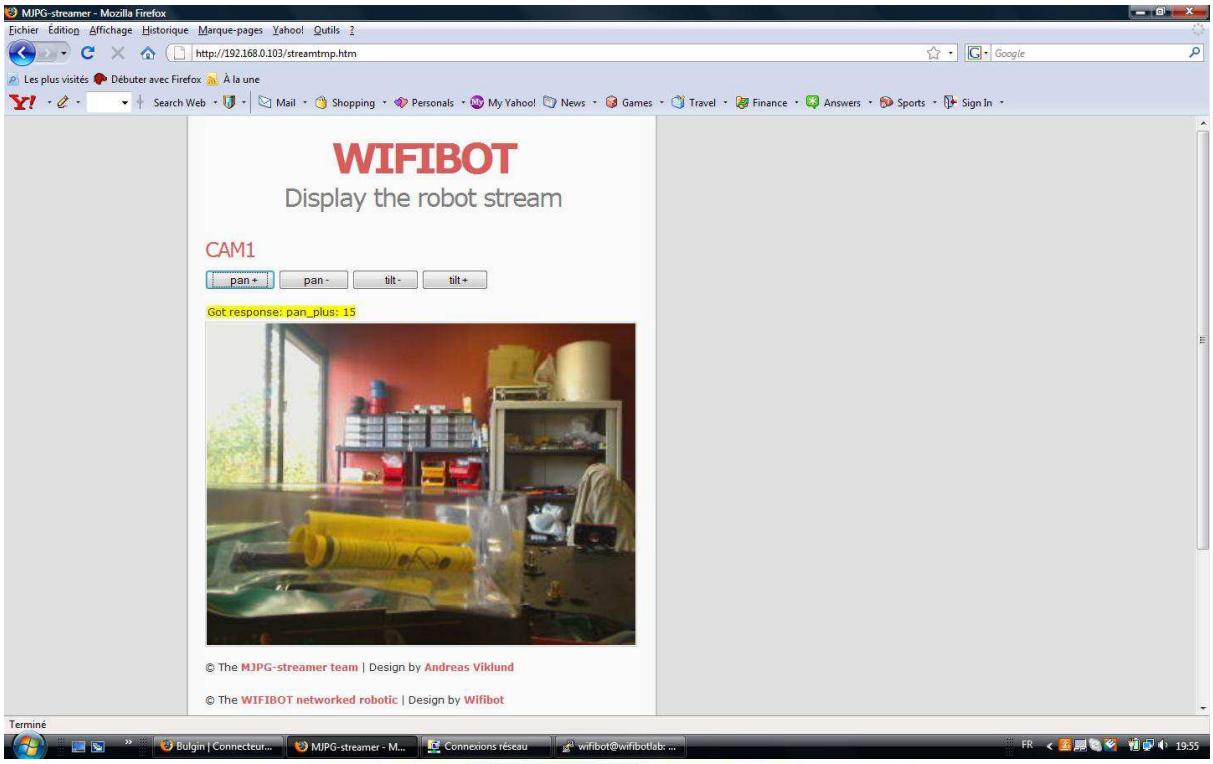
AXIS COMMUNICATIONS

Web Cam Server web client:

Windows WIA SERVER: http://192.168.1.XXX:8080



Linux MJPEG-STREAMER: http://192.168.1.XXX:8080



Connecting to the robot using wireless network:

By default, the robot has been pre-configured with a certain IP addresses and it connect to the provided access point (essid “wifibotlab”).

You need just to connect your control PC using DHCP to the access point. And then you can obtain a valid IP address to get into the robot network.

You can also adjust the IP settings of the network adapter of your computer manually. Make sure all the devices in a same network having to communicate with the robot have the same class of address.

SSID WIFIBOTLABAP
192.168.1.1
DHCP Server

192.168.1.XXX

If you are connecting to a robot **under Linux or Windows** with a **cable** directly to his Ethernet port, then enter 192.168.0.x on your PC (x can be any number between 1 and 254 except 250 and those used by the CPU and the camera of the robot).

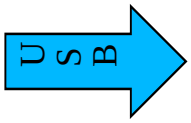
For example, a Wifibot Serial Number: **LABYYYXXX** will have as IP for **the CPU 192.168.0.XXX and 192.168.0.XXX:8080** for the camera if webcam, **192.168.0.20:80** if IP camera. Set the **Subnet Mask** to 255.255.255.0 and leave **Default gateway** and **DNS** empty.

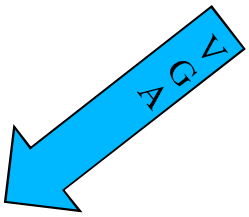
If you are connecting **wirelessly** to a robot: **Under windows** because we bridge the wired and the wireless interface, the IP are the same as previous wired mode.
Under Linux we are on 192.168.1.XXX. We NAT the eth0 to the ath0.

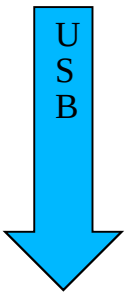
For example, a Wifibot Serial Number: LABYYYXXX will have as IP 192.168.1.XXX, and 192.168.1.XXX:8080 for the camera IP or webcam.
Set the **Subnet Mask** to 255.255.255.0

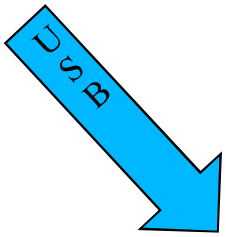
Connecting to the robot using a vga screen and a keyboard:

The robot can act as A regular PC. You can Plug a screen and a Keyboard.









Networking

Network architecture:

In the Wifibot Lab the embedded CPU works as a gateway between the internal wired LAN and the external wifi WLAN. The CPU has at least one ethernet card and one wireless card that form two separate networks (LAN/WLAN).The LAN and the WLAN should have in general a different address class and therefore data needs to be routed between them. Depending if you have chosen a robot under Windows or Linux the problem of connecting the two networks has been solved differently. Under Windows this has been done by configuring a bridge between the network interfaces, by doing so the robot's CPU appears to have a unique network interface and uses one single IP address. Under Linux, the interconnection is done through Dynamic NAT (Network Address Translation) and the CPU uses two different IP adresses, one for the internal LAN and one for the WLAN. In both cases, all local components of the robots such the IP camera will have their own IP address within the LAN, but when it comes to accessing them from the WLAN the method will differ. Under Windows as there is in practice no distinction between the WLAN and the LAN, every internal component will be reached using its own IP address (see **Fig1**). Under Linux, only the robot's CPU WLAN IP address can be seen and any internal network element will have to be reached using this single IP. In order to be able to access the separate devices using a single IP, we will need to assign to each of them a separate port (see **Fig2**). This will require to configure the CPU with the proper routing table.

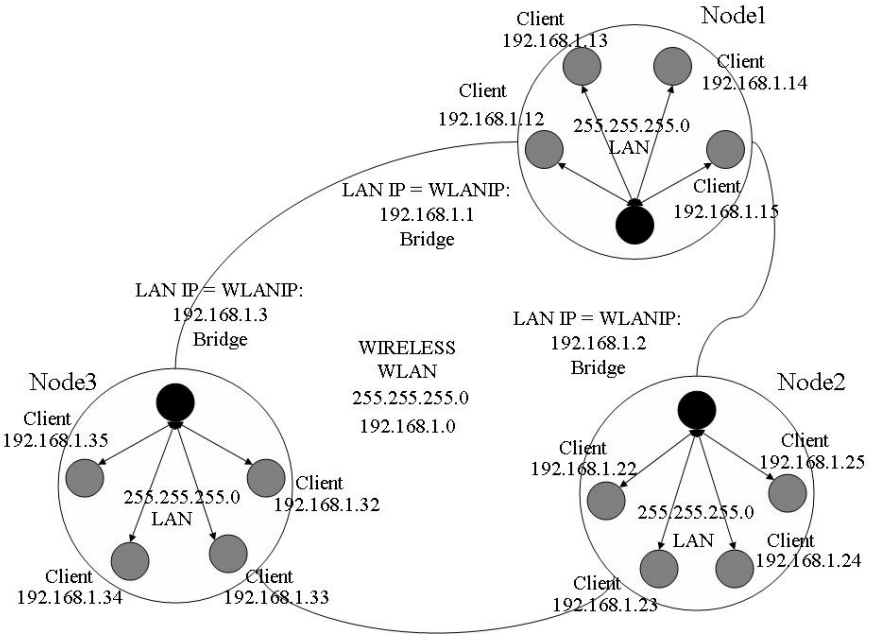


Fig 1

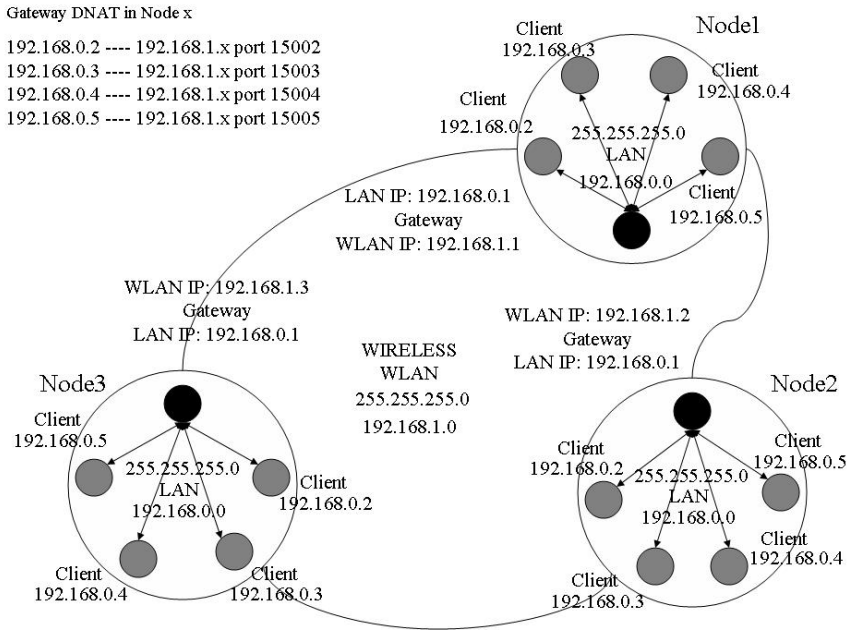
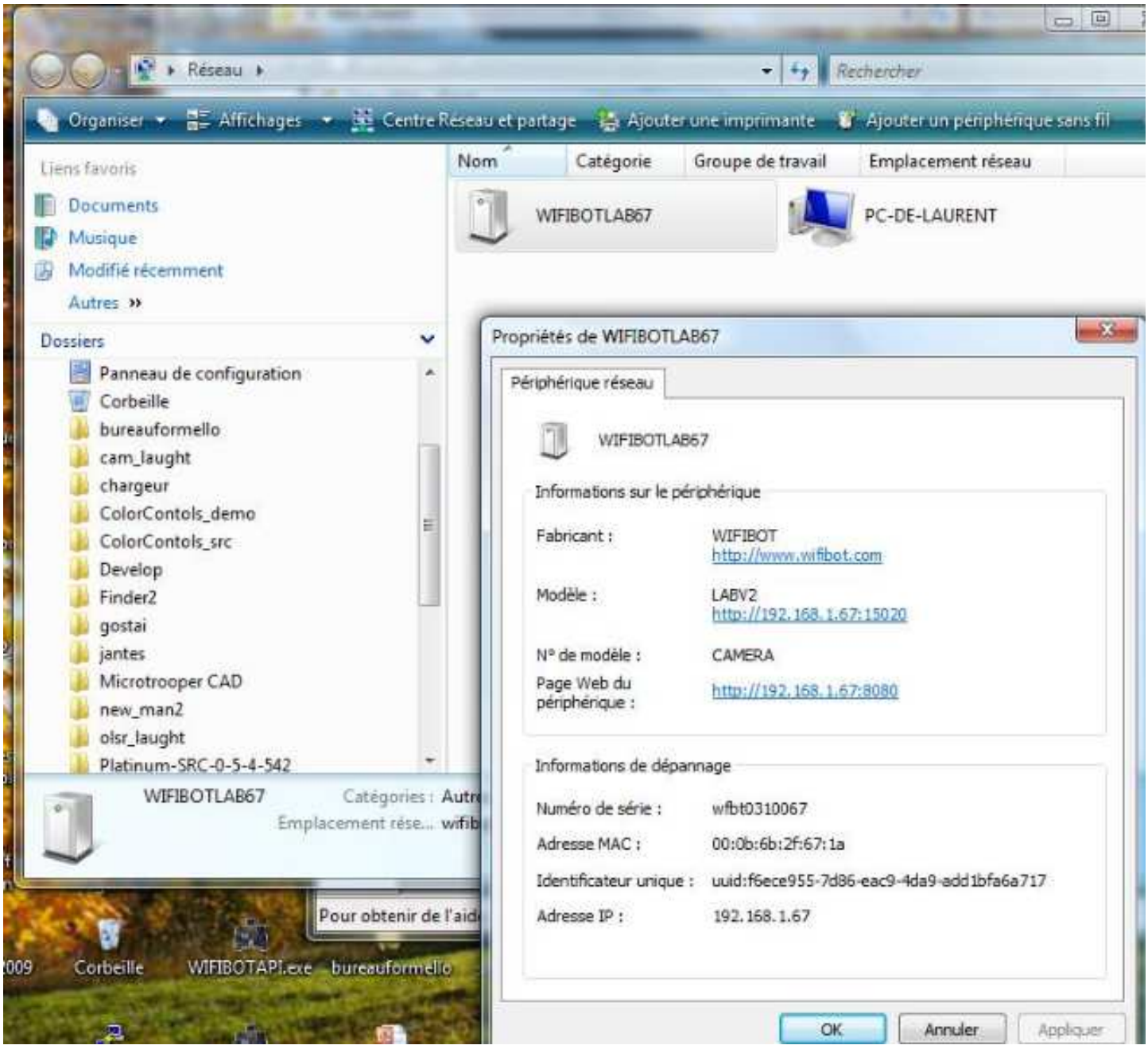


Fig 2

UPNP:

For a Linux or Windows robot
An UPNP server expose the
robot data:



WLAN modes:

Let's have here a quick overview of the different modes Wi-Fi adapters can be configured :

-Master (Access Point) not used
-Infrastructure Managed (default mode)
Connected to the wifibot wifi ap essid « wifibotlabap ».
-Ad-hoc without routing algorithm
-Ad-hoc with the OLSR routing algorithm (Mesh Networking)

In infrastructure mode we have a master/slave structure where all the data is centralized in one device called access point (server/master) to which different adapters (clients/slaves/managed) connect. A client cannot talk directly to another but has to pass by the access point which will forward the data to the destination. Several access points can be connected together with cables extending in this way the zone covered by the wireless network. This is the most common setup for a Wi-Fi network (see **Fig1**).

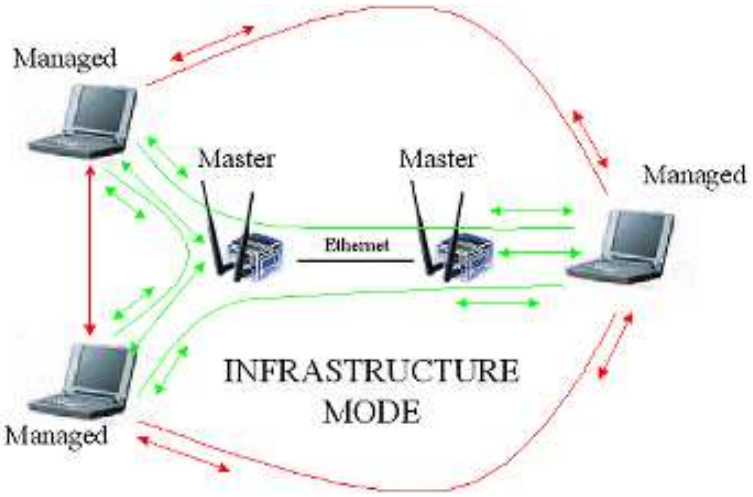


Fig 1

In ad-hoc mode we do not have any central management, each client can talk directly to the other. This mode works fine for networks with few elements. Without any routing algorithm, each element needs to have a direct radio link with the others in order to communicate, no data will be forwarded (see **Fig2**). If a routing algorithm such as OLSR or BATMAN is added, you obtain a self-organizing mesh network in which message forwarding is possible wirelessly between different nodes, connecting in this way devices which are not within direct radio range (see **Fig3**). This allows to extend the zone covered without the need of any cable.The network is completely dynamic, routing tables are rewritten automatically and dynamically as the network changes. If a new OLSR or BATMAN enabled device appears, it will be automatically detected and merged to the routing tables of each node. This is especially useful for mobile networks that can change over time like for example in a multi-robot application.

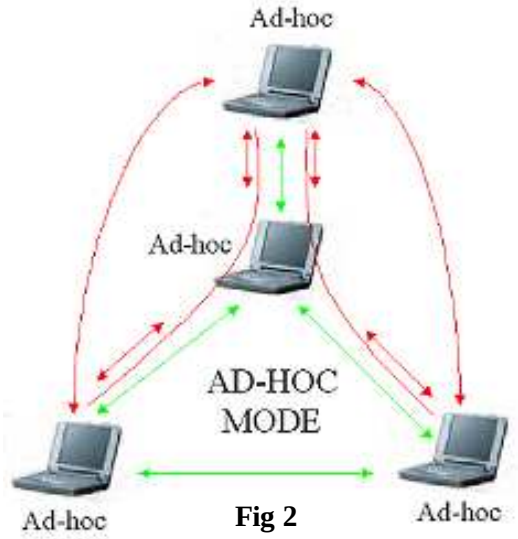


Fig 2

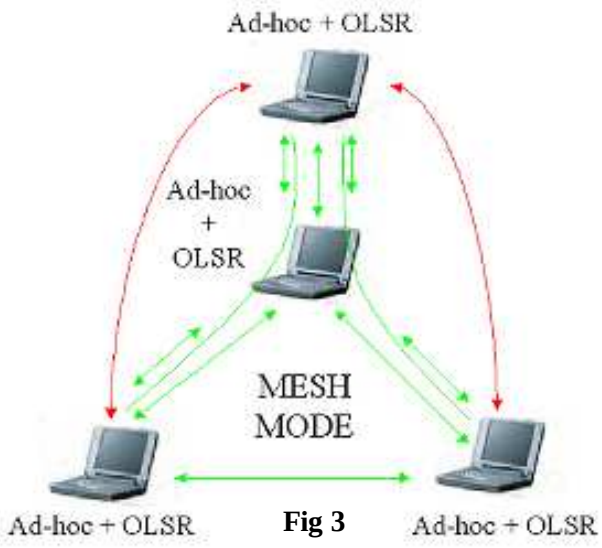


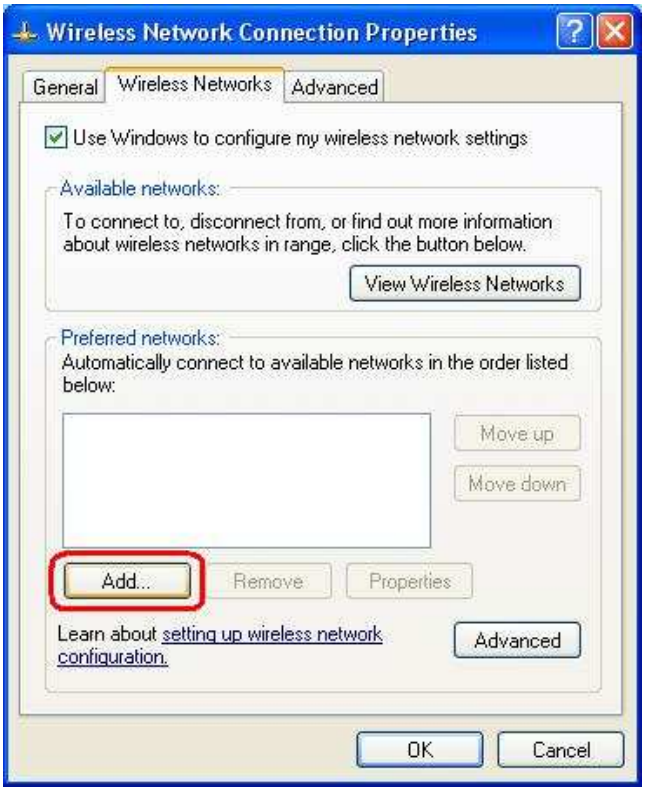
Fig 3

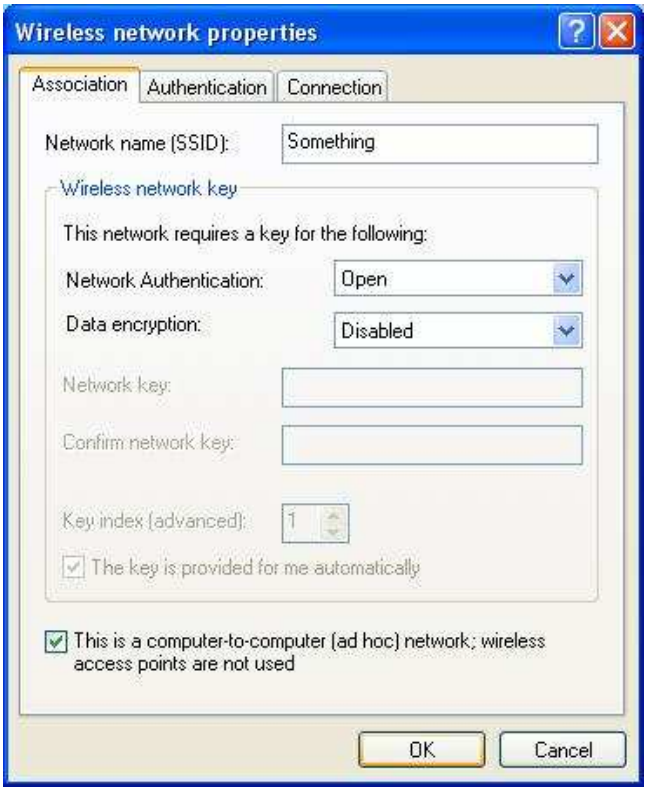
Network configuration

Robot under Windows XP

By default all robots come already configured and ready to work with the provided access point.

Information is given here for those users willing to make changes in the network configuration. When working under Windows the robolab can only be configured in the managed and ad-hoc modes. For configuring the IP settings in managed mode or connecting the robolab to an AP or an already created ad-hoc network please follow the steps detailed in the "connecting to the robot" section. In addition to those steps, it is recommended to create from the robot itself the ad-hoc network to be used:





1. Open **Network Connections**, Select your Wireless card right click on it and select **Properties.**
2. Click the **Wireless Networks** tab.
3. Enable **Use Microsoft Windows to configure my wireless network settings**
4. Click **Add…**
5. For **Network name (SSID)** type: **wifibot**
6. For **Data encryption** select **Disabled**
7. Enable **This a computer-to-computer (ad hoc) network**
8. Click **Ok** to close the '**Wireless network properties**' window
9. Click **Ok** to close the '**Wireless Network Connection Properties**' window
10. Using your test computer wireless adapter, view the available wireless networks, check the list and validate that you can see your newly configured **wifibot** network. If it is configured, try to connect to it. If you cannot find your new network verify the settings are correct.

Robot under Linux

Under Linux all modes are possible but master mode seems buggy since Xubuntu 9.04. We will see here the different parameters involved in the configuration of the robot. There are a few important configuration files we need to manage in the robot:

/etc/network/interfaces

/etc/init.d/wifibot-init	launch **/usr/sbin/wifibot-init**	the script witch set the NAT
/etc/init.d/wifibot-server	launch /usr/sbin/robot_server	robot server launch scripte for control
/etc/init.d/wifibot-mjpeg	launch **mjpeg-streamer**	the webcam server
/etc/wifibot.ini	Some variables for /usr/sbin/wifibot-ini	

/usr/sbin/wifibot-init

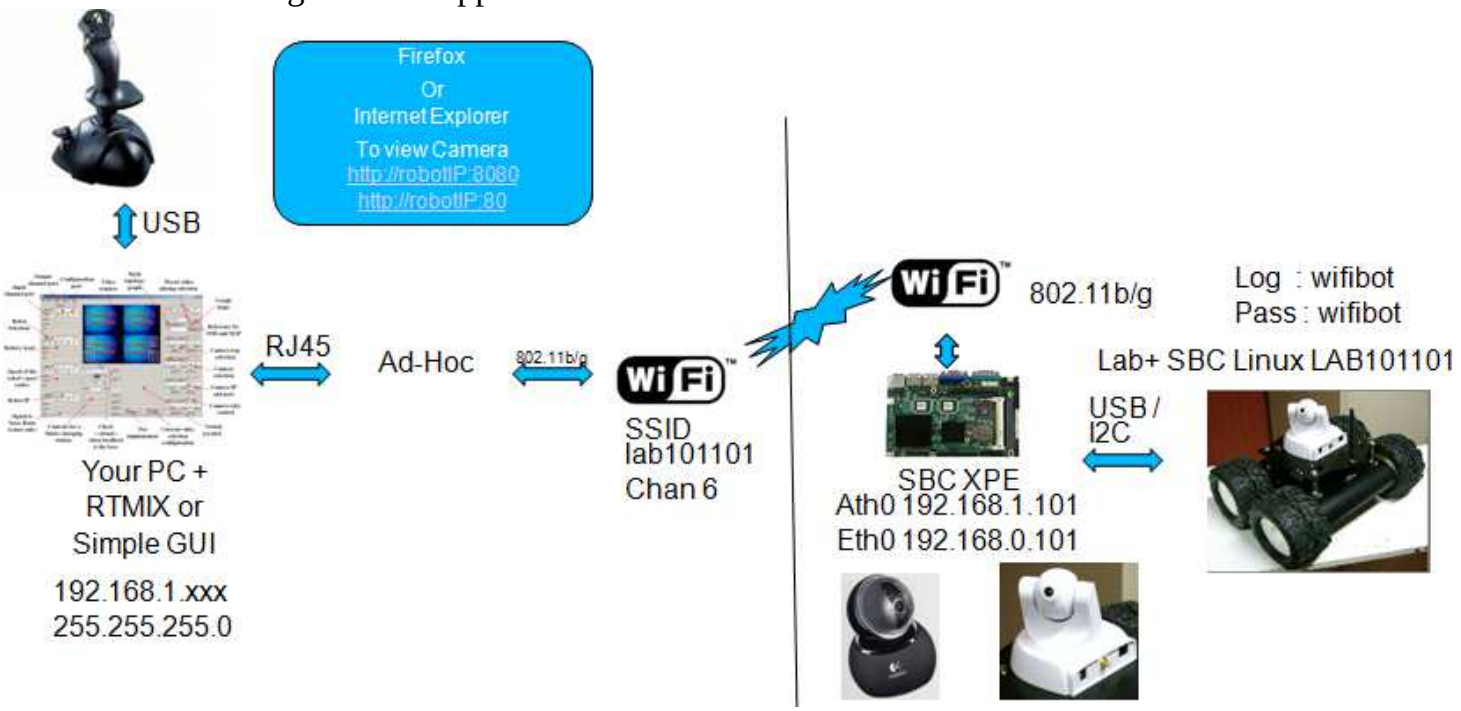
Binary:
/usr/sbin/robot_serverrun

/dev/ttyS0 is the RS232 COM1

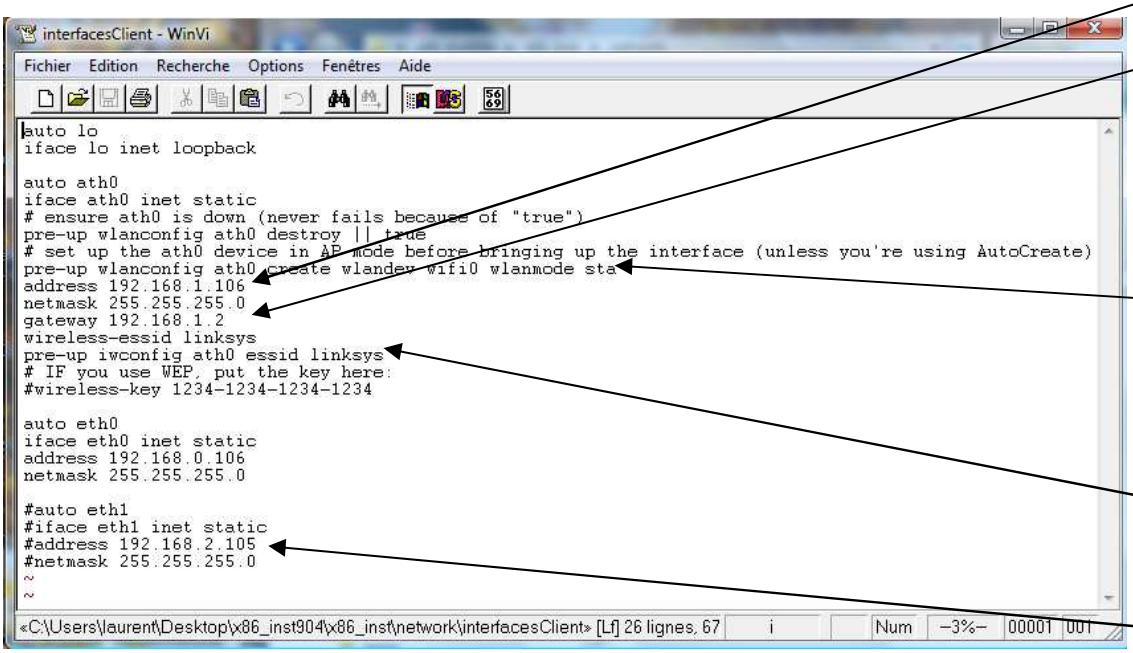
These files can either be edited outside the robot and then transferred or directly edited on the robot.

The "interfaces" configuration file:

This file allows to specify the IP settings of the different network interfaces present on the robot and the wireless settings when it applies. All the Wifibot Lab have the eth0 interface for the LAN and



Infrastructure Managed:



•WLAN IP settings

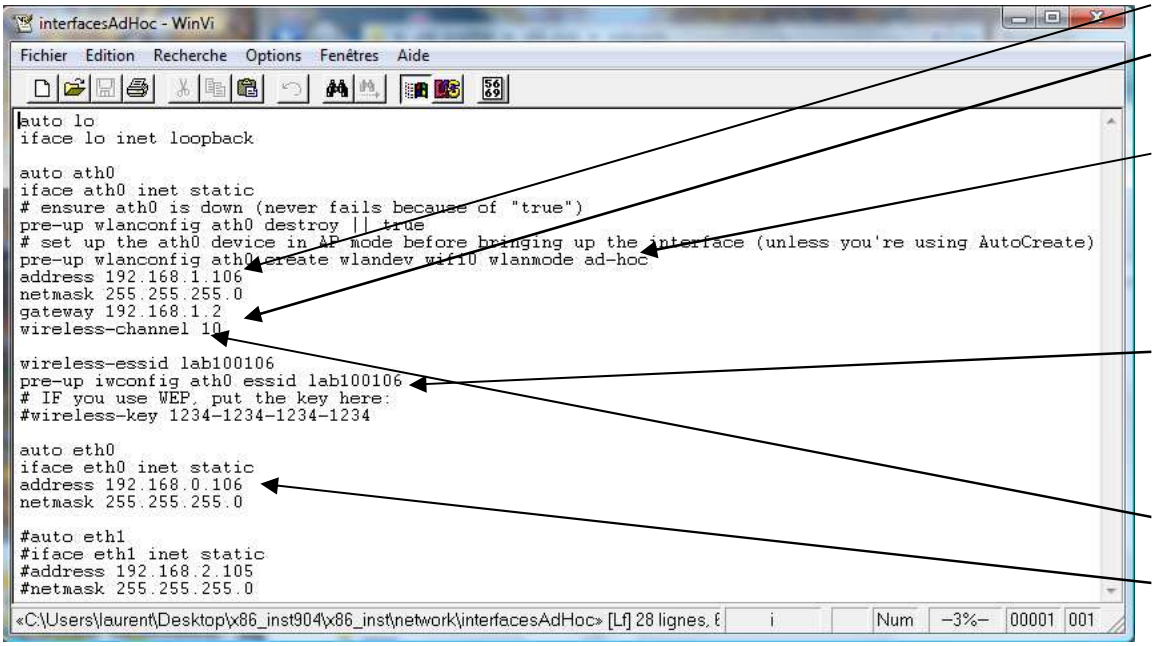
• If the wireless network is further to be connected to another network (i.e Internet) we need to specify the gateway.

• wireless mode specified to **managed,** that is, it will connect to an existing wireless network.

• SSID, that is the name of the wireless network the robot will connect.

•LAN IP settings

Ad-hoc:



•WLAN IP settings

• The gateway IP if there is one.

• wireless mode specified to **ad-hoc,** that is,all devices will talk directly to each other.

• SSID, that is the name of the wireless network the robot will connect.

• channel to be used,

• LAN IP settings

The "/usr/sbin/wifibot-ini" configuration file:

This is the last step of configuration, we will first specify the routing tables of the NAT address translation, this is needed to make the embedded devices visible from outside the robot. Then we set the commands to launch the control server and some computer dependent drivers at boot time.

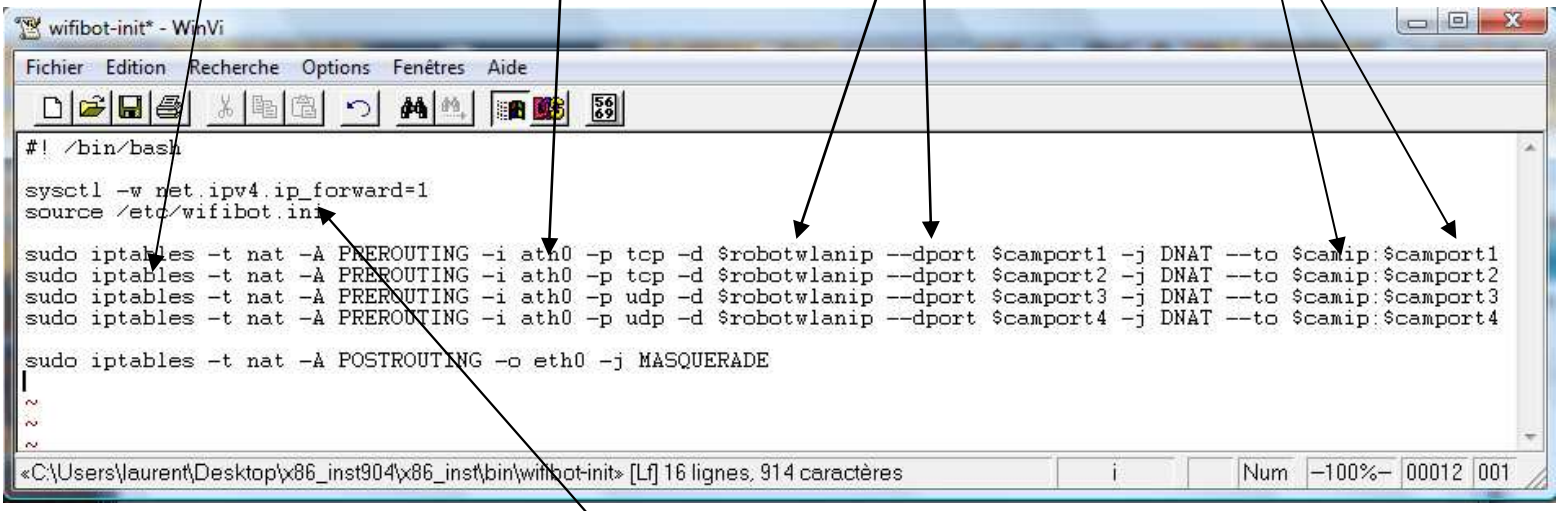
Information about IPTABLES/NAT can be found at http://www.netfilter.org/

We use « iptables » for seeting the NAT

The interface we are « NATting »

The WLAN interface **IP** and **ports** we will connect to from outside.

The LAN device **IP** and **ports** we want to reach (i.e the camera)



Read the /etc/wifibot.ini file to get NAT info

IMPORTANT NOTE!!!!: When editing the configuration files under windows, use the "WinVi32.exe" text editor ONLY, it is included in the CD ROM at **\software\WinVi32**
It is important to use it to respect the Linux format, specially when editing configuration files. Another option is to edit the files directly on the CPU under Linux with the installed "vi" editor, check http://www.linuxfibel.de/vi.htm for more information.

Remote access

Remote access to the desktop of a robot working under Windows XP:

When working with the robolab, it is always possible to attach a screen, a mouse and a keyboard directly into the embedded computer but it is often more convenient to have access to the robot remotely over the network. If the robot works under Windows follow these steps:

1- Click Start, point to All Programs, and then point to Accessories.
2- In the Accessories menu,point to communications and then click Remote Desktop Connection.
3- In the Computer box, type the IP address or the name of the robot you want to connect to (**Fig 1**).
4- Click Connect.
5- When the Log On to Windows dialog box appears type **root** as the user name and **wifibot** as the password, and then click OK (**Fig 2**).

Fig 1

Fig 2

The Remote Desktop window opens, and you see the desktop settings, files, and programs that are on the robot. Your robot remains locked, and nobody can access it without a password. In addition, no one will be able to see the work you are doing remotely.

To end your Remote Desktop session:

1. Click Start, and then click Log Off at the bottom of the Start menu.
2. When prompted, click Log Off (**Fig 3**).

Fig 3

Remote access to the command line of a robot working under Linux :

To remotely log into the robot's Linux operating system we will make use of a protocol called SSH (Secure Shell) which facilitates encrypted communication across networks. This requires a SSH client program. Whichever the SSH client you use, the procedure is similar:

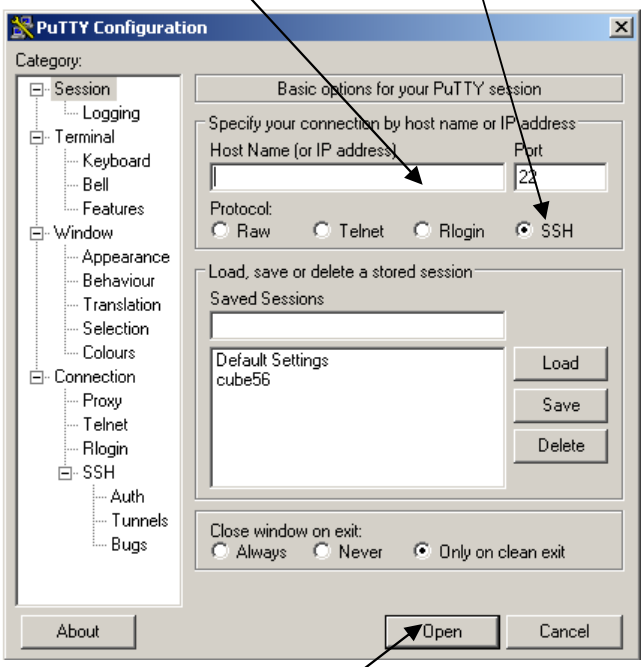
- Open the SSH client.
- Enter the CPU IP address (the default port is 22) and then start the connection.
- The first time a connection is established, the program will ask for confirmation.
- Enter login: **wifibot**.
- Enter password: **wifibot**

For your convenience the CDROM includes a free SSH client you can find in **\software\putty**

Connect to the robot in the following steps:

1 - Enter the **IP address** here.

2 - Check the **SSH** option.



3 - Click **Open** to start the connection.

4 - Confirm the connection.

5 - Enter login: **wifibot**

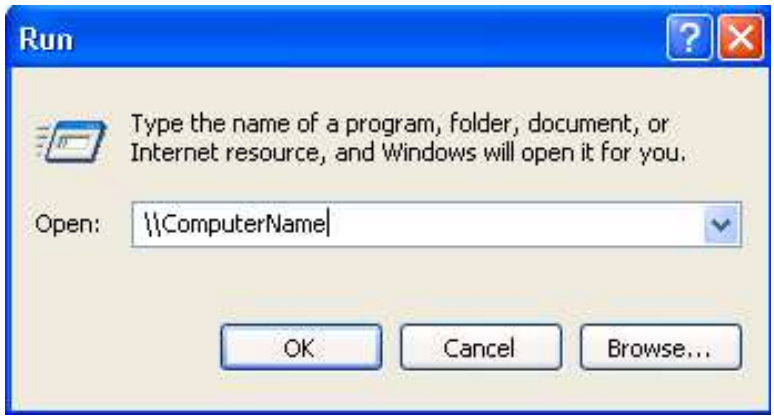
6 - Enter password: **wifibot**

File transfer

Transferring files to a robot working under Windows XP:

For transferring files we will make use of the file sharing capabilities of Windows XP.
From your computer in order to connect to the robot and transfer files do the following:

1. Click **Start > Run.**
2. In the **Open** field type **\\Robotname** or **\\IP address**
3. In the window that appears, type in the username **root** and password **wifibot**
4. Click **OK**
5. Only "\data" folder is shared and not protected with fbwfmgr



Important Notice for Xpe:

To change the configuration to the Compact Flash except the /data folder witch is writable

In the command terminal:

fbwfmgr /disable and reboot to change CF
fbwfmgr /enable and reboot to reprotect CF

Transferring files to a robot working under Linux:

For transferring files we will use the SFTP protocol,this requires an SCP client program. For your convenience you will find in the CD ROM a free SCP client in **\software\WinSCP**

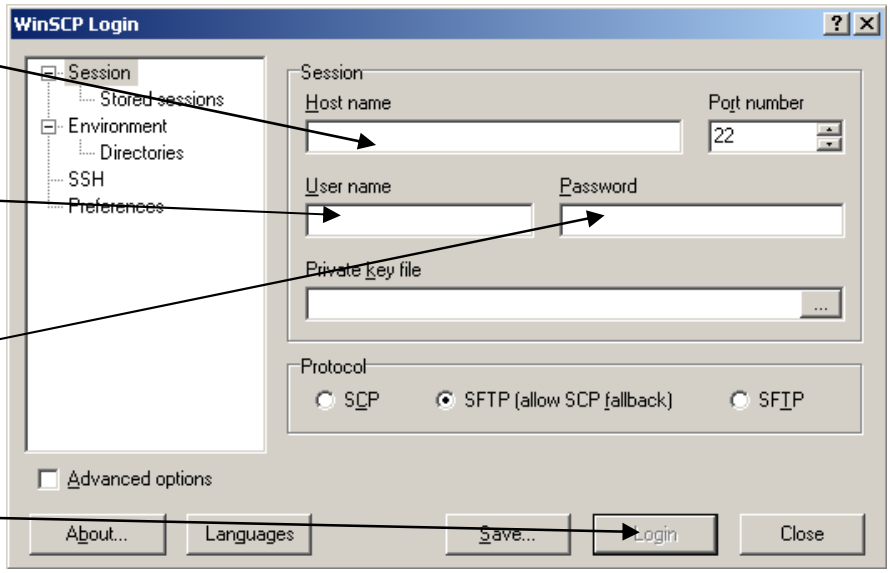
Connect to the robot in the following steps:

1 - Enter the **IP address** here.

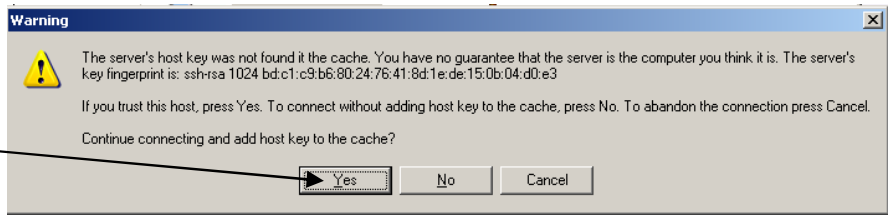
2 - Enter User name : **wifibot**

3 - Enter password: **wifibot**

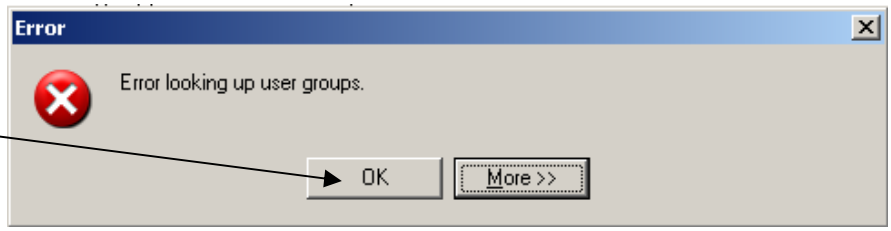
4 - Click **Login** to initiate the connection.



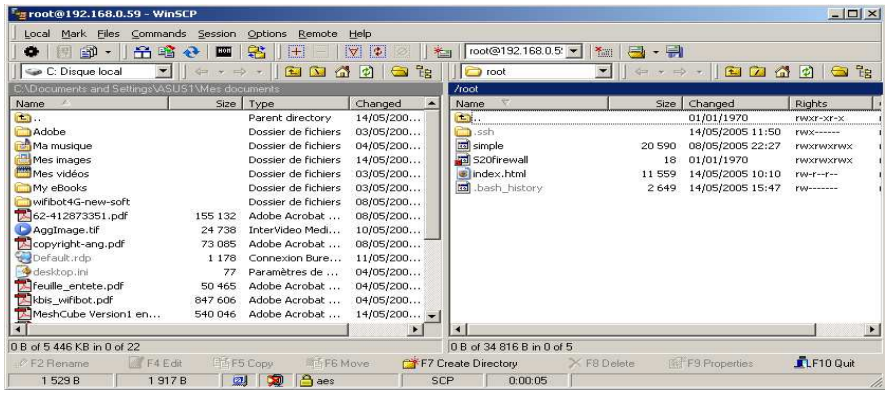
5 - Confirm the connection.



6 - Confirm again.

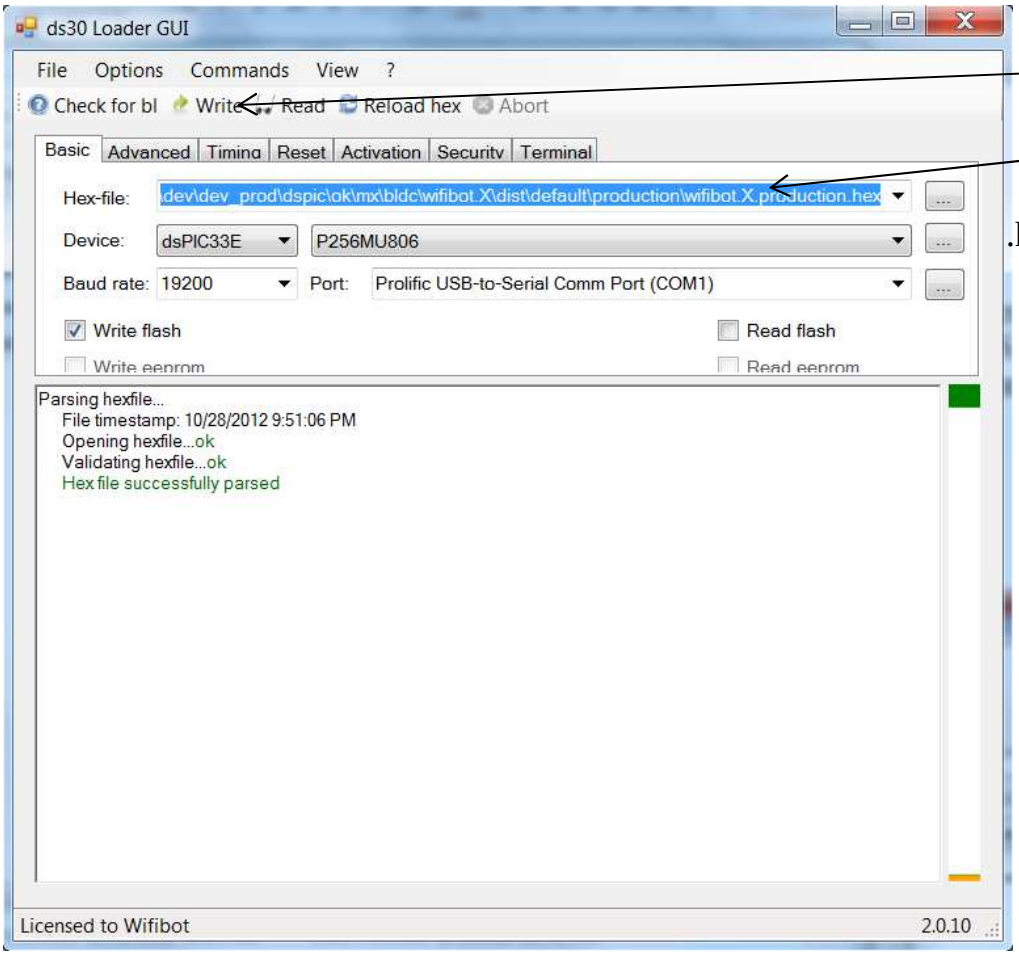


You are now connected and you can start transferring the files.



Chassis update:

We can upgrade the chassis using Microchip ICD2 ICD3 programmer or using the embedded bootloader DS30 using ds30 Loader GUI.exe software.



Plug your pc on the robot serial port, push the Download button and quickly switch ON the robot. The upgrade will start automatically

.hex File for update

Wifibot Lab V4
dspic
DSPIC33EP256MU806

EMBEDDED CPU

Intel® Atom TM processor D2550, 1.86 GHz

LE-379

3.5" embedded board with Intel® Atom™ dual-core Solution

LE-379D5S	Support Intel® Atom™ CedarTrail D2550 processor with Onboard VGA, LVDS, DVI, Giga LAN, USB2.0, HD Audio, SATAII, SMBUS, LPC, LPT, GPIO, Mini PCI, mSATA

Industrial Single Board Computer

3.5 Inches Mini board

LE-379

Intel® Atom™ Processor with DDRIII SO-DIMM, CRT, DVI, LVDS, Gigabit LAN, USB2.0, HD Audio, Serial ATAII, Mini PCI, PCIE mini card, LPC, LPT, CFast, mSATA, SATADOM

Form Factor	3.5 Inches Embedded Mini board
CPU	Intel® Atom™ CedarTrail Processor with optional D2700 or D2550 or N2800 Package type：FCBGA559
Memory	1 x DDRIII SO-DIMM 800/1066 MHz up to 4GB Support Non-ECC, unbuffered memory only
Chipset	Intel® NM10
Real Time Clock	Chipset integrated RTC with onboard lithium battery
Watchdog Timer	Generates a system reset with internal timer for 1min/s ~ 255min/s
Power Management	Supports ACPI 3.0 compliant
Serial ATA Interface	2 x serial ATAII interface with 300MB/s transfer rate(Optional support SATADOM)
Integrated Graphics	Intel® integrated extreme GMA 3650(Graphic Media Accelerator) Technology
VGA Interface	Onboard DSUB15 connector for VGA interface
LVDS Interface	Onboard 18-bit signal channel LVDS connector with +3.3V/+5V supply (N2800) Onboard 18 and 24-bit signal channel LVDS connector with +3.3V/+5V supply (D2700 / D2550)
DVI interface	Onboard DVI with 20-pin connector
Audio Interface	REALTEK ALC888 HD Audio
LAN Interface	1 x Intel® 82583V Gigabit Ethernet controller
GPIO Interface	Onboard programmable 8-bit Digital I/O interface
Extended Interface	1 x mini PCI, 1 x PCIE mini card(Optional support mSATA) CFast Card socket(shared with SATA2)
Internal I/O Port	4 x RS232, 1 x RS232/485/422, 1 x SMBUS, 1 x GPIO, 4 x USB2.0, 1 x IrDA, 2 x Serial ATAII, 1 LPT, 1x LPC, 1 x HD Audio, 1 x DVI , 1 x LVDS, 1 x CN_INV(Support LED Backlight)
External I/O Port	1 x PS/2, 1 x RJ45, 1 x VGA, 2 x USB2.0, 1 x RS232
Power Requirement	Full ranged 5V~24V(±5%) DC Input
Dimension	146mm x 101mm
Temperature	Operating within 0~60 centigrade Storage within -20~85 centigrade

The optional CPU (core I5 520M or core I7 620M)

Industrial Single Board Computer

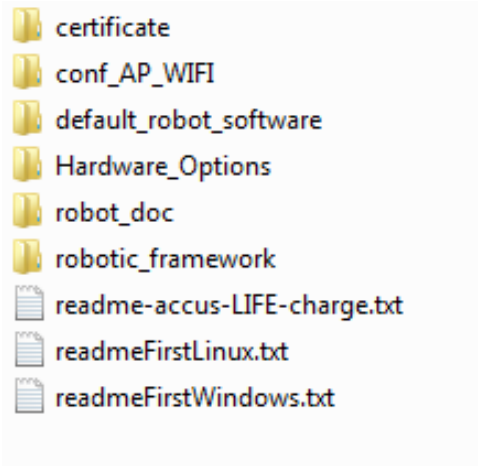
3.5" Miniboard

LS-377

Support Intel® Core™ i7, Core™ i5 and Core™ i3 CPU with DDRIII SO-DIMM, CRT, LVDS, DVI, Gigabit LAN, Mini PCI, PCI Express mini card, Serial ATAII, 7.1Channel HD Audio

Form Factor	3.5" Miniboard
CPU	Intel® Core™ i7, Core™ i5, Core™ i3, Celeron®, and Pentium® Mobile Processor Package type: rPGA988A
Memory	1 x DDRIII SO-DIMM 800/1066 MHz up to 4GB
Chipset	Intel QM57
Real Time Clock	Chipset integrated RTC with onboard lithium battery
Watchdog Timer	Generates a system reset with internal timer for 1min/s ~ 255min/s
Power Management	Supports ACPI 2.0 compliant.
Serial ATA Interface	2 x serial ATAII interface with 300MB/s transfer rate
VGA Interface	Onboard VGA (depend on CPU)
LVDS Interface	Onboard 24-bit dual channel LVDS connector with +3.3V/+5V/+12V supply
DVI Interface	DVI interface
Audio Interface	Realtek ALC888 HD Audio
LAN Interface	1 x Intel 82574L Gigabit LAN
GPIO Interface	Onboard programmable 8-bit Digital I/O interface
Extended Interface	1 x Mini PCIE socket, 1 x Mini PCI socket to support Mini PCI Type IIIA
Internal I/O Port	1 x RS232/422/485, 1 x SMBUS, 1 x GPIO, 4 x USB ports, 1 x IrDA, 1 x LVDS, 1 x DVI, 1 x LCD, 2 x Serial ATA, 1 x LCD Inverter, 1 x HD Audio, 1 x DIO, 1 x DCOUT and 1 x CDIN
External I/O Port	1 x PS/2, 1 x LAN ports, 1 x VGA port, 2 x USB2.0 ports, 1 x RS232 port
Power Requirement	9~24V full range DC Input
Dimension	146mm x 101mm
Temperature	Operating within 0~60 centigrade Storage within -20~85 centigrade

The CDROM



The CDROM included with the robot contains the documentation and sample programs for the robot. Its contains three folders:

- cdlabRS232_V3
  - certificate
  - conf_AP_WIFI ← WIFI AP Configuration file
  - default_robot_software
    - Bootloader_DSPIC ← Bootloader DSPIC
    - Control_software
      - new_protocol ←
      - old_protocol ← .exe Windows control HMI old protocol (LabV2)
    - mjpeg_web_cam_server ← MJPEG server Windows and Linux
    - other
    - Robot_Server_Client_Source ← HMI Source + Robot server
      - linux
        - new_raw_protocol
          - raw_server ← Robot server new protocol linux
        - old_protocol
          - robot_server ← Robot server old protocol linux
      - windows
        - new_raw
          - gui_raw
          - robot_server ← Robot server new protocol windows
          - gui_raw.zip ← HMI source new protocol V5
        - old ← HMI + server source old protocol V4
    - UPNP_Server ← UPNP Server Windows and Linux
    - Robot_Server_Client_Source.zip
  - Hardware_Options ← Wifibot options Documentation
  - robot_doc ← Robot documentation + Ethernet and RS232 protocol
  - robotic_framework ← WIFIBOT partner Robot framework

Annexe 1

WLAN 802.11a/b/g mini-PCI Module

DCMA-81

SPECIFICATION

Frequency Band	➢ 2.312 – 2.472GHz, 2.484 GHz ➢ U-NII: 5.15 - 5.35GHz, 5.725 - 5.825GHz ➢ ISM: 5.725 – 5.850 GHz ➢ DSRC: 5.850 – 5.925 GHz ➢ Europe: 5.15 - 5.35GHz, 5.47 - 5.725GhHz ➢ Japan: 4.90 – 5.00GHz, 5.03 – 5.091GHz, 5.15 – 5.35GHz
Modulation technique	➢ **802.11 a/b/g** DSSS (DBPSK, DQPSK, CCK) OFDM (BPSK,QPSK, 16-QAM, 64-QAM)
Host interface	Half size Mini PCI Type 3A
Channels support	➢ **802.11b/g** US/Canada: 11 (1 ~ 11) Major European country: 13 (1 ~ 13) France: 4 (10 ~ 13) Japan: 11b: 14 (1~13 or 14th), 11g: 13 (1 ~ 13) ➢ **802.11a** US/Canada:12 non-overlapping channels Europe: 19 non-overlapping channel Japan: 4 non-overlapping channels
Output power	➢ A Mode: +17dBm at 6, 9, 12, 18, and 24Mbps +16dBm at 36Mbps +14dBm at 48Mbps +13dBm at 54Mbps ➢ B Mode: +19dBm at 1,2, 5.5, and 11Mbps ➢ G Mode: +17dBm at 6, 9, 12, 18, 24 and 36Mbps +16dBm at 48Mbps +15dBm at 54Mbps
Operation distance	➢ **802.11a:** Outdoor: 85m@54Mbps, 250m@6Mbps Indoor: 20m@54Mbps, 40m@6Mbps ➢ **802.11b:** Outdoor: 250m@11Mbps, 300m@1Mbps Indoor: 30m@11Mbps, 50m@1Mbps ➢ **802.11g**: Outdoor: 80m@54Mbps, 250m@6Mbps Indoor: 15m@54Mbps, 35m@6Mbps
Operation System supported	➢ Windows® 2K, XP
Dimension	➢ 59.75mm(L) * 25.50mm (W) * 5mm (H)
Security	➢ 64-bit,128-bit, 152-bit WEP Encryption ➢ 802.1x Authentication ➢ AES-CCM & TKIP Encryption
Operation mode	➢ Infrastructure & Ad-hoc mode
Operation temperature	➢ 0°C ~ 70°C
Storage temperature	➢ -20°C ~ 70°C

Annexe 2

108M Wireless Access Point

TL-WA601G

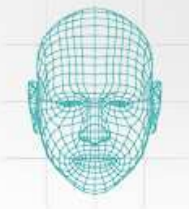
Specifications:

Standards	IEEE 802.11g, IEEE 802.11b
Interface	1 10/100M auto-sensing LAN Port
Wireless Signal Rates With Automatic Fallback	Super G™ : 108M 11g: 54/48/36/24/18/12/9/6M(dynamic) 11b: 11/5.5/2/1M(dynamic)
Frequency Range	2.4-2.4835GHz
Wireless Transmit Power	20dBm(Max)
Antenna	3dBi detachable Omni directional antenna
Modulation Technology	IEEE 802.11b: DQPSK, DBPSK, DSSS, and CCK IEEE 802.11g: BPSK, QPSK, 16QAM, 64QAM, OFDM
Receiver Sensitivity	108M: -68dBm@10% PER 54M: -68dBm@10% PER 11M: -85dBm@8% PER 6M: -88dBm@10% PER 1M: -90dBm@8% PER 256K: -105dBm@8% PER
Power Supply Unit	Input: localized to country of sale Output: 9VAC / 0.8A linear PSU
Operating temperature	0°C~40°C (32°F~104°F)
Storage temperature	-40°C~70°C (-40°F~158°F)
Relative humidity	10% ~ 90%, non condensation
Storage Humidity	5%~95% non-condensing
Dimensions	6.2×4.3×1.3 in. 158×110×32 mm

Annexe 3

Technical Specifications

- Motorized tracking (189° horizontal and 102° vertical)
- Carl Zeiss® optics
- Autofocus lens system
- Ultra-high resolution 2-megapixel sensor with RightLight™ 2 Technology
- Color depth: 24-bit true color
- Video capture: Up to 1600 by 1200 pixels (HD quality)
- Still-image capture: 8 megapixels (with software enhancement)
- Built-in microphone with RightSound™ Technology
- Frame rate: Up to 30 frames per second
- High-Speed USB 2.0
- Logitech QuickCam® software (with Video Effects™, filters, avatars, and face accessories)
- Works with Skype™, Windows Live™ Messenger, Yahoo®, AOL® and other compatible instant messaging applications



Motorized tracking

It keeps you right in the middle of the picture, offering 189-degree field of view and 102-degree tilt.

Carl Zeiss® optics

You'll enjoy razor-sharp images from a lens designed with the help of one of the pioneers in the industry. Find out more about why our collaboration with Carl Zeiss benefits you.

Learn more.

Advanced autofocus

Your images stay razor sharp, even in close-ups (up to 10 cm from the camera lens) with built-in autofocus. Learn all about Logitech autofocus.

Learn more.

HD video recording

Your friends and family can see you in widescreen video at HD quality (720p).

Higher-megapixel performance

With its true 2-megapixel sensor, with up to 8-megapixel photos (software enhanced), every video call and photo will look sharp. Megapixels? Sensor? Why is image quality so important?

Learn more.

RightLight™ 2 technology

Even if you make a video call in dim or poorly backlit settings, the camera will intelligently adjust to produce the best possible image. Find out what's right about RightLight 2 technology.

Learn more.

GP2Y0A02YK

Long Distance Measuring Sensor

■ Features

1. Less influence on the colors of reflected objects and their reflectivity, due to optical triangle measuring method
2. Distance output type
   (Detection range:20 to 150cm)
3. An external control circuit is not necessary
   Output can be connected directly to a microcomputer

■ Applications

1. For detection of human body and various types of objects in home appliances, OA equipment, etc

■ Absolute Maximum Ratings

(T_a=25°C)

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC}	−0.3 to +7	V
*1 Output terminal voltage	V_O	−0.3 to V_{CC} +0.3	V
Operating temperature	T_{opr}	−10 to +60	°C
Storage temperature	T_{stg}	−40 to +70	°C

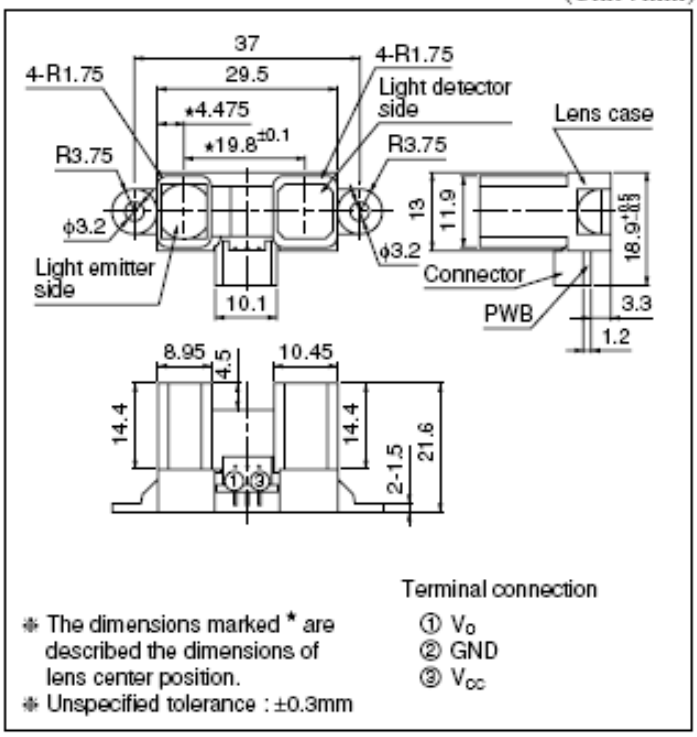
*1 Open collector output

■ Recommended Operating Conditions

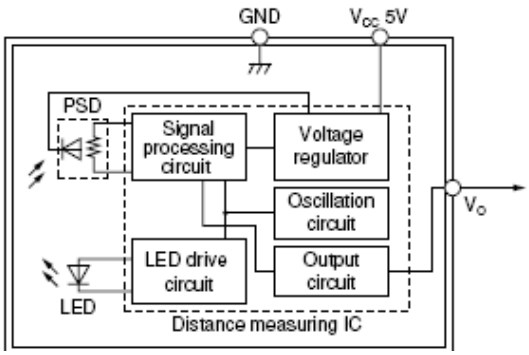
Parameter	Symbol	Rating	Unit
Operating Supply voltage	V_{CC}	4.5 to 5.5	V

■ Outline Dimensions

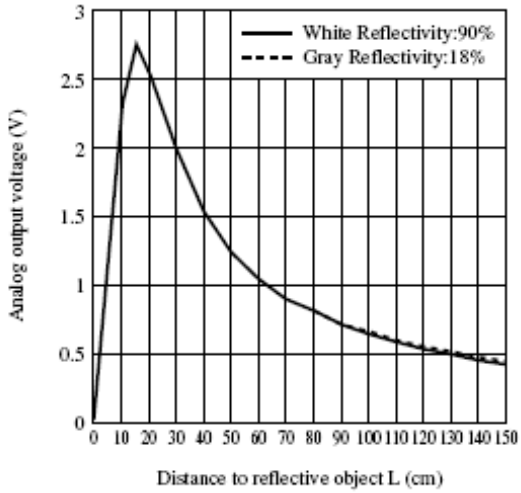
(Unit : mm)



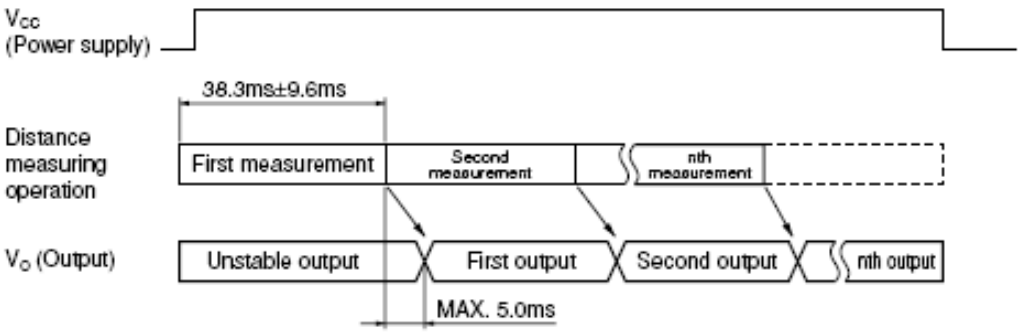
Internal Block Diagram



Analog Output Voltage vs. Distance to Reflective Object



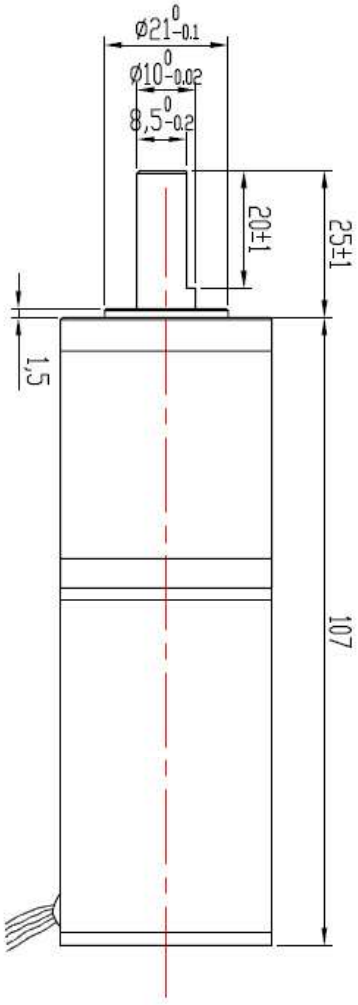
Timing Chart



Annexe 5 (Brushless Motor 12V 1/28)

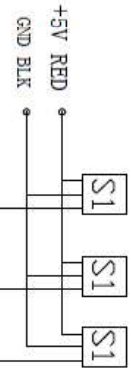
Wi-fibOt

REV:A
DATE:20120810

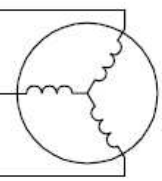


Electrical Spec:

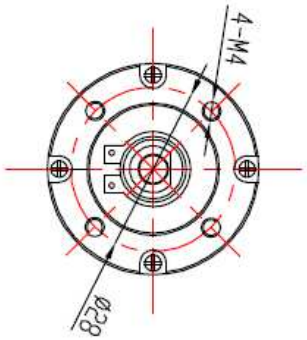
Model		
ITEM	UNIT	SPEC
PHASE	PHS	3
VOLTAGE	VDC	12
NOLOAD SPEED	RPM	5200REF
NOLOAD CURRENT	A	0.3REF
RATED SPEED	RPM	3000
RATED POWER	W	16
RATED TORQUE	N.m	0.051
RATED CURRENT	A	2.4
INSULATING STRENGTH	VAC	500
IP CLASS		IP40
INSULATION CLASS		B
RATIO		28.5:1
RATED SPEED FROM GEARBOX	RPM	105
RATED TORQUE FROM GEARBOX	N.m	1.1



Hall Wire :UL1007 26AWG
300mm



Motor Wire :UL1007 22AWG
300mm



Annexe 6 (OPTION)

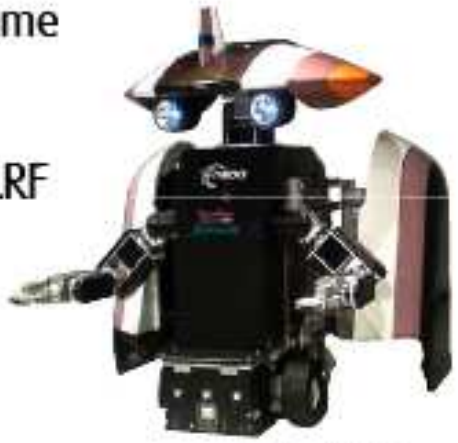
Robotics

URG-04LX-UG01

Low Cost Compact LRF from HOKUYO

Laser Range Finders (LRF) provide continuous time stamped mapping information.

The URG-04LX-UG01 is the smallest & lightest LRF available. With a single USB connection it is ideally suited to mobile robotic applications



Detection performance in the indoor environment with the existence of two pedestrians

- 5.6 metres range
- 240° scan 0.35° resolution
- 10 scans per second
- Compact: 50 x 50 x 70mm
- Lightweight 160g
- Low Power 5V DC, 2.5W

Annexe 7 (OPTION)

UTM-30LX

FDA approved
SOKUIKI sensor for intelligent robots

30m and 270° scanning range. Suitable for robots with higher moving speed because of the longer range and fast response.

Model No.	UTM-30LX
Power source	12VDC ± 10%(Current consumption:Max:1A,Normal:0.7A)
Light source	Semiconductor laser diode(λ =905nm) Laser safety Class 1(FDA)
Detection Range	0.1 to 30m(White Square Kent Sheet 500mm or more),Max.60m 270°
Accuracy	0.1 to 10m:±30mm, 10 to 30m:±50mm[*1]
Angular Resolution	0.25° (360° /1,440 steps)
Scan Time	25msec/scan
Sound level	Less than 25dB
Interface	USB2.0(Full Speed)
Synchronous output	NPN open collector
Command system	Exclusively designed command SCIP Ver.2.0
Connection	Power and Synchronous output:2m flying lead wire USB:2m cable with type-A connector
Amblent(Temperature/Humidity)	-10 to +50 degrees C, less than 85%RH(without dew and frost)
Vibration Resistance	Double amplitude 1.5mm 10 to 55Hz, 2 hours each in X, Y and Z direction
Impact Resistance	196m/s^2, 10 times in X, Y and Z direction
Weight	Approx. 370g(with cable attachment)

Annexe 8 (OPTION)

Robotics

UTM-30LX-EW

Long Range HOKUYO LRF

Model	UTM-30LX-EW
Power Source	12V DC +/- 10% , Current usage Max 1A at start-up, Normal use 0.7A
Light Source	Pulsed laser diode (λ=905nm), Laser safety class 1
Principle	Direct Time of Flight
Detection Range	0.1m to 30m (500mm x 500mm or more, White Kent Sheet)
Multi-Echo function	Max 3 output of distance per step
Accuracy	0.1m to 10m +/- 30mm, 10m to 30m +/- 50mm
Scan Window & Resolution	270° Resolution 0.25°
Scan speed	25ms/scan
Communication protocol	SCIP2.2 (Exclusive command)
Interface	Ethernet 100 Base-TX (Auto-negotiation) TCP/IP Synchronous output: NPN open collector
Connection	Power / synchronous output cable 2m Ethernet RJ-45 with male connector 30cm (female connector included)
Physical dimensions	62 x 62 x 87mm Weight 370g
Operating temperature / humidity	-10 to +50°C @ 85% humidity (no condensing or icing) (Storage -25 to +75°C)
Vibration resistance	Double amplitude 1.5mm, 10 to 55Hz each for 2 hours in X,Y,Z Directions
Impact Resistance	196m/s² each 10 times in in X,Y,Z Directions

- 30 metres range
- Designed for outdoor use
- 270º scan 0.25º resolution
- 40 scans per second
- Compact: 62 x 62 x 87mm
- Lightweight: 400g
- Power frugal: 12VDC, 8.4W
- Ethernet connectivity
- Multi-Echo functionality
- Effective in adverse weather

SENTEK solutions

Annexe 9 (Option)

<u>Optional Sensor: Kinect</u>
<u>(+DC/DC + special mounting)</u>

Annexe 10 (Option)

UBIQUITI NETWORKS

TECHNICAL SPECS / DATASHEET

PicoStation M2-HP 2.4GHz Hi Power 802.11N Outdoor Radio System

World's Smallest and Most Powerful Outdoor WiFi AP

SYSTEM INFORMATION	
Processor Specs	Atheros MIPS 24KC, 400MHz
Memory Information	32MB SDRAM, 8MB Flash
Networking Interface	1 X 10/100 BASE-TX (Cat. 5, RJ-45) Ethernet Interface

REGULATORY / COMPLIANCE INFORMATION	
Wireless Approvals	FCC Part 15.247, IC RS210, CE
RoHS Compliance	YES

OPERATING FREQUENCY 2412MHz-2462MHz

TX POWER SPECIFICATIONS			
	DataRate	Avg. TX	Tolerance
11g	1-24Mbps	28 dBm	+/-2dB
	36Mbps	27 dBm	+/-2dB
	48Mbps	26 dBm	+/-2dB
	54Mbps	24 dBm	+/-2dB
Airmax 11n	MCS0	28 dBm	+/-2dB
	MCS1	28 dBm	+/-2dB
	MCS2	28 dBm	+/-2dB
	MCS3	28 dBm	+/-2dB
	MCS4	27 dBm	+/-2dB
	MCS5	25 dBm	+/-2dB
	MCS6	24 dBm	+/-2dB
	MCS7	23 dBm	+/-2dB

RX SPECIFICATIONS			
	DataRate	Sensitivity	Tolerance
11g	1-24Mbps	-97 dBm min.	+/-2dB
	36Mbps	-80 dBm	+/-2dB
	48Mbps	-77 dBm	+/-2dB
	54Mbps	-75 dBm	+/-2dB
Airmax11n	MCS0	-96 dBm	+/-2dB
	MCS1	-95 dBm	+/-2dB
	MCS2	-92 dBm	+/-2dB
	MCS3	-90 dBm	+/-2dB
	MCS4	-86 dBm	+/-2dB
	MCS5	-83 dBm	+/-2dB
	MCS6	-77 dBm	+/-2dB
	MCS7	-74 dBm	+/-2dB

ANTENNA & RANGE PERFORMANCE	
RP-SMA Antenna Included	Outdoor Omni-directional. 6dBi
Indoor/Outdoor Range	Over 200m / 500m

PHYSICAL / ELECTRICAL / ENVIRONMENTAL	
Enclosure Size	13.6 cm. length x 2.0 cm. height x 3.9cm. width
Weight	0.10kg
Enclosure Characteristics	Outdoor UV Stabalized Plastic
Max Power Consumption	8 Watts
Power Rating	Up to 24V. POE Supply included
Power Method	Passive Power over Ethernet (pairs 4,5+; 7,8 return)
Operating Temperature	-20C to +70C
Operating Humidity	5 to 95% Condensing
Shock and Vibration	ETSI300-019-1.4

Annexe 11 (Option)

Mini-PCI

MP-323 - Mini-PCI IEEE 1394a Module

Form Factor: Mini-PCI type III B with 124-pin interface.
Controller: Agere FW323.
Output Function: 3 x 8-pin IEEE1394a Connector.
Dimensions: 45mm x 60mm (W x L).
Accessories: 1x 8-pin IEEE 1394a Cable.
Power Requirements: small 4-pin AT power connector for 12V.

MP-840

H.264 Hardware Compression Card with 4 Ports of Video & Audio Inputs

Features
- Mini-PCI interface
- H.264 Hardware Compression
- 4-ch Video & Audio inputs
- Support D1
- Windows XP, Vista (32-bit) SDK & Driver

MP-878D2

2-ch Mini-PCI capture card with Software Develop Kit

Features
- Mini-PCI interface
- 2-ch Video input
- Support D1 , CIF resolution
- Windows Driver & SDK provide
- Linux Driver provide

MP-6100

H.264 Hardware Compression Card with 4 Ports of Video & Audio Inputs

Features
- Mini-PCI interface
- H.264 Hardware Compression
- 4-ch Video & Audio inputs
- Support D1 , CIF
- Windows / Linux SDK & Driver

Annexe 12 (Option)

Optional CPU (core I5 520M or core I7 620M)

Industrial Single Board Computer

3.5'' Miniboard

LS-377

Support Intel® Core™ i7, Core™ i5 and Core™ i3 CPU with DDRIII SO-DIMM, CRT, LVDS, DVI, Gigabit LAN, Mini PCI, PCI Express mini card, Serial ATAII, 7.1Channel HD Audio

Form Factor	3.5'' Miniboard
CPU	Intel® Core™ i7, Core™ i5, Core™ i3, Celeron®, and Pentium® Mobile Processor Package type: rPGA988A
Memory	1 x DDRIII SO-DIMM 800/1066 MHz up to 4GB
Chipset	Intel QM57
Real Time Clock	Chipset integrated RTC with onboard lithium battery
Watchdog Timer	Generates a system reset with internal timer for 1min/s ~ 255min/s
Power Management	Supports ACPI 2.0 compliant.
Serial ATA Interface	2 x serial ATAII interface with 300MB/s transfer rate
VGA Interface	Onboard VGA (depend on CPU)
LVDS Interface	Onboard 24-bit dual channel LVDS connector with +3.3V/+5V/+12V supply
DVI Interface	DVI interface
Audio Interface	Realtek ALC888 HD Audio
LAN Interface	1 x Intel 82574L Gigabit LAN
GPIO Interface	Onboard programmable 8-bit Digital I/O interface
Extended Interface	1 x Mini PCIE socket, 1 x Mini PCI socket to support Mini PCI Type IIIA
Internal I/O Port	1 x RS232/422/485, 1 x SMBUS, 1 x GPIO, 4 x USB ports, 1 x IrDA, 1 x LVDS, 1 x DVI, 1 x LCD, 2 x Serial ATA, 1 x LCD Inverter, 1 x HD Audio, 1 x DIO, 1 x DCOUT and 1 x CDIN
External I/O Port	1 x PS/2, 1 x LAN ports, 1 x VGA port, 2 x USB2.0 ports, 1 x RS232 port
Power Requirement	9~24V full range DC Input
Dimension	146mm x 101mm
Temperature	Operating within 0~60 centigrade Storage within -20~85 centigrade

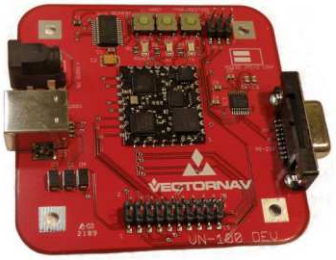
Annexe 13 GPS (Option)

Module GPS "XBU-353" à sortie USB

Le "XBU-353" est un récepteur GPS ultra compact à sortie USB livré dans un petit boîtier magnétique étanche très esthétique. Livré avec un CD-ROM comprenant des drivers ainsi qu'un logiciel de test, ce modèle 20 canaux est basé sur un chipset SiRF StarIII™ qui lui confère une sensibilité exeptionnelle de l'ordre de -159 dBm.

Capable de supporter la démodulation WASS™, le "XBU-353" dispose d'un câble d'une longeur de 1,50 m et d'une Led de contrôle allumée lors de la recherche de position et clignotante lorsque la position a été trouvée. Une "super capacité" de sauvegarde est également intégrée au module.

Dimensions	Diamètre: 53 mm x 19.2 mm
Alimentation	+4.5 à +6.5 Vcc
Consommation	80 mA
Canaux	20
Position	10 m, 2D RMS
Vélocité	515 m/sec.
Altitude maxi.	18.000 mètres
Accélération	< 4 g
Temps de réacquisition	0.1 sec.
Hot Start	1 sec.
Warm Start	38 sec.
Cold Start	42 sec.
Signal de sortie	SiRF binary : Position, Velocity, Altitude, Status et Control NMEA 0183 : GGA, GSA, GSV, RMC



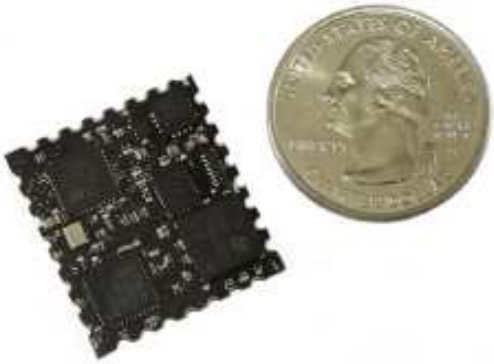
Annexe 14 IMU (Option)

VECTORNAV

Embedded Navigation Solutions

VN-100

Embedded Attitude Heading Reference System

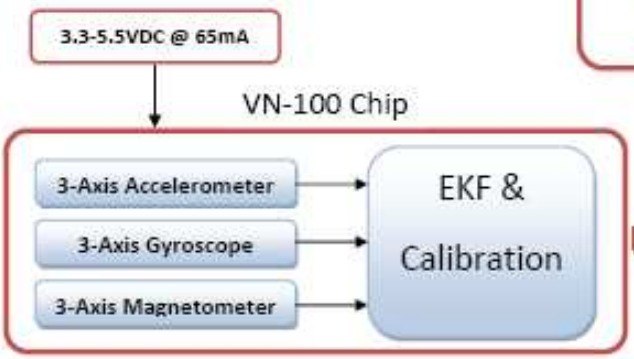


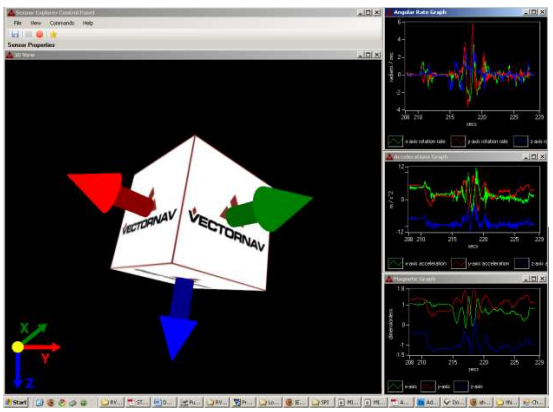
The VN-100 is the world's first Attitude Heading Reference System (AHRS) integrated into a single chip sized module. It's small size and high performance opens the door for numerous embedded applications.

Watch our video demonstration at:
http://tinyurl.com/vectornav

Features

- Single surface mount solution
- Small SMT footprint < $1in^2$
- Accuracy < 0.5 deg rms (static)
- Fully calibrated at room temp
- Extended Kalman Filter (EKF) attitude solution at 200 Hz
- Serial TTL, SPI Outputs
- Euler angles, quaternion, DCM, acceleration, angular rates, magnetic outputs
- Low cost





Performance

Heading	
Range	±180 °
Accuracy (rms)	< 2.0 °
Resolution	< 0.2 °

Attitude	
Range: Pitch, Roll	±180 °, ±90 °
Accuracy	< 0.5 °
Resolution	< 0.06 °

Angular Rate	
Range: Heading	±300 °/sec
Range: Pitch, Roll	±500 °/sec
Bias Stability: Heading	< 0.1 °/sec @ 25°C
Bias Stability: Pitch, Roll	< 0.06 °/sec @ 25°C
Resolution: Heading	< 0.2 °/sec
Resolution: Pitch, Roll	< 0.06 °/sec
Bandwidth: Heading	80 Hz
Bandwidth: Pitch, Roll	140 Hz

Acceleration	
Input Range: X/Y/Z	±2 g, ±6 g
Bias Stability: X/Y	< 0.5 mg @ 25°C
Bias Stability: X/Y	< 1.6 mg @ 25°C
Resolution: X/Y	< 0.4 mg
Resolution: Z	< 2 mg
Bandwidth	50 Hz

Technical Brief

YEI 3-Space Sensor™
Product Family

Miniature High-Performance Attitude & Heading Reference Systems / Inertial Measurement Units

Overview

The YEI 3-Space Sensor™ product line is a family of miniature, high-precision, high-reliability, Attitude and Heading Reference Systems (AHRS) / Inertial Measurement Units (IMU). Each YEI 3-Space Sensor uses triaxial gyroscope, accelerometer, and compass sensors in conjunction with advanced processing and on-board quaternion-based Kalman filtering algorithms to determine orientation relative to an absolute reference in real-time. The product family offers a breadth of communication, performance, and packaging options ranging from the ultra-miniature TSS embedded to fully integrated battery-powered wireless and data-logging versions.

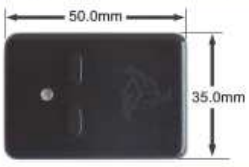
Orientation can be returned in absolute terms or relative to a designated reference orientation. The proprietary multi-reference vector mode and 24-point ortho-calibration process increase accuracy and greatly reduce and compensate for sensor error. The YEI 3-Space Sensor system also utilizes a dynamic sensor confidence algorithm that ensures optimal accuracy and precision across a wide range of operating conditions.

The YEI 3-Space Sensor system features are accessible via a well-documented open communication protocol that allows access to all available sensor data and configuration parameters using a variety of communication interfaces. Versatile commands allow access to raw sensor data, normalized sensor data, and filtered absolute and relative orientation outputs in multiple formats including: quaternion, Euler angles (pitch/roll/yaw), rotation matrix, axis angle, two vector (forward/up).

Applications

- Robotics
- Motion capture
- Positioning and stabilization
- Personnel / pedestrian navigation and tracking
- Unmanned air/land/water vehicle navigation
- Education and performing arts
- Healthcare monitoring
- Gaming and motion control
- Accessibility interfaces
- Virtual reality and immersive simulation

Product Family



- USB2.0, RS232 serial
- 50x35x15 mm, 17 grams
- USB communications via virtual COM port
- RGB status LED, two buttons
- Hand-held or strap-down case style

Annexe 15 (Option)

AC/DC Multi-Functional Balance Silent Fast Charger/Discharger (must switch off the robot)

Chargeur AC/DC Multi-Fonctions charge/décharge équilibreur silencieux Avec monitoring USB par PC