

# KoreWiFi

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user manual

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## Documentation version

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1.1	15.04.2009	J. Tharin	Added details, corrected modules load (pcmcia,pxa2xx_cs)

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**Matlab:** MathWorks Corp.

**Webots:** Cyberbotics

**Khepera:** K-Team and LAMI

**Logitech:** Logitech Int. SA

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- The contents of this manual are subject to change without notice
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- The above notwithstanding, K-Team can assume no responsibility for any error in this manual.

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# 1 INTRODUCTION

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Thank you for buying the KoreWifi module. This module will enable the connection of the KoreBot card to a wireless network.

## 1.1 How to use this handbook

This handbook introduces the KoreWifi module and its various operating modes. For a quick start, jump to [chapter 3: Usage](#).

If this handbook does not answer one of the problems you are confronted with, please consult the K-Team web site ([www.k-team.com](http://www.k-team.com)) and, especially the Forum and the FAQs.

- **Unpacking and Inspection** : KoreWifi package description.
- **Usage** : KoreWifi usage descriptions.
- **Annexes** : Detailed descriptions of several helpful commands are explained.

## 1.2 Safety precautions

Here are some recommendations on how to correctly use the KoreWifi:

- **Keep the module away from wet area.** Contact with water could cause malfunction and/or breakdown.
- **Store your module in a stable position.** This will avoid the risks of falls, which could break it or cause damage to a person.
- **Do not attach any connectors while the module is powered on.** To avoid any damage, make all connections when the module power is off.
- **Never leave the KoreWifi and KoreBot powered when it is unused.** When you have finished working with KoreWifi, turn it off.

## 1.3 Recycling

Think about the end of life of your product! Parts of the module can be recycled and it is important to do so. By recycling you can help to create a cleaner and safer environment for generations to come. For those reasons please take care to the recycling of your product at the end of its life cycle, for instance sending back the product to the manufacturer or to your local dealer.

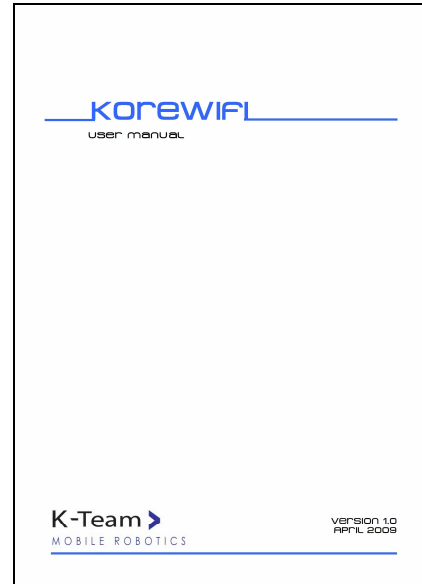
**Thanks for your contribution to a cleaner environment!**

## 2 UNPACKING AND INSPECTION

### 2.1 Package Contents



1. KoreWifi module



2. User manual

*Figure 2.1: Contents of the KoreWifi Pack*

Your package should contain the following items:

1. KoreWifi module
2. this present document

### 2.2 Specifications

The main specifications of the KoreWifi module are listed below:

- Network : Wireless network IEEE 802.11 B/G
- Card type : compactflash type I

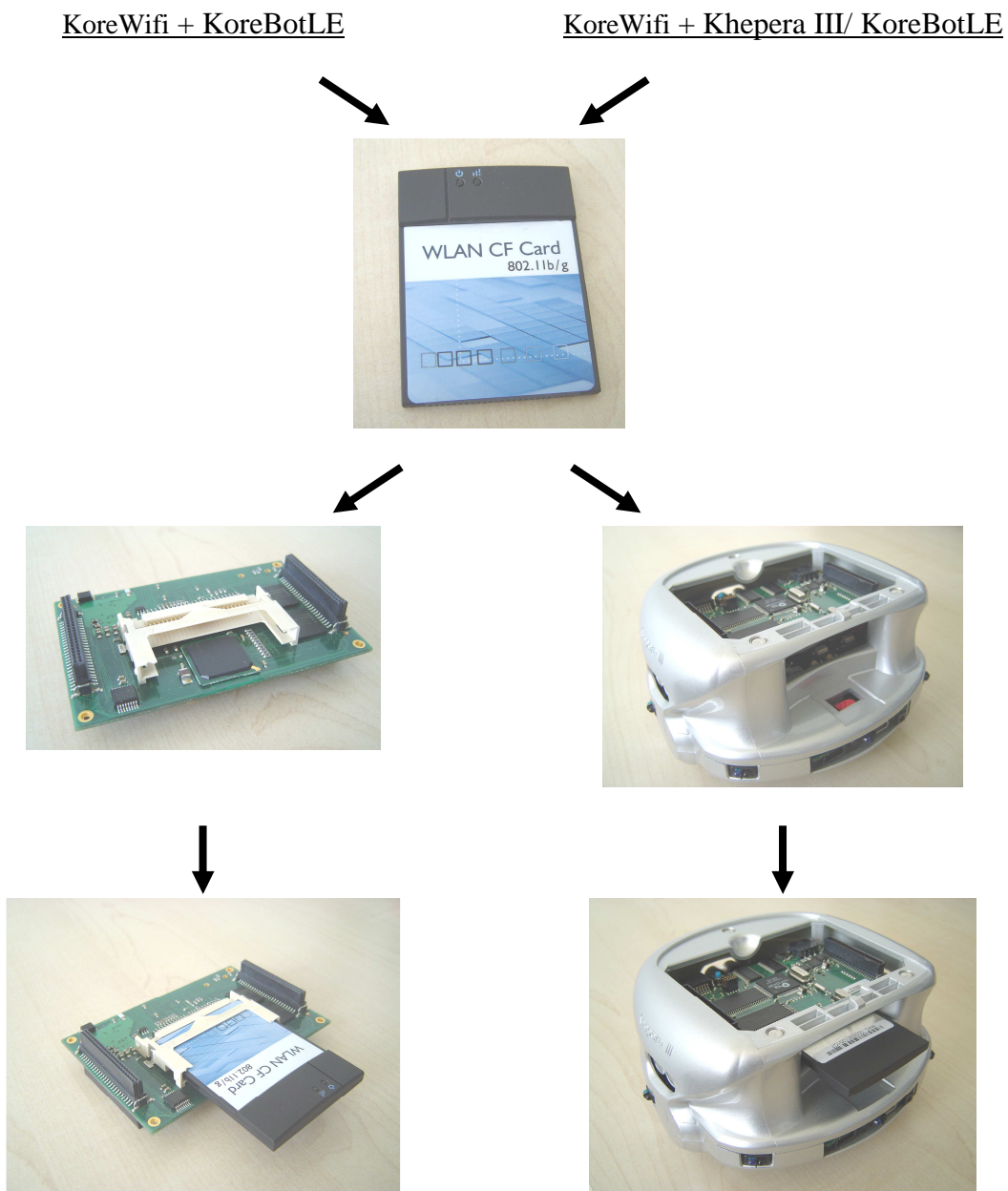
## 3 Usage

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### 3.1 Assembly

This sub-chapter explains how to connect the KoreWifi module, depending on your configuration:

- Insert the KoreWifi module onto the KoreBotLE as depicted below (*figure 3.1*):



**Figure 3.1: KoreWifi + KoreBotLE/ KheperaIII assembly**

## 3.2 Driver installation

Firstly the required hardware and software is described to install the driver, then the power-up and the usage of the module is explained.

### 3.2.1. Required hardware and software

The required hardware and software to use the module is described below.

#### i. Required hardware:

To use the KoreWifi module, you must have any of these components:

- KorebotLE with software kernel 2.6.5.25.7-kb1 <sup>1</sup>
- KheperaIII + KorebotLE with software kernel 2.6.5.25.7-kb1 <sup>1</sup>

#### ii. Required software:

- development directory (see [http://ftp.k-team.com/korebot/toolchain-2.6-betaV0.1/light\\_toolchain/development\\_light\\_kernel2.6\\_readme.txt](http://ftp.k-team.com/korebot/toolchain-2.6-betaV0.1/light_toolchain/development_light_kernel2.6_readme.txt) )
- sources files:  
path: <http://ftp.k-team.com/korebot/kernel/kernel2.6.25.7-kb1/>
  - kernel and drivers : linux-2.6.25.7-kb1.tar.bz2 <sup>2</sup>
  - camera driver : gspcav1-20071224-kb1.tar.bz2 <sup>3</sup>
  - scripts and directories : korebot-various-1.0.tar.bz2
  - driver firmware : libertas-tools.tar.bz2

<sup>1</sup> You can check the Kernel version with the command “*uname -r*”. The kernel and toolchain 2.6 for the Korebot is available at:

<http://ftp.k-team.com/korebot/toolchain-2.6-betaV0.1/>

<sup>2</sup> This kernel works also with Wifi B cards (hostap driver): replace eth0 by wlan0

<sup>3</sup> For the latest version of the camera driver see <http://ftp.k-team.com/korebot/koreusbcam/>

### 3.2.1 Installing the kernel 2.6.25.7-kb1

1. Enter your development directory (see [http://ftp.k-team.com/korebot/toolchain-2.6-betaV0.1/light\\_toolchain/development\\_light\\_kernel2.6\\_readme.txt](http://ftp.k-team.com/korebot/toolchain-2.6-betaV0.1/light_toolchain/development_light_kernel2.6_readme.txt) )
2. a) Modify *KTEAM\_KERNEL\_VERSION* in *env.sh* to:  
***export KTEAM\_KERNEL\_VERSION=2.6.25.7-kb1***  
  
b) enter bash shell by executing: ***bash***  
  
c) then source *env.sh* to have access to the cross-compiler and development variables:  
***source env.sh***



- d) if you installed the full toolchain ([http://ftp.k-team.com/korebot/toolchain-2.6-betaV0.1/full\\_toolchain/development\\_toolchain\\_full\\_version\\_2.6\\_readme.txt](http://ftp.k-team.com/korebot/toolchain-2.6-betaV0.1/full_toolchain/development_toolchain_full_version_2.6_readme.txt)), you have to modify the 2 following lines to adapt to the new kernel path and name version in the file `/usr/local/korebot-oetools-1.0/create-image.sh`:

```
ROOTFS_MODULES_SRC="/home/jtharin/projects/kernel2.6/development/dist/lib/modules/2.6.25.7-kb1"
```

```
/sbin/depmod -a -b build/tmp/rootfs 2.6.25.7-kb1
```

3. Extract the following files in your development directory:

```
various           : korebot-various-1.0.tar.bz2  
kernel and drivers : linux-2.6.25.7-kb1.tar.bz2  
camera driver    : gspcav1-20071224-kb1.tar.bz2
```

4. In `gspcav1-20071224-kb1` directory, execute to compile the camera driver

```
make clean  
make  
make install
```

5. Change directory to `linux-2.6.25.7-kb1` and compile the kernel with the usual commands:

```
make menuconfig (Select <Exit>, if you don't want to customize the kernel)  
make -j3  
make modules_install  
(DO NOT run make install).
```

=> Your kernel has been built.

6. Enter the `ktboot-1.6` directory and modify the Makefile:

```
replace the uncommented line KERNEL = .. by  
KERNEL = $(KTEAM_KERNEL_HOME)
```

and modify the variable "`SDEV = /dev/ttyS0`" to match your serial port connection

7. a) Connect the Korebot to the computer.

b) Edit the script `picocom` in your development directory to match your serial port  
**./picocom**

c) Reboot the KoreBot, then press a key when U-Boot asks for autoboot.

d) Type `Ctrl-y Ctrl-x` to exit `picocom`.

e) Use the following command to upload the kernel:

```
make flashk
```

8. Reboot the Korebot: **reboot**

9. Remove the old modules on the korebot:

```
rm -rf /lib/modules/2.6.*
```

10. Connect the korebot with the usb cable (the module `g_ether` is already in the new kernel) and change it's IP address with the command (the old ip 10.0.0.2/24 does not work anymore):

```
ifconfig usb0 10.0.0.2 netmask 255.255.255.0
```

11. On the computer, edit the script `tx-ssh` in the directory "dist":

```
- replace 2.6.23-kb1 with $KTEAM_KERNEL_VERSION
```

```
- execute it to transfer the modules: ./tx-ssh
```

Remarks: if the file `tx-ssh` is not executable, change its mode with `chmod +x tx-ssh`

12. a) Extract the file `libertas-tools.tar.bz2`

- b) Copy the firmware files of the Wifi G card `libertas-tools/fwcuter/*.fw` (2 files) into `/lib/firmware` on KoreBot as follow:

In the `libertas-tools/fwcuter/` directory, execute the following command to copy the files to the korebot:

```
scp *.fw root@10.0.0.2:/lib/firmware
```

13. Add the two following modules with the following commands to be able to detect automatically the compact flash card:

```
echo pcmcia>>/etc/modules
```

```
echo pxa2xx_cs>>/etc/modules
```

### 3.3 Power-up

- Power up the Korebot (or Khepera 3).
  - ⇒ During the boot of the Korebot, the module is detected and its `libertas/hostap` driver is automatically loaded. Below a part of the boot sequence is depicted (fig. 3.2):

```
...
[ 15.031440] Korebot CF Init
[ 15.034315] korebot_init: skt->irq=77
[ 15.049273] korebot_pcmcia_configure_socket(): Reset off sock 0
[ 15.080672] Korebot CF Init
[ 15.083544] korebot_init: skt->irq=78
[ 15.110448] korebot_pcmcia_configure_socket(): Reset off sock 1
[ 15.220177] korebot_pcmcia_configure_socket(): Reset off sock 0
...
[ 15.630179] korebot_pcmcia_configure_socket(): Reset on sock 0
[ 15.636114] korebot_pcmcia_configure_socket(): Reset off sock 0
...
[ 15.750222] pccard: PCMCIA card inserted into slot 0
...
[ 16.005802] pcmcia: registering new device pcmcia0.0
...
[ 16.350269] ieee80211: 802.11 data/management/control stack, git-1.1.13
[ 16.356988] ieee80211: Copyright (C) 2004-2005 Intel Corporation <jketreno@linux.intel>
...
[ 18.041999] libertas: 00:0e:8e:13:51:c7, fw 5.0.16p0, cap 0x00000303
[ 18.057575] libertas: eth0: Marvell WLAN 802.11 adapter
...
```

**Figure 3.2: part of the boot sequence with module detected**

### 3.4 Usage

Two wireless compact flash types are supported. The card name and its driver are listed below:

- i) Wifi B: Ambicom WL1100C-CF/ Pretec OC-WLBXX-A with `hostap_cs` driver module
- ii) Wifi B/G: Ambicom WL5400G-CF with `libertas_cs` driver module

Remark:

With the ii) *Ambicom WL5400G-CF* model, you have to update your kernel and the driver as described in chapter 3.2.2.

Then you may replace the wireless port name *eth0* by *wlan0* in the following instructions.

- 1) insert a Wireless compact flash card in the Korebot
- 2) load the module by typing: ***modprobe pxa2xx\_cs***

You may load the module automatically by adding `pxa2xx_cs` in the file */etc/modules*.

You can use the following command `echo` to add the module name to the file:  
***echo pxa2xx\_cs >> /etc/modules***

- 3) you can select the network security method of your wireless between:

- i) WEP support

- a) for configuring the wifi connection, type:

***iwconfig eth0 essid YOUR\_SSID\_OF\_NETWORK***

- b) if the network is secured, enter the key by typing :

***iwconfig eth0 key YOUR\_KEY***

- c) then set an ip address to the korebot:

***ifconfig eth0 YOUR\_IP\_ADDRESS***

- d) configure the gateway by entering the gateway ip:

***route add default gw YOUR\_GATEWAY\_IP eth0***

- e) insert the local domain name in */etc/resolv.conf*

***echo search YOUR\_LOCAL\_DOMAIN\_NAME >> /etc/resolv.conf***

- f) and the dns server

***echo nameserver YOUR\_DNS\_SERVER\_IP\_ADDRESS >> /etc/resolv.conf***

You can also create a file in */etc/network/if-pre-up.d* named *wireless* to have these settings saved.

Put the following into it:

```
#!/bin/sh  
ifconfig eth0 up  
iwconfig eth0 essid YOUR_SSID_OF_NETWORK  
iwconfig eth0 key s:YOUR_KEY  
ifconfig eth0 YOUR_IP_ADDRESS  
route add default gw YOUR_GATEWAY_IP eth0
```

And the following in a file named */etc/resolv.conf*:

```
search YOUR_LOCAL_DOMAIN_NAME  
nameserver YOUR_DNS_SERVER_IP_ADDRESS
```

ii) WEP, WPA and other encryptions:

a) create a file named */etc/wpa\_supplicant/wpa\_supplicant.conf* and insert your selected wireless encryption:

WEP:

```
#Shared WEP key connection (no WPA):  
network={  
ssid="YOUR_SSID"  
key_mgmt=NONE  
wep_key0="YOUR_WEP_KEY"  
auth_alg=SHARED  
wep_tx_keyidx=0  
priority=5  
}
```

WPA-TKIP:

- see instructions at:

[http://ftp.k-team.com/korebot/kernel/modules/wpa-tkip/wpa-tkip\\_support.txt](http://ftp.k-team.com/korebot/kernel/modules/wpa-tkip/wpa-tkip_support.txt)

```
#/etc/wpa_supplicant/wpa_supplicant.conf  
with WPA-PSK TKIP:  
network={  
ssid="YOUR_SSID"  
psk="YOUR_PASS_KEY"  
key_mgmt=WPA-PSK  
group=TKIP  
pairwise=TKIP  
proto=WPA  
priority=5  
}
```

You can check the following link for other encryptions:

[http://hostap.epitest.fi/wpa\\_supplicant/](http://hostap.epitest.fi/wpa_supplicant/)

b) run the daemon controlling the wireless connection with the following command:  
***wpa\_supplicant -c /etc/wpa\_supplicant/wpa\_supplicant.conf -i eth0 -Dwext -B***

You can also add the command above to a file  
in */etc/network/if-pre-up.d* named *wireless*:

```
#!/bin/sh  
ifconfig eth0 up  
ifconfig eth0 YOUR_IP_ADDRESS  
route add default gw YOUR_GATEWAY eth0  
wpa_supplicant -c /etc/wpa_supplicant/wpa_supplicant.conf -i eth0 -Dwext -B
```

4) Then you can start using the network for transferring files or data (see Annexes).

## 4 Annexes

---

In this part, the detailed descriptions of helpful commands are explained.

### 4.1 Connecting to the Korebot with network over usb cable

a) launch the usb module on the Korebot:

```
modprobe g_ether
```

b) connect the computer to the Korebot USB slave port with an USB cable

c) configure the usb port on the Korebot:

```
ifconfig usb0 10.0.0.2/24
```

d) on the computer, configure also the usb port (you must be root, or use sudo):

```
ifconfig usb0 10.0.0.1/24
```

### 4.2 Transferring files using scp (ssh)

- 1) Establish a network connection between the computer and the korebot (using Wifi see chapter "Using a Wireless compact flash card", or using Ethernet over usb see chapter "Connecting to the Korebot with network over usb cable")
- 2) Execute the following command, where FILE, is the file to transfer, KOREBOT\_IP the Korebot ip address.

```
scp FILE root@KOREBOT_IP:/home/root
```

## 5 WARRANTY

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K-TEAM warrants that the KoreWifi is free from defects in materials and workmanship and in conformity with the respective specifications of the product for the minimal legal duration, respectively one year from the date of delivery.

Upon discovery of a defect in materials, workmanship or failure to meet the specifications in the Product during the afore mentioned period, Customer must request help on K-Team Internet forum on <http://www.k-team.com/kforum/> by detailing:

- The type of KoreWifi used (version).
- The kernel version of the Korebot.
- The programming environment of the Korebot/robot (standard, version, OS).
- The standard use of Product before the appearance of the problem.
- The description of the problem.

If no answers have been received within two working days, Customer can contact K-TEAM support by phone or by electronic mail with the full reference of its order and KoreWifi serial number.

K-TEAM shall then, at K-TEAM's sole discretion, either repair such Product or replace it with the equivalent product without charging any technical labour fee and repair parts cost to Customer, on the condition that Customer brings such Product to K-TEAM within the period mentioned before. In case of repair or replacement, K-TEAM may own all the parts removed from the defective Product. K-TEAM may use new and/or reconditioned parts made by various manufacturers in performing warranty repairs and replacement of the Product. Even if K-TEAM repairs or replaces the Product, its original warranty term is not extended.

This limited warranty is invalid if the factory-applied serial number has been altered or removed from the Product.

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This limited warranty is non-transferable.

It is likely that the contents of Customer's flash memory will be lost or reformatted in the course of the service and K-TEAM will not be responsible for any damage to or loss of any programs, data or other information stored on any media or any part of the Product serviced hereunder or damage or loss arising from the Product not being available for use before, during or after the period of service provided or any indirect or consequential damages resulting therefore.

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This warranty is limited as set out herein and does not cover, any consumable items (such as batteries) supplied with the Product; any accessory products which is not contained in the Product; cosmetic damages; damage or loss to any software programs, data, or removable storage media; or damage due to (1) acts of God, accident, misuse, abuse, negligence, commercial use or modifications of the Product; (2) improper operation or maintenance of the Product; (3) connection to improper voltage supply; or (4) attempted repair by any party other than a K-TEAM authorized module service facility.

This limited warranty does not apply when the malfunction results from the use of the Product in conjunction with any accessories, products or ancillary or peripheral equipment, or where it is determined by K-Team that there is no fault with the Product itself.



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MOBILE ROBOTICS

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A DIVISION OF  
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