GCtronic
Electronics and Mechatronics
CH – 6900 Lugano

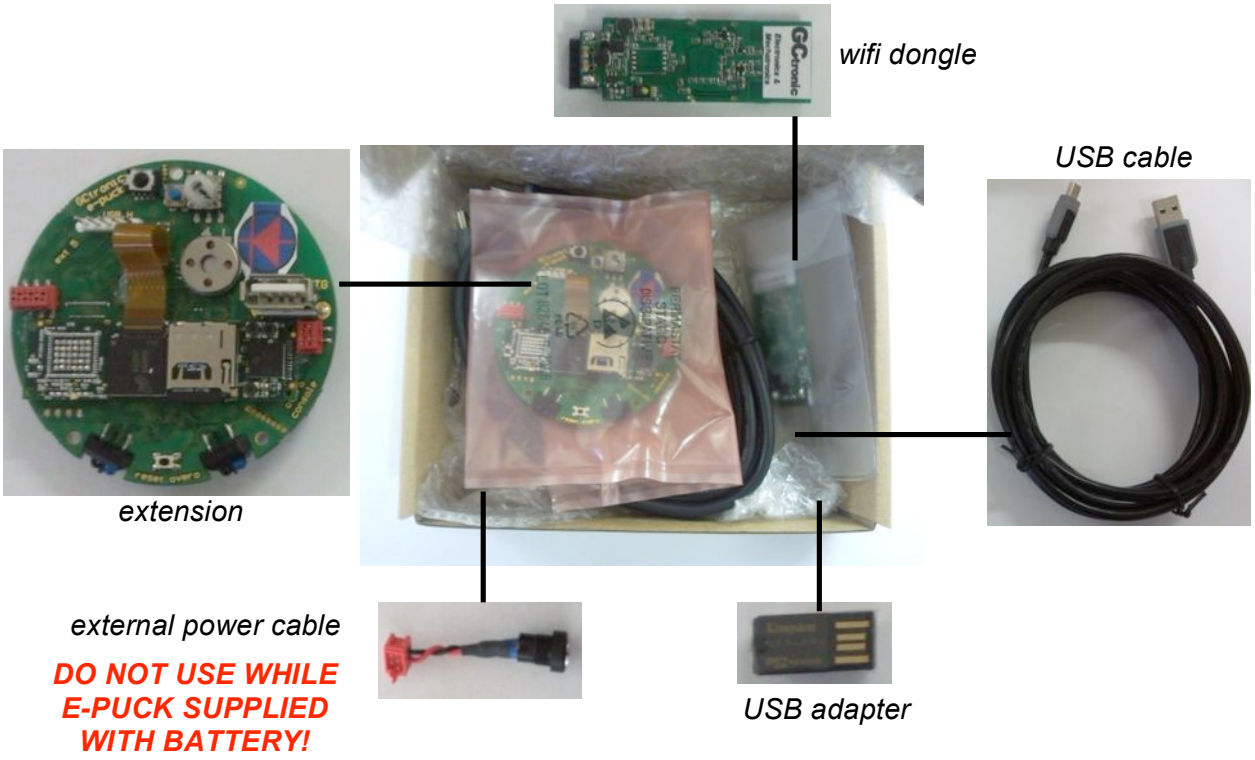
e-puck extension for Gumstix Overo COM

Unpacking and introduction documentation

Package content

The box you received should contain:

- e-puck extension with gumstix overo earth and micro sd card already inserted
- USB wifi dongle
- A to mini-B USB cable, 3 meters long
- USB adapter for the micro sd
- External power adapter cable



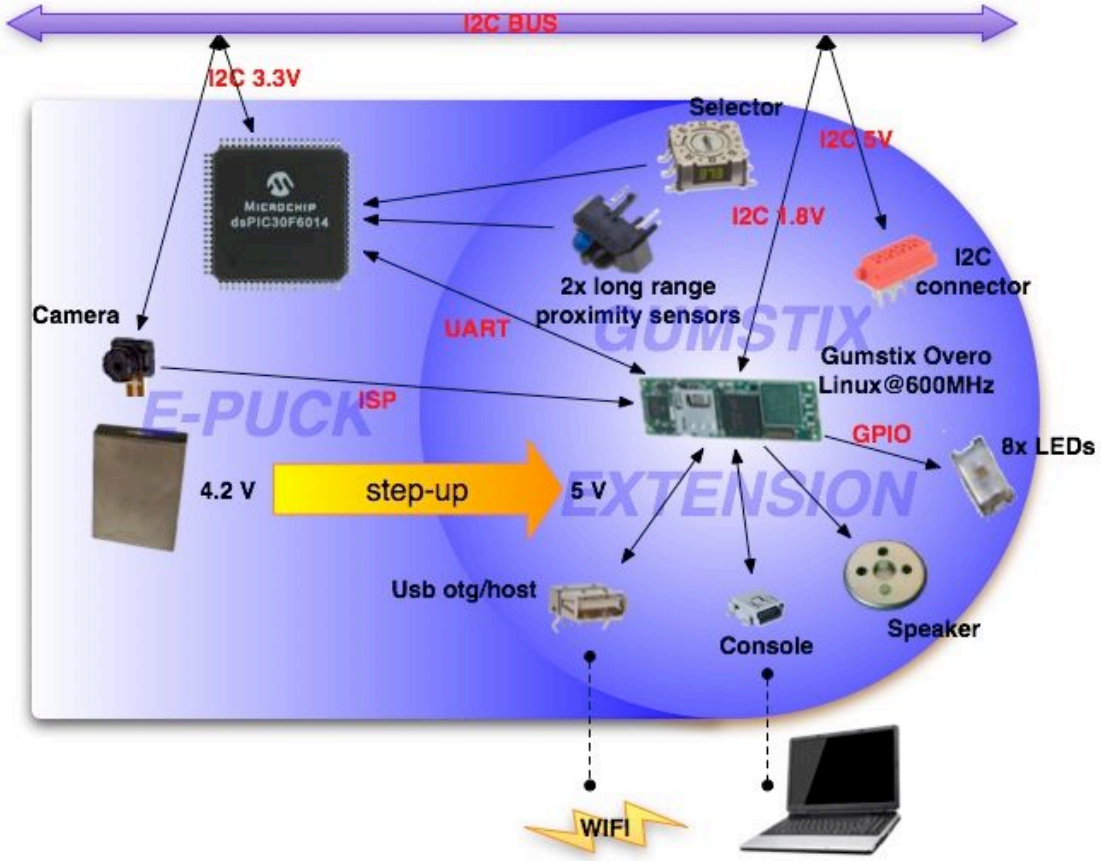
Hardware overview

The following figure shows the main components offered by the e-puck extension for the Gumstix Overo COM and their interconnection with the e-puck robot and the Gumstix Overo COM. In particular there are:

- a Gumstix Overo COMs: compatible with all Gumstix Overo COM models. The communication between the Gumstix Overo COM (OMAP 35xx) and the e-puck (dsPIC) is handled with a serial line at 230400 baud
- a mini-USB connector (console) used to enter the linux system through a terminal
- one USB OTG[1] and one USB host: these two connectors are really useful to connect whatever peripheral you need, like a WiFi dongle or simply a pen drive to extend the memory
- a speaker: with Linux running on the Gumstix Overo COM, it's really easy play any audio format you need or implement a speech synthesizer. If the user prefer to have the speaker on the extension linked to the e-puck processor, it can simply be done changing two small resistors (refer to the wiki page)
- 8 LEDs completely controllable through GPIO[2] lines
- an I2C connector (@5 V)

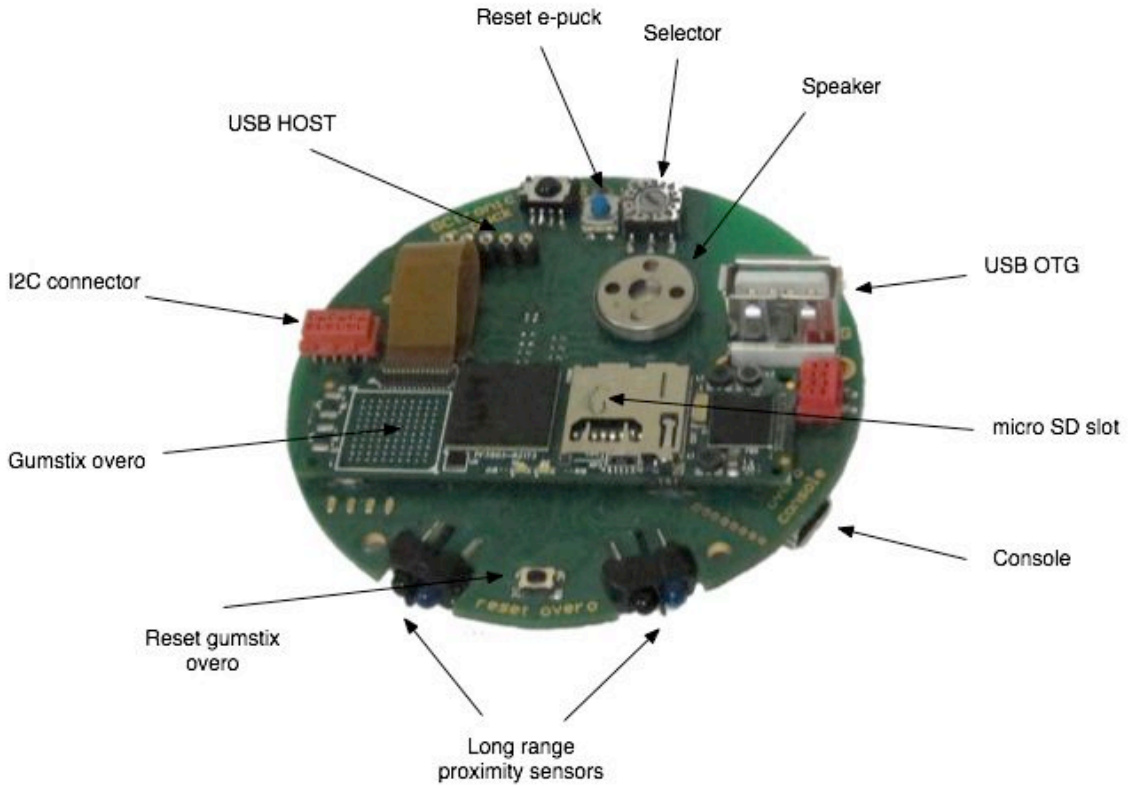
[1] OnTheGo, automatic host or device
[2] General Purpose Input Output

- a rotary selector: one could choose what program is running on the e-puck based on the selector position
- 2 long range infrared proximity sensors
- the PixelPlus PO6030 camera remains mounted on the robot, but you could receive image from it by using the OMAP[3] ISP (Camera Interface Subsystem); this way we can receive up to 18 frames per second (VGA color images)



The following figure illustrates where the components are physically placed on the e-puck extension board for the Gumstix Overo COM.

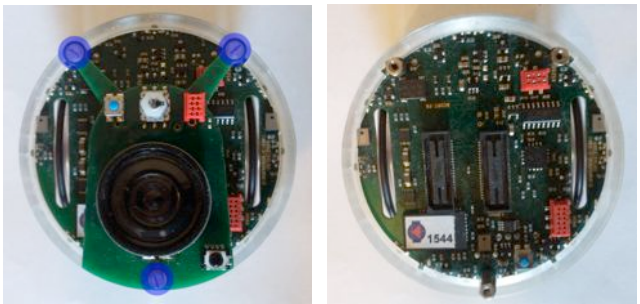
[3] Microprocessor on Gumstix Overo COM



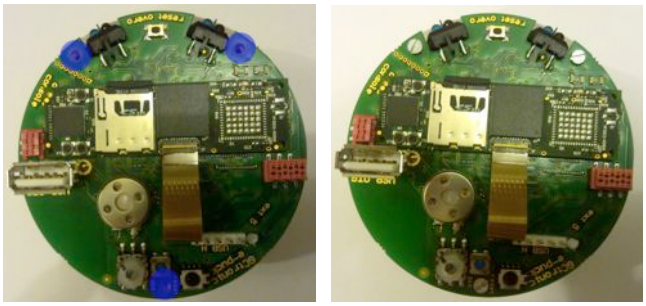
Basic steps: mount the extension and access the linux console

Requirements: the robot communicates with the extension through the RS232 protocol at 230400 baud, for this reason a new firmware must be uploaded in the e-puck; this firmware can be downloaded from the wiki (refer to “Links” section).

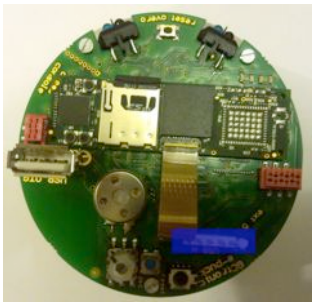
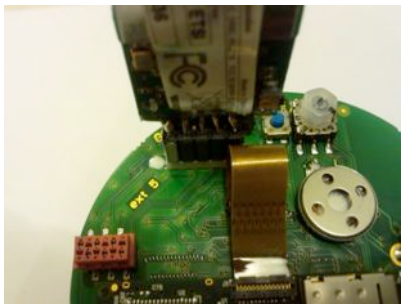
1) Remove the e-jumper module (top side of the robot) by first unscrewing the three screws that fix it:



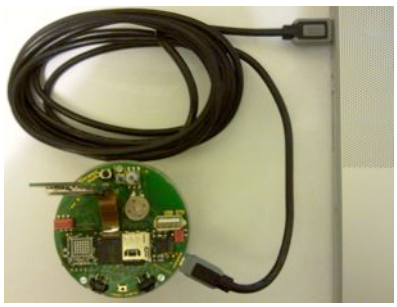
2) Insert the extension on top of the robot, replacing the previously removed e-jumper, and put the three screws on their place to fix the extension to the robot:



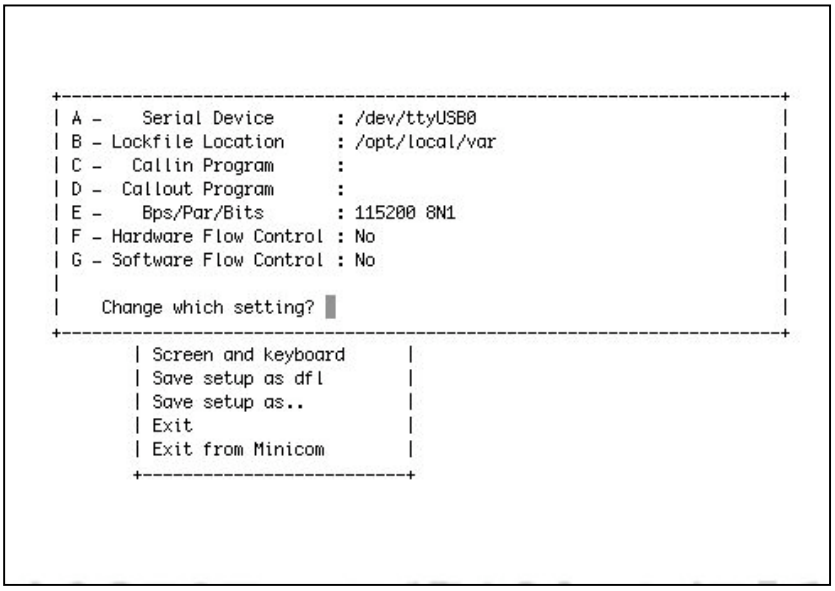
3) Insert the wifi dongle on the white male connector on the extension; the wifi dongle will remain vertical:

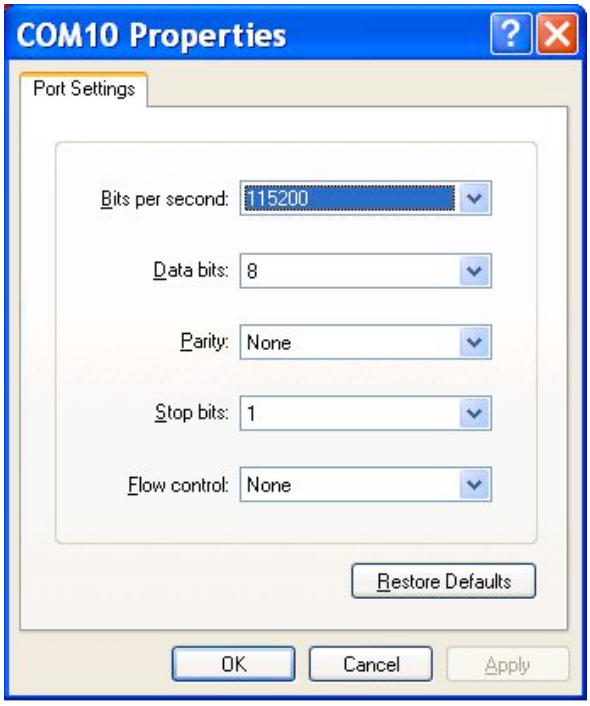



4) Connect the mini-USB into the connector of the extension (near the camera), and the other side of the USB cable into the computer:

5) Open a terminal program (e.g. minicom on Linux or hyperterminal on Windows) and configure the serial connection with 115200 baud, 8 data bits, neither hardware nor software control. The serial device path should be typically something like "/dev/ttyUSB0" on Linux and something like “COM10” on Windows.
To check exactly which port corresponds to the device on Windows you should go under Control Panel ➔ System ➔ Hardware ➔ Device Manager (or Start ➔ run ➔ devmgmt.msc) and look under COM & LPT ports; there should be a virtual serial port that was created when the cable was inserted. Under Linux you could simply use the “ls” command and look under the “/dev/” path which device is created.
The following figures illustrate the minicom and the hyperterminal window setting respectively.





6) Turn on the robot; now the terminal should display the Gumstix Overo booting information (booting time 25-30 seconds):

```
NAND:  256 MiB
In:    serial
Out:   serial
Err:   serial
Die ID #37960002000000000004031c1319019007
Net:   No ethernet found.
Hit any key to stop autoboot:  0
mmc1 is available
reading uImage

2581012 bytes read
## Booting kernel from Legacy Image at 82000000 ...
   Image Name:   Linux-2.6.32
   Image Type:   ARM Linux Kernel Image (uncompressed)
   Data Size:    2580948 Bytes =  2.5 MB
   Load Address: 80008000
   Entry Point:  80008000
   Verifying Checksum ... OK
   Loading Kernel Image ... OK
OK

Starting kernel ...

Uncompressing Linux.....................................................................
```

7) login with user=root, password=root:

```
net.ipv4.conf.default.rp_filter = 1
net.ipv4.conf.all.rp_filter = 1
INIT: Entering runlevel: 5
chown: invalid user: `messagebus'
Starting syslog-ng:.
Starting ntpd: done
Starting syslogd/klogd: done

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The Angstrom Distribution overo ttyS2

Angstrom 2010.4-test-20100504 overo ttyS2

overo login: root
Password:
root@overo:~#
```
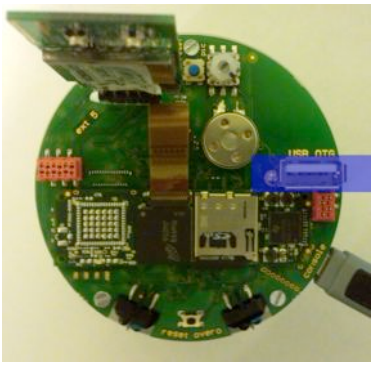
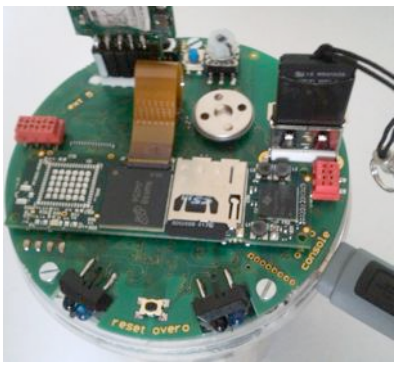

Primary test

Once logged in you can enter /home/root/demos (actually is enough to type the command “cd demos” because you are already in the /home/root directory) and type “./ser” to test the communication between the robot and the onboard computer on the extension (remember that the selector must be in position 10). To check it’s really working you can type “h + enter” and you should receive from the e-puck processor an help menu with the commands you can play on the robot.

External USB device

The extension provides a standard USB connector that could be used to connect whatever device is needed; since it’s a standard connector, in order to attach an external USB device you only need to simply plug in it:





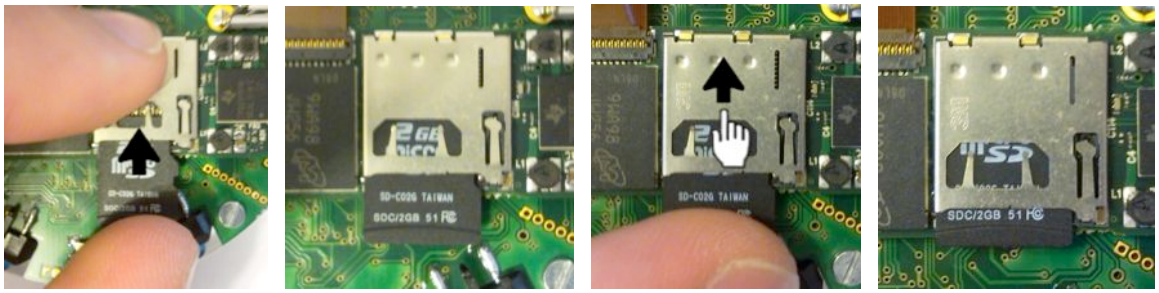
You can then test whether the device was successfully recognized in the system by issueing the command “lsusb” that will display all USB devices attached to the extension:

```
root@overo:~# lsusb
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 002 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 002 Device 002: ID 0586:3417 ZyXEL Communications Corp.
root@overo:~# usb 1-1: new high speed USB device using musb_hdrc and address 2
usb 1-1: New USB device found, idVendor=05e3, idProduct=0715
usb 1-1: New USB device strings: Mfr=3, Product=4, SerialNumber=2
usb 1-1: Product: USB Reader
usb 1-1: Manufacturer: Genesys
usb 1-1: SerialNumber: 000000009407
usb 1-1: rejected 1 configuration due to insufficient available bus power
usb 1-1: no configuration chosen from 1 choice

root@overo:~# lsusb
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 001 Device 002: ID 05e3:0715 Genesys Logic, Inc. USB 2.0 microSD Reader
Bus 002 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 002 Device 002: ID 0586:3417 ZyXEL Communications Corp.
root@overo:~#
```

Micro SD removing/inserting

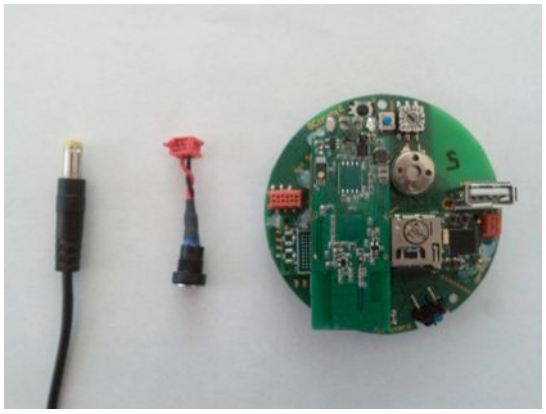
The micro SD can be inserted and removed as you like; there is also a default system on the flash of the Gumstix Overo module, so you can also works without it (pay attention, the system it's not the same contained in the micro SD, so many features are missing). In order to remove the micro SD you first need to push it and then it will be easy to remove it completely:

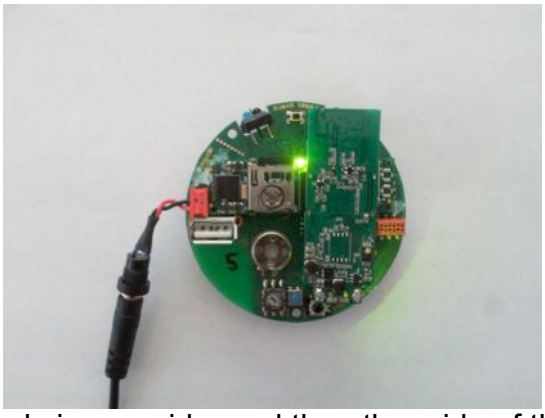
Once the card is removed, it's possible to read and write its content on a computer through the USB adapter. In order to re-insert the micro SD, insert it in its place and push it again:



External power adapter usage

In the package you'll find also an external power adapter that will be useful during development of your applications. As power supply you could use the one of the e-puck battery charger. The following figure (left) shows the power supply cable, the external power cable and the extension.





You need to simply attach the power supply in one side, and the other side of the external power cable on top of the extension (near the USB plug). Once the cable is connected a green led should turn on indicating that the extension is running, as shown in the previous figure (right).
The external power cable could also be plugged in when the extension is mounted on the e-puck, but **pay attention to not turn on the robot when the external cable supplies the energy, otherwise there could be serious damages of the devices and the battery**.

Warning

Don't remove the flex ribbon cable that connects the Gumstix Overo with the extension and try to avoid touching it as much as possible. Moreover the extension is thought to be used with the Gumstix Overo Earth already inserted in it, so avoid to change it in order to preserve its pins.

Links

http://www.gctronic.com/doc/index.php/Overo_Extension
http://www.gumstix.net/
http://www.e-puck.org/

Contact information

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