e-puck2 Mini Doc (Ver. 2.0)

EPFL educational and research mini mobile robot

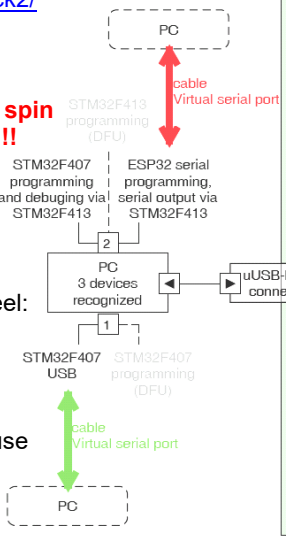
e-puck2 is the latest mini mobile robot developed by GCtronic and the Swiss Federal Institute of Technology in Lausanne (EPFL). This is an evolution of the successful e-puck robot used in many research and educational institutes. Now with WiFi and USB link & charge. e-puck2 is compatible with its predecessor but is powered by an STM32F4 microcontroller and features a larger number of sensors: IR proximity, sound I/O, 9x IMU, ToF distance sensor, camera, uSD storage. The e-puck2 hardware and software is fully open source giving low-level access to every electronic device and offering unlimited extension possibilities. A flourishing user community provides software, documentation and discussion groups. The robot is a full system with USB hub, debugger/programmer, WiFi module.

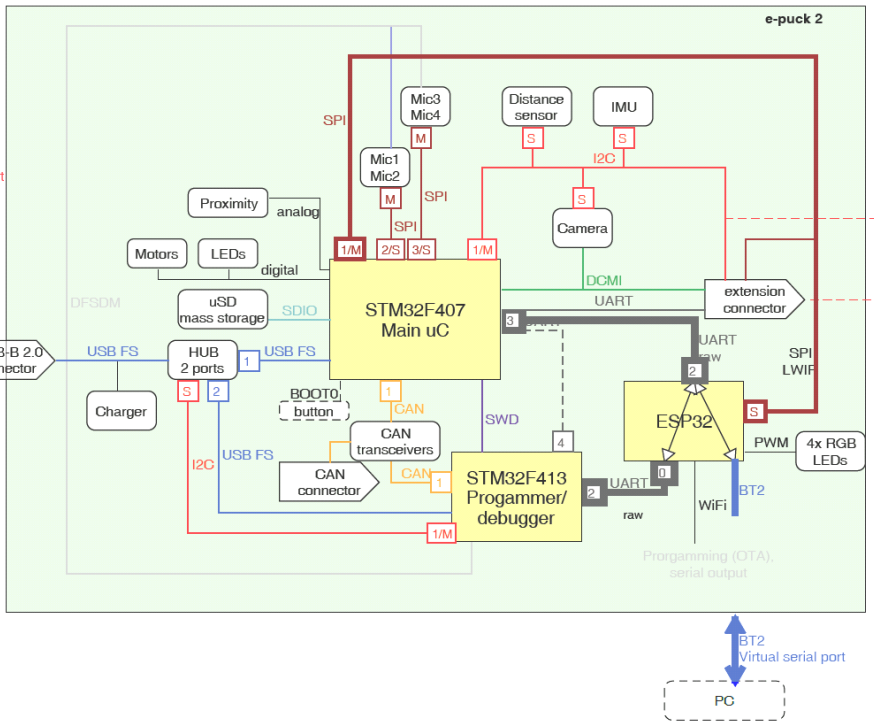
Documentation and SW:
www.gctronic.com/doc/index.php/e-puck2
https://github.com//e-puck2/
www.e-puck2.org

WARNING !
!! Forcing the wheel to spin will damage the motor !!

ON - OFF
- short => ON
- long (~1s) => OFF
Use the blue button below near the right wheel:

USB CHARGE
Top **OR** side µSB
The 2 connectors share the same lines. Please use only one at a time.





First BT connection
Start with the robot OFF
Push esp32 button **AND** turn ON.
3 serial port created on PC. Use “UART”.

USB connection
Inserting the USB cable creates 2 ports to the programmer and (if ON) a port to the main processor.
Drivers and procedure on the wiki.

PROGRAMMING
To program in C the robot, you can use the Eclipse IDE prepared for e-puck2. With the IDE you edit, compile, debug, program.
- Eclipse IDE: links on the wiki for Windows, Mac OS, Linux
Without the IDE you can upload standard precompiled program with batch files. Links on the wiki

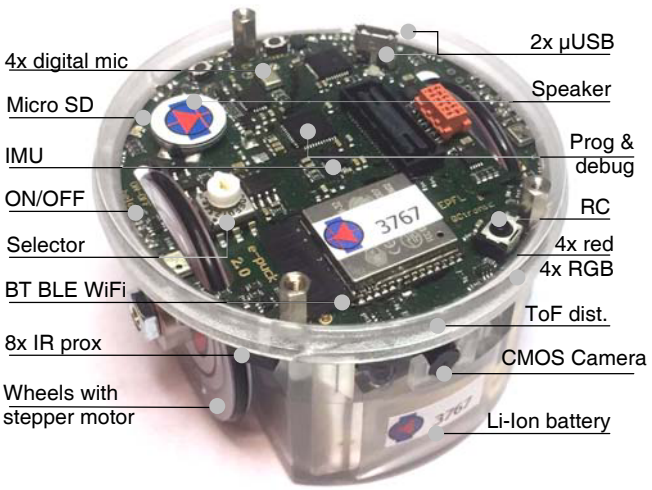
MONITOR
With the e-puck2 monitor you can see all the robot sensors and pilot it. You can link with USB or wireless.

SIMULATION
Webots supports e-puck2 for simulation and remote controlling. The sensors are well modeled in 3D and physics is simulated. To crosscompile and download, simple commands are available. For the first demos, you can download the evaluation version (free) of Webots. With the EDU version (~320 CHF) you can reprogram the simulated robot and remote control the real robot.
www.cyberbotics.com/products/webots/download.html

EXAMPLE CODE
Several demos are pre-programmed on the delivered robot. Also available on the wiki. Move the mode selector and push reset to start several demos, activating reactions from acceleration or sound; run obstacle avoidance; communicate with a host PC to show all the sensors data including VGA camera.

The embedded software running on the e-puck is continuously extended and managed under github. A snapshot is available.

ROBOT VERSIONS
e-puck2 is available since January 2018. Most scenarios and demos are compatible with the previous version. The libraries handle the use of the evolved actuators and sensors.



LICENSE

e-puck2 Robot
Open Source Hardware License Version 2.0

January 2018

Preamble

This Open Source Hardware License aims at the dissemination of the specifications necessary to build the e-puck2 robot, a mobile robot developed by GCtronic Sagl, Lugano and the Ecole Polytechnique Fédérale de Lausanne ("EPFL"), Switzerland.

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"License" shall mean this Open Source Hardware License.
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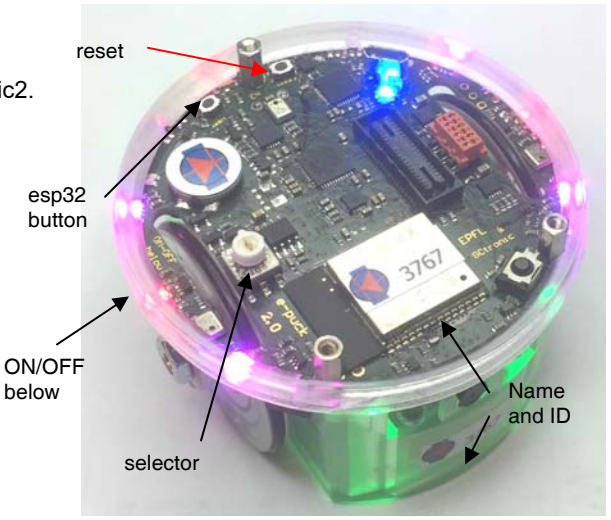
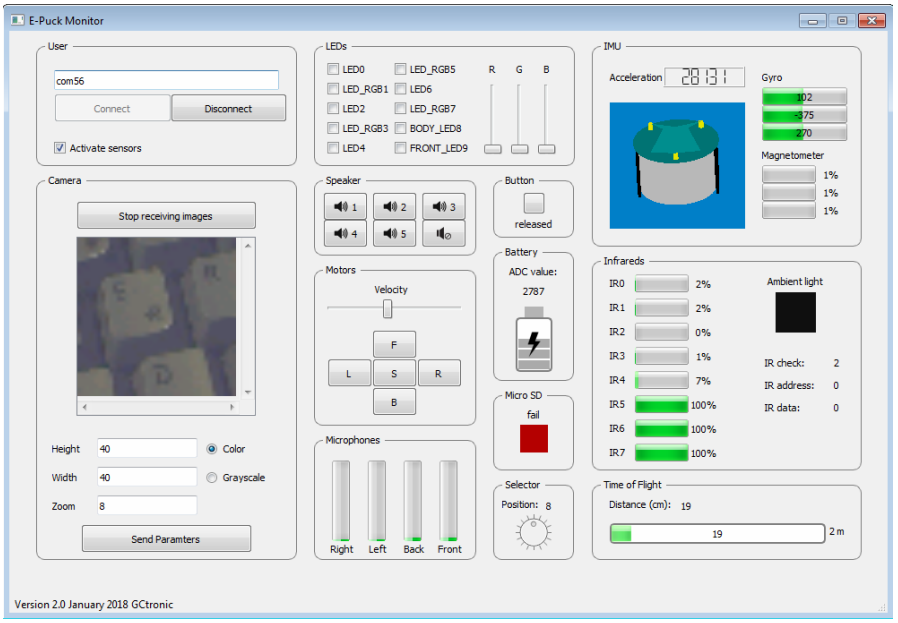
First test after unpacking



The e-puck2 robot comes with a set of demos preinstalled called demoGCtronic2. Also available at GCtronic web site www.gctronic.com/e-puck2.php
Moving the mode selector and pushing on the small reset button, it's possible to activate different sub programs:
3) Communicate using Bluetooth with a host PC to show all the sensors data including VGA camera.
8) Same but with the USB cable and another virtual serial port
B) Obstacle avoidance, LED and sound show
C) Fix forward speed (150) and LED show
D) Reactions from accelerometer

Apart the Bluetooth demo (3), the others do not require any else than the robot itself and make use of most of the sensors and actuators on the robot base.
To communicate via **Bluetooth** the computer and the robot must be "paired". Each e-puck2 has a name (e-puck2_XXXXX) and the PIN code is 0000. XXXXX is the number written on the body and on top of the BT/WiFi module. On the nearby figure XXXXX is 3767.
The steps are:
- for the first pairing, keep pushed the esp32 button and power on the robot.
- run a search of new Bluetooth devices from the PC.
- choose the e-puck2_XXXXX device where XXXXX is the number of your e-puck2.
- depending on your OS you might be asked to enter the PIN.
- 3 virtual serial ports are created. Use the one called "UART" to link the main processor.
- once paired, next time no step is required.

Any terminal program can be used and typing 'H' 'enter' the help menu is written on the screen. The **e-puck monitor** (also on www.gctronic.com) is an example interface (nearby figure) using the communication protocol called Asercom to access all the sensors and actuators of the robot.



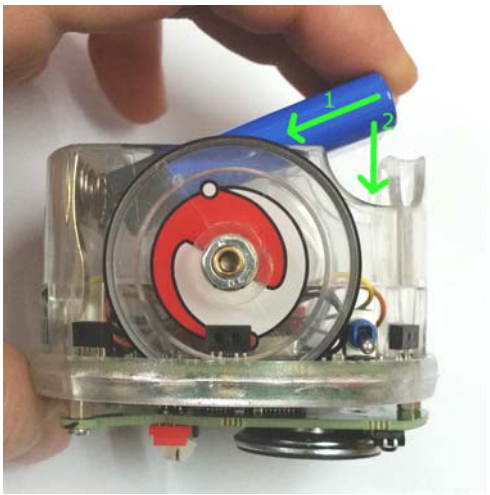
Monitor interface on PC showing all sensors and allowing control of actuators

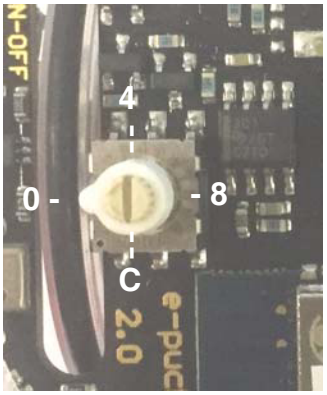
Charging the battery

You can charge the battery in the robot via USB or externally. To charge externally, pull the battery out from the robot frame and install it on the charger board.
Be careful with the positive terminal of the battery (the one with the black plastic). Avoid scratching it. Instead, fully compress the springs on the opposite side while managing it.

Battery in the charger

Compress the springs pushing the battery





Mode selector with 16 positions

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