

Projet

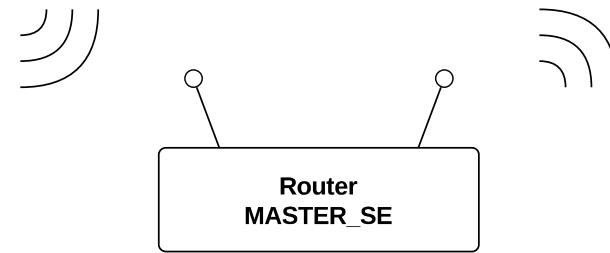
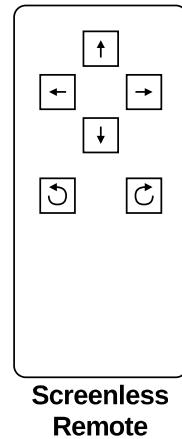
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MASTER 1

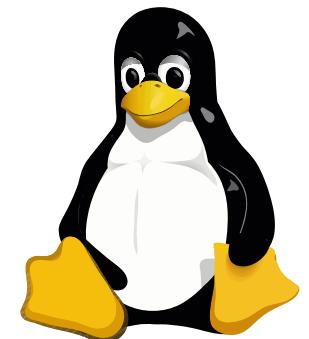
Sommaire

- Cahier des charges
- Hardware
- Middleware

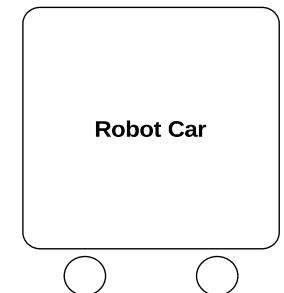
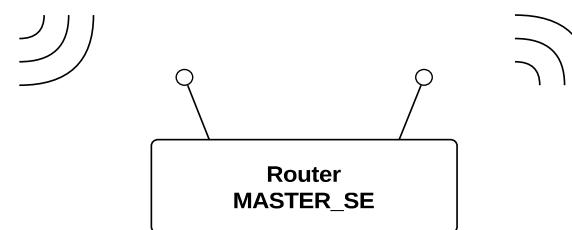
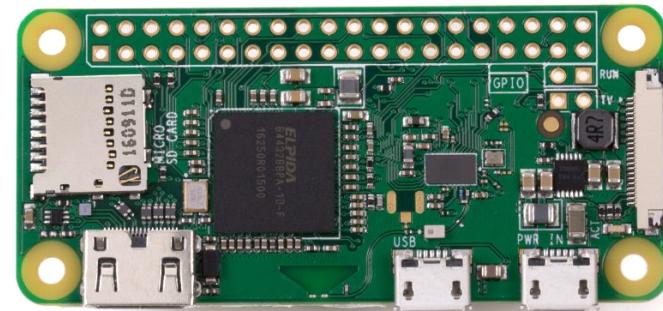
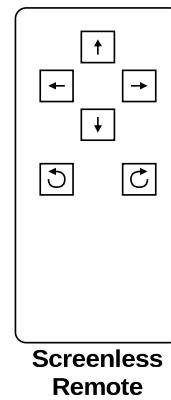
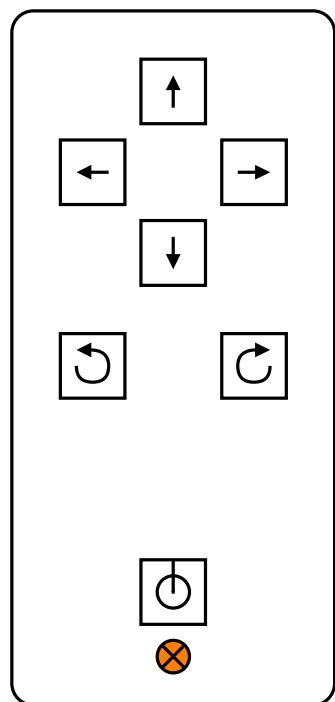
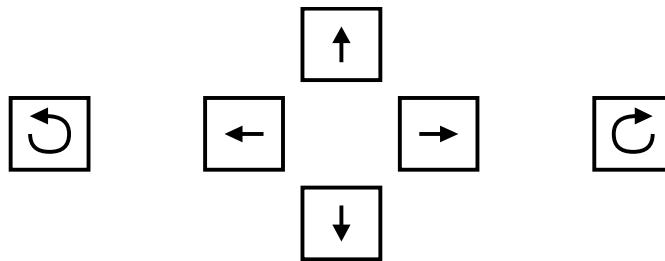
Cahier des charges



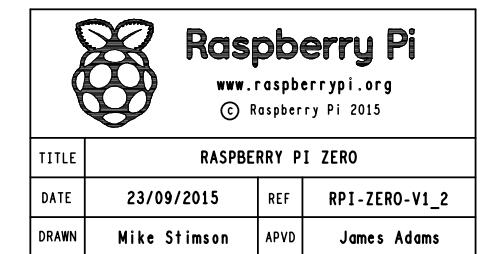
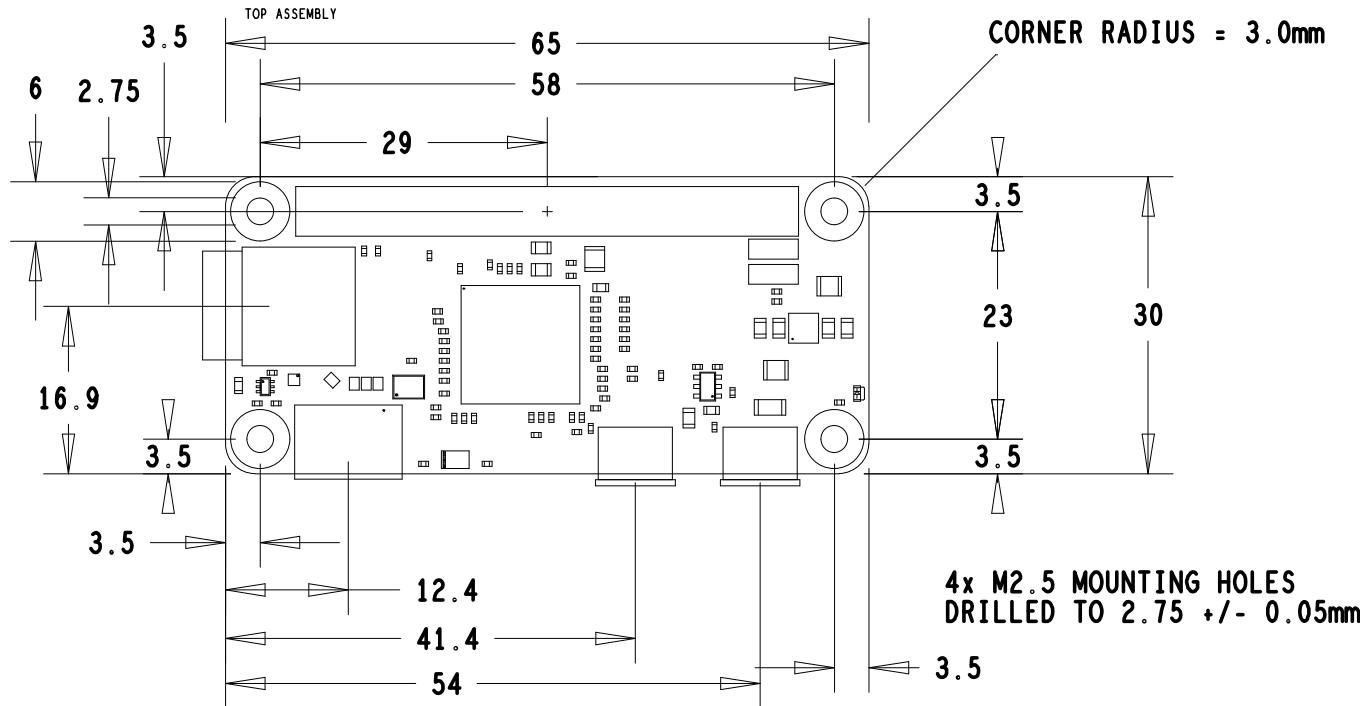
- Wifi
- Raspberry Pi 0 W
- + Télécommande sans écran
- + Mode autonome



Hardware

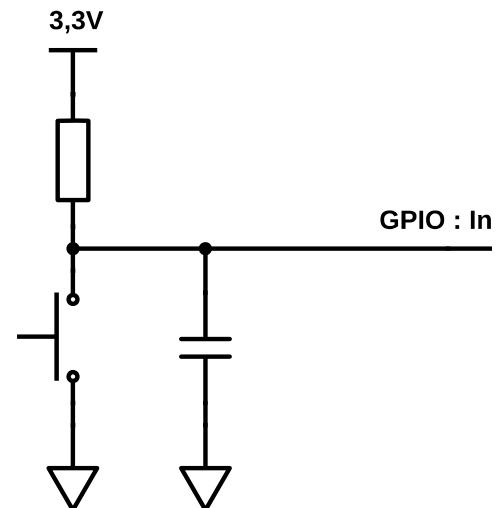
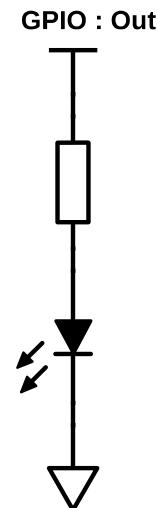
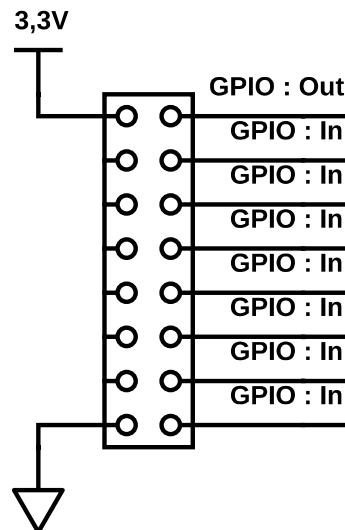
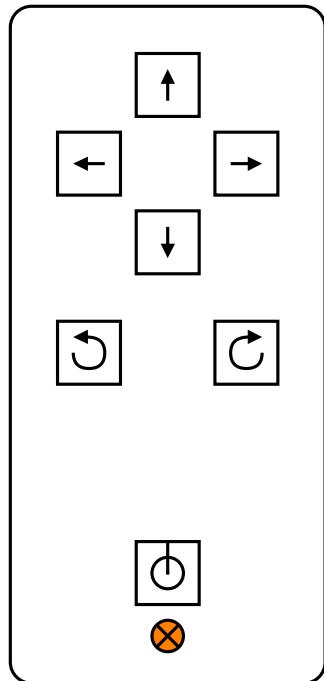


Hardware

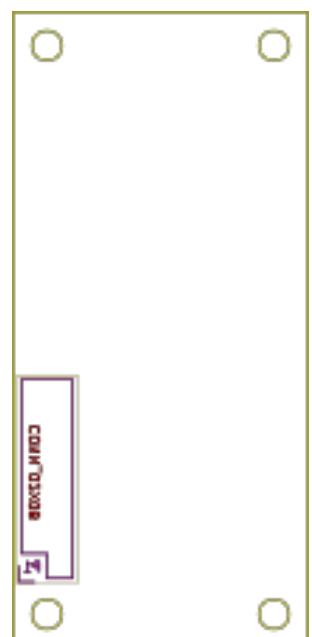
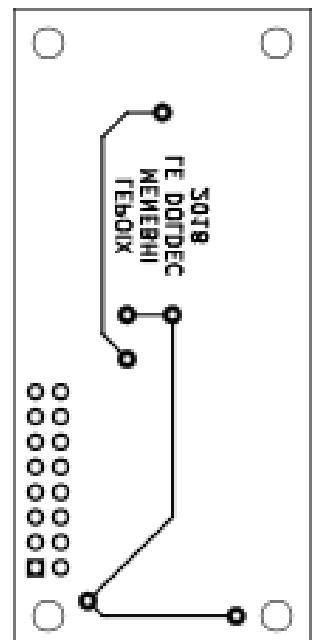
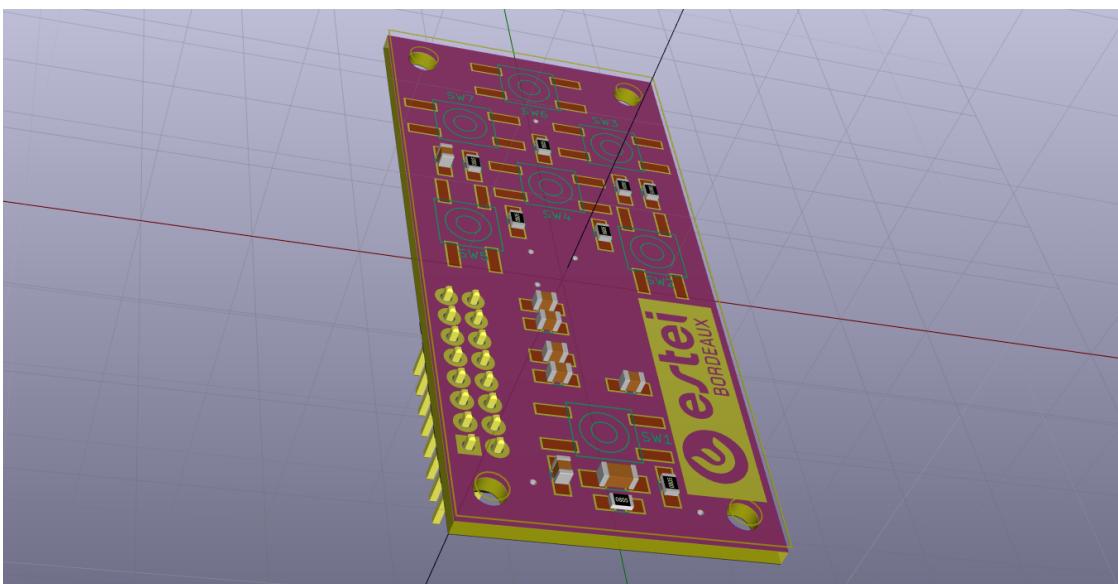
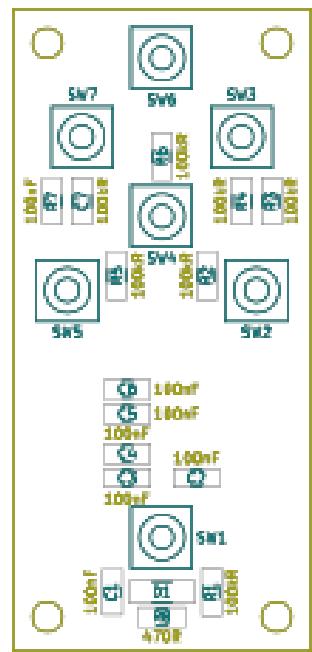
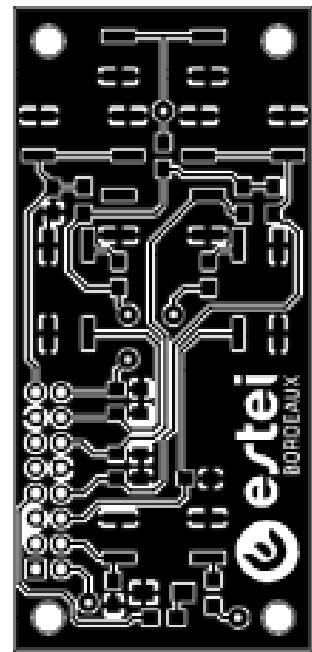
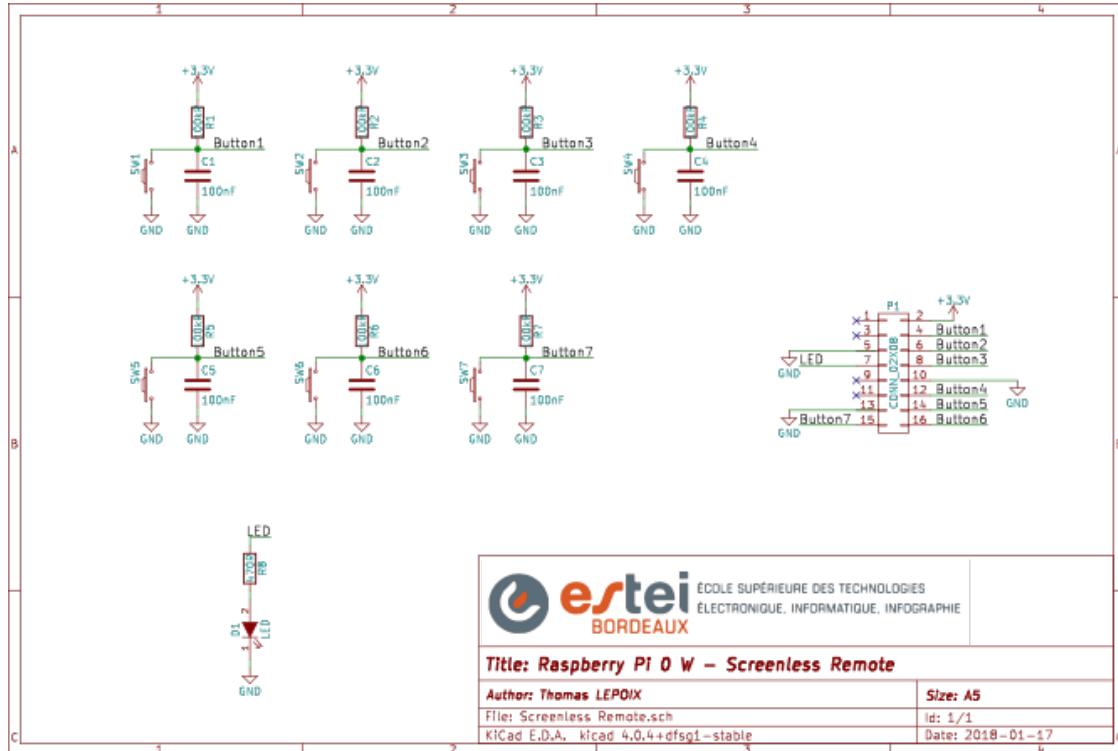


- Dimensions
- Trous
- Connecteur

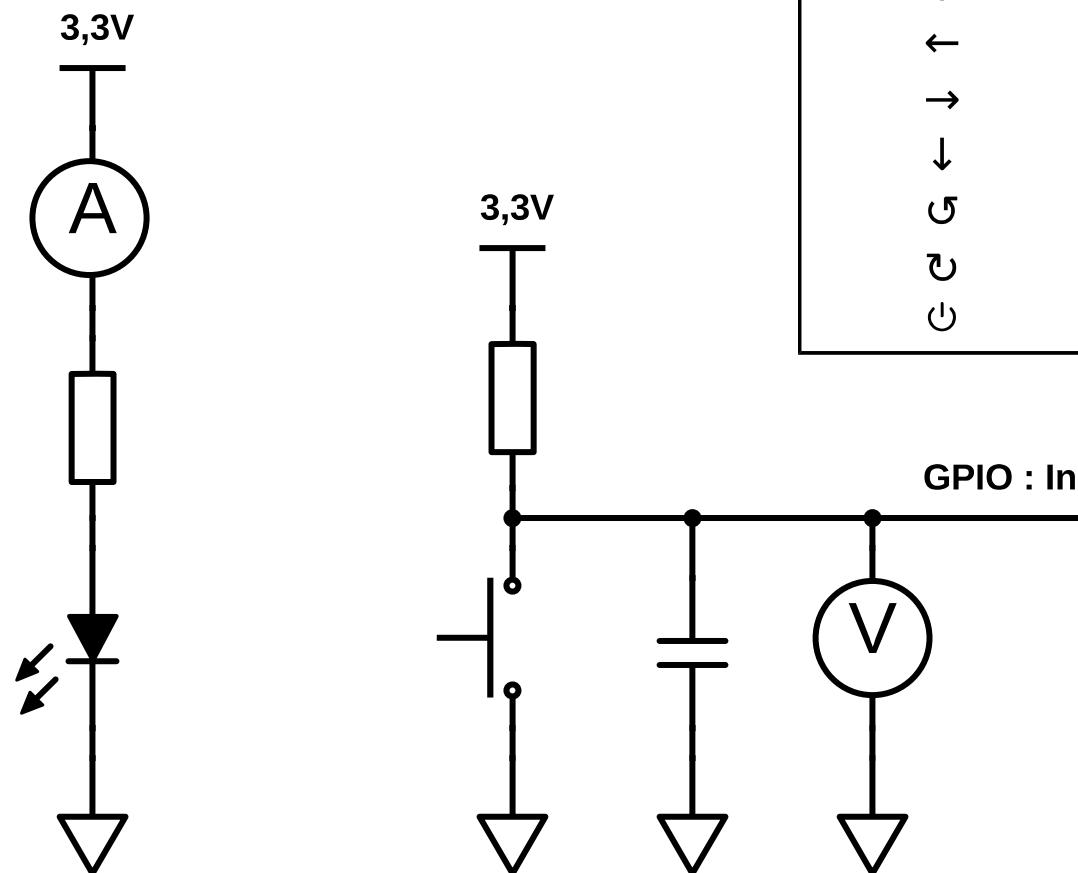
Hardware



- $\text{GPIO } I_{\max} = 16\text{mA}$
- $I_{\text{LED}} = 1,38\text{mA}$



Hardware recette



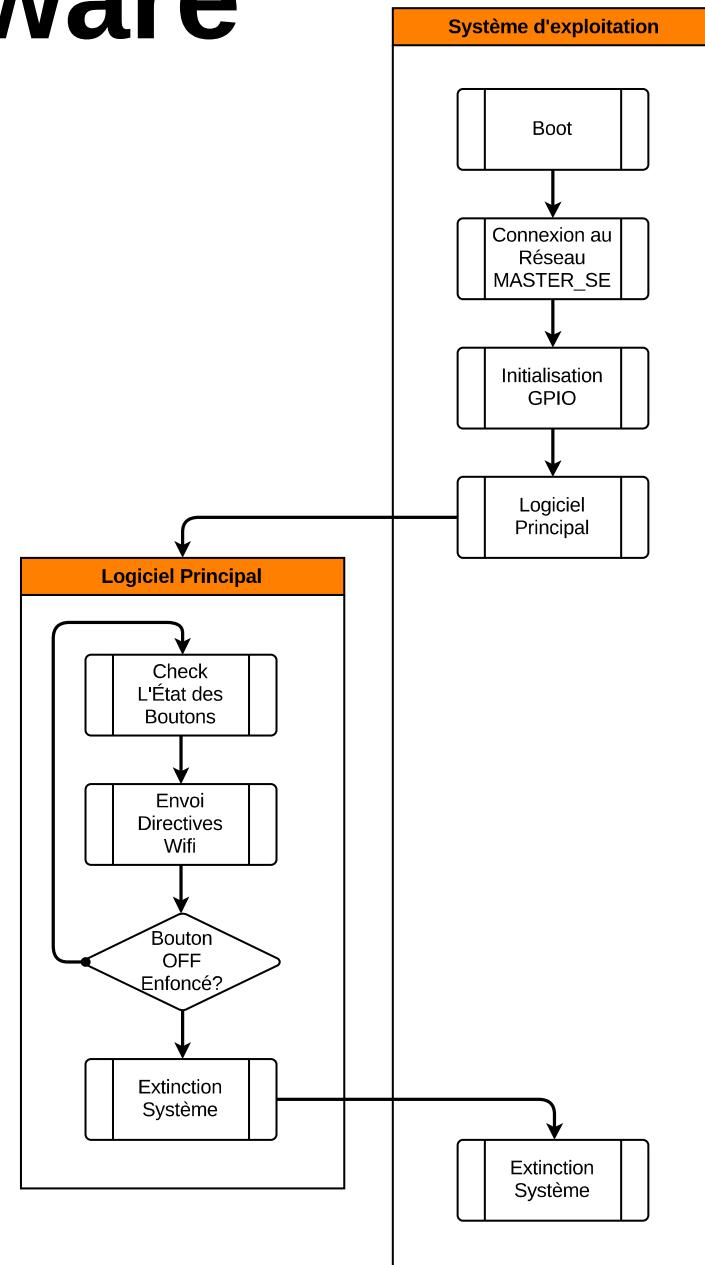
Bouton	V _{in} (V)	V _{out↑} (V)	V _{out↓} (mV)
↑	3,35	3,3	0,4
←	3,35	3,3	0,4
→	3,35	3,3	0,4
↓	3,35	3,3	0,4
↶	3,35	3,3	0,4
↷	3,35	3,3	0,4
⟲	3,35	3,3	0,4

Logique	CMOS (V)
0	0 – 1,1
1	2,2 – 3,3

- $V_{in}=3,35V$
- $I_{LED}=1,51mA$

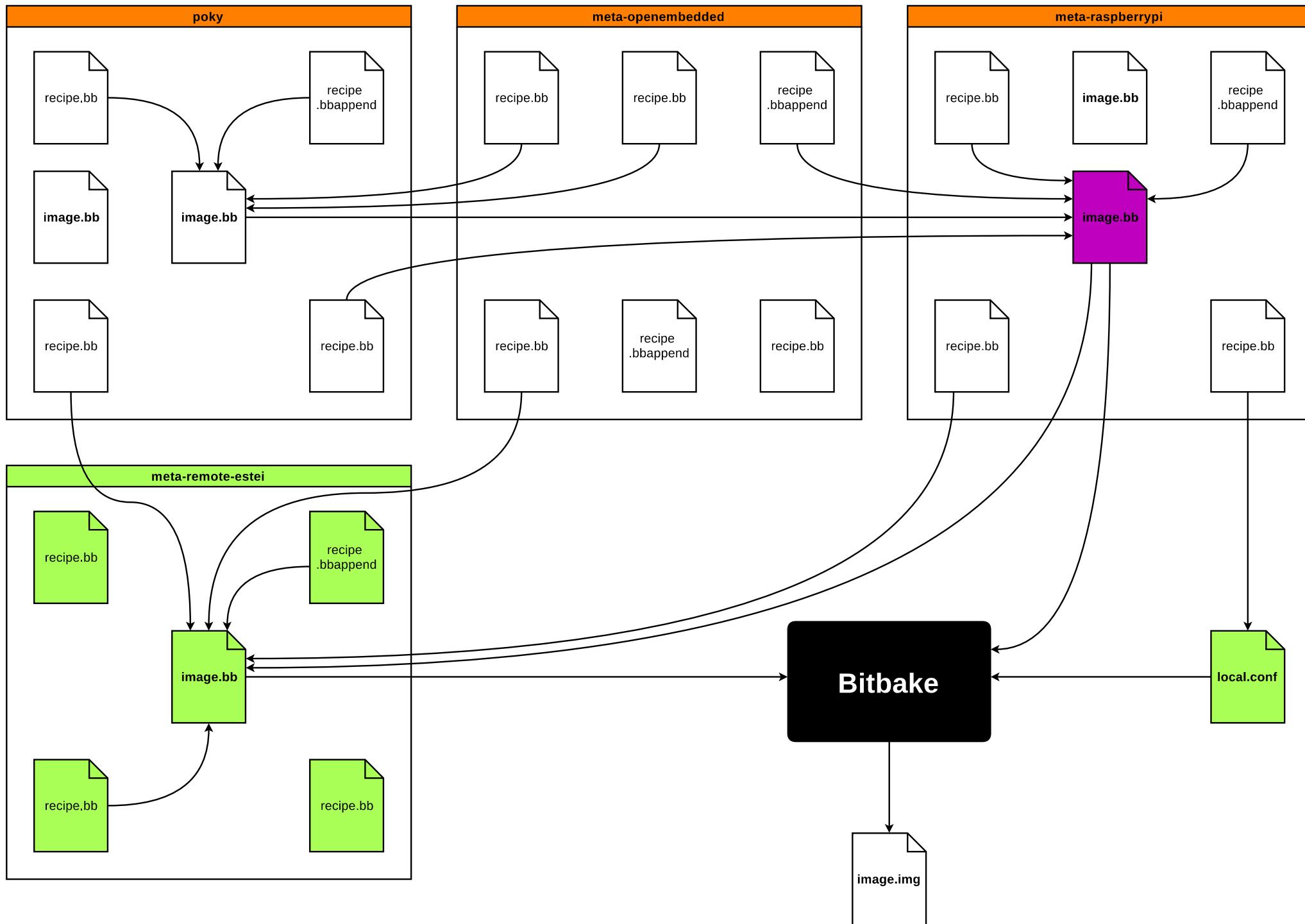
Middleware

- Programme principal par Taha & Thibaud



L'outil Yocto

- Création de distributions Linux
- Poky
- OpenEmbedded
- Bitbake
 - Recipe
 - recipe.bb
 - Recipe-image
 - Layer
 - Meta-layer-name/



Meta-remote-estei

- GPIO Init
- Connexion à MASTER_SE
- Programme principal
- Splash screen



```
ernie@E5-575: ~/yocto/sources/meta-remote-estei$ tree
.
├── conf
│   └── layer.conf
├── recipes-connectivity
│   ├── init-ifupdown
│   │   ├── files
│   │   │   └── interfaces
│   │   │       └── init-ifupdown_%.bbappend
│   │   └── resetnet
│   │       ├── files
│   │   │   └── resetnet.sh
│   │   └── resetnet.bb
│   └── wpa-supplicant
│       ├── wpa-supplicant
│       │   └── wpa_supplicant.conf-sane
│       └── wpa_supplicant_%.bbappend
├── recipes-core
│   └── images
│       └── screenless-remote-image.bb
├── recipes-estei
│   ├── base-files
│   │   ├── base-files_%.bbappend
│   │   └── files
│   │       ├── motd
│   │       └── motd.tmp
│   └── psplash
│       ├── files
│       │   └── psplash-poky-img.h
│       └── psplash_git.bbappend
└── sysvinit
    └── sysvinit-inittab_%.bbappend
recipes-project
└── helloworld
    ├── files
    │   ├── helloworld.pro
    │   └── helloworld.sh
    └── main.cpp
init-gpio
└── files
    └── init-gpio.sh
    └── init-gpio.bb
remote
└── files
    ├── main.cpp
    ├── MyTcpSocket.cpp
    └── MyTcpSocket.h
    └── remote.pro
    └── remote.sh
    └── remote.bb

23 directories, 26 files
```

Initialisation

- SysVinit
- Daemons
- Init-gpio
- Resetnet
- Helloworld
- Remote

```
● hernie@E5-575: ~/yocto/sources/meta-remote-estei
Fichier Édition Affichage Rechercher Terminal Aide
hernie@E5-575:~/yocto/sources/meta-remote-estei$ head recipes-project/
helloworld/files/helloworld.sh
#!/bin/sh
### BEGIN INIT INFO
# Provides:          helloworld
# Required-Start:    $remote_fs $syslog
# Required-Stop:     $remote_fs $syslog
# Default-Start:    5
# Default-Stop:     0 1 6
# Short-Description: Helloworld test
## END INIT INFO
```

```
● ernie@E5-575: ~/Documents/ESTEI/M1/Projet/yocto/rpi-estei-b
Fichier Édition Affichage Rechercher Terminal Aide
hernie@E5-575:~/Documents/ESTEI/M1/Projet/yocto/rpi-estei-build/tmp
/work/raspberrypi0_wifi-poky-linux-gnueabi/start-basic-image/1.0-r0
/rootfs$ tree etc/rc5.d/
etc/rc5.d/
├── S01networking -> ../init.d/networking
├── S02dbus-1 -> ../init.d/dbus-1
├── S10dropbear -> ../init.d/dropbear
├── S15mountnfs.sh -> ../init.d/mountnfs.sh
├── S20hostapd -> ../init.d/hostapd
└── S20syslog -> ../init.d/syslog
S97init-gpio -> ../init.d/init-gpio
S98resetnet -> ../init.d/resetnet
S99helloworld -> ../init.d/helloworld
S99rmnologin.sh -> ../init.d/rmnologin.sh
S99stop-bootlog -> ../init.d/stop-bootlogd

0 directories, 11 files
```

Init-GPIO

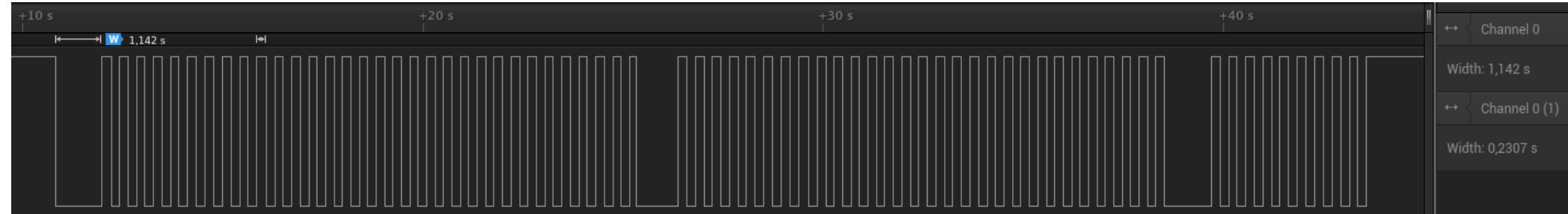
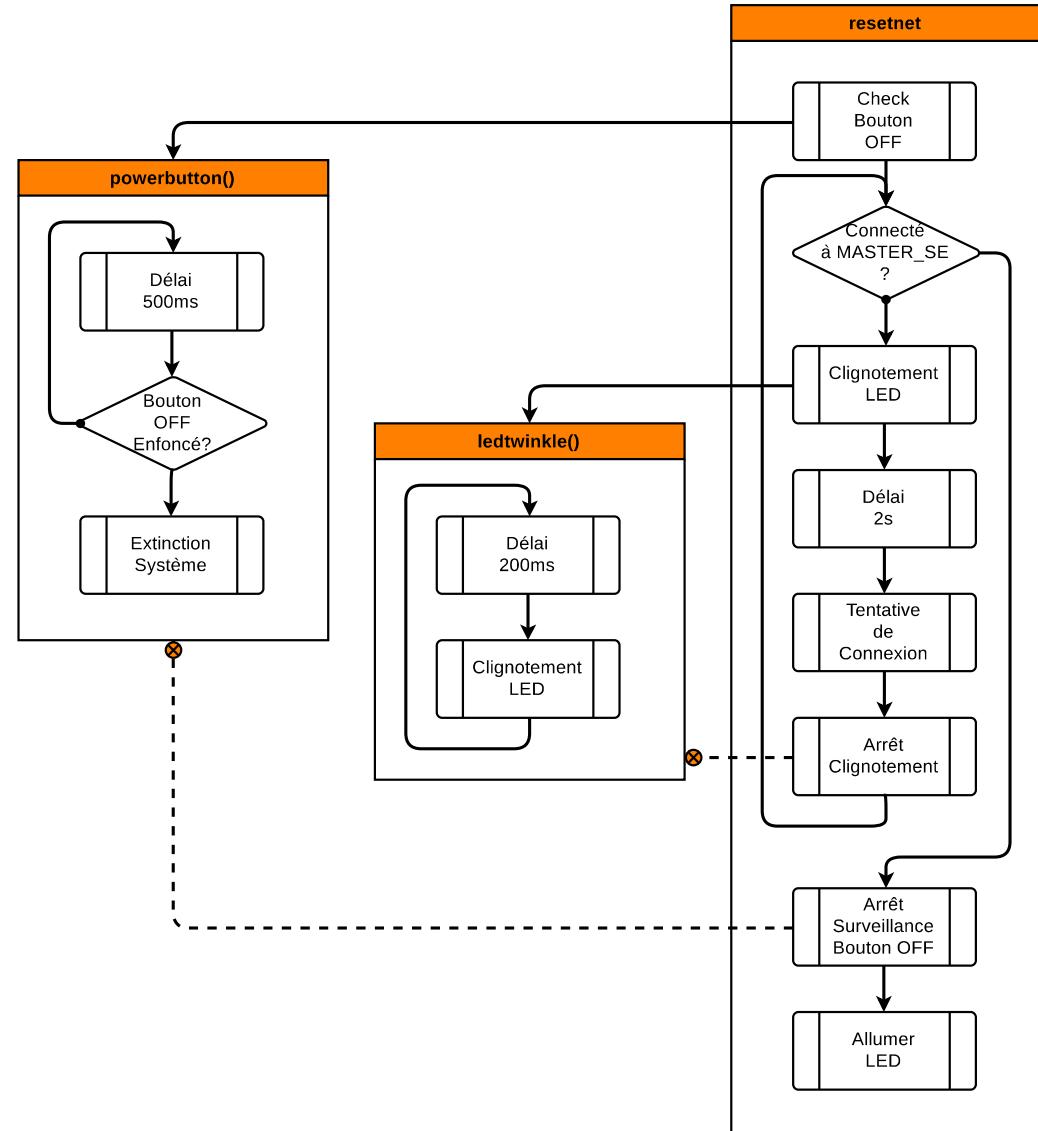
- /sys/class/gpio/{export,unexport}
- /sys/class/gpio/gpio1/{direction,value}

```
root@estei:/sys/class/gpio# 
> for i in `ls | grep "gpio[0-9digit:]"`;
>   do
>     echo -n "$i : "
>     cat "$i/direction"
>   done
gpio14 : out
gpio17 : in
gpio2 : in
gpio22 : in
gpio23 : in
gpio27 : in
gpio3 : in
gpio4 : in
root@estei:/sys/class/gpio#
```

GPIO	Fonction
2	⊕
3	⊖
4	→
14	LED
17	↓
22	↑
23	←
27	↺

Wifi

- wpa_supplicant
- Init-ifupdown
- Resetnet



Helloworld

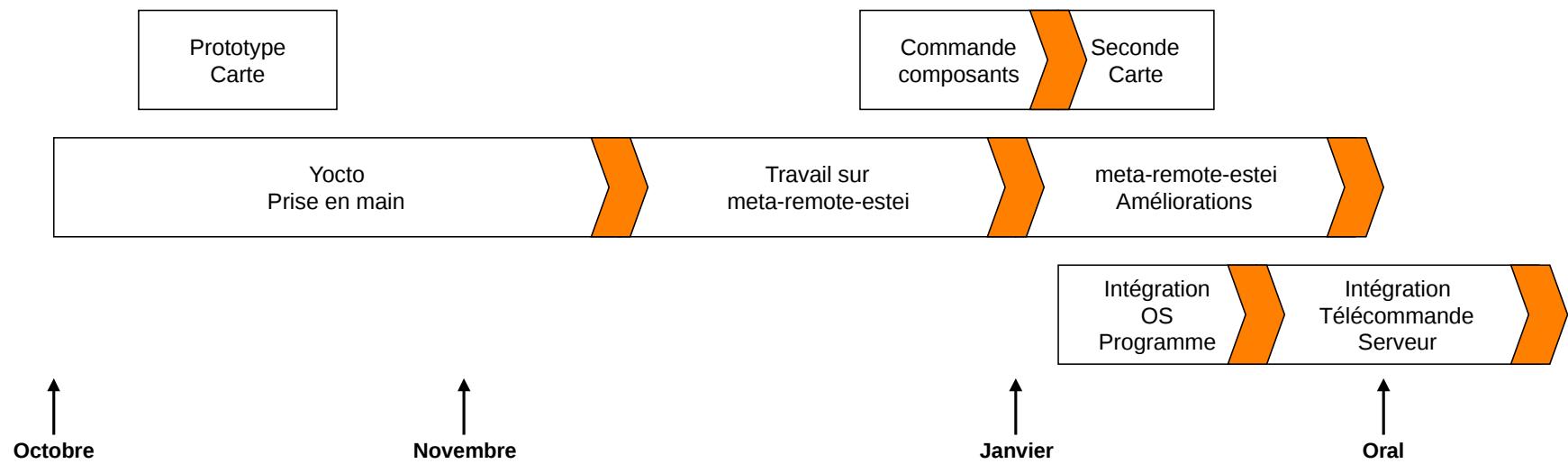
```
helloworld : TEST MESSAGE
```

- TTY1 : Prompt
- TTY2 : Remote
- TTY3 : Helloworld

```
INIT: version 2.88 booting
Starting udev
udev: Not using udev cache because of changes detected in the following files:
udev: /proc/version /proc/cmdline /proc/devices
udev: lib/udev/rules.d/* etc/udev/rules.d/*
udev: The udev cache will be regenerated. To identify the detected changes,
udev: compare the cached sysconf at /etc/udev/cache.data
udev: against the current sysconf at /dev/shm/udev.cache
Populating dev cache
Thu Mar 1 23:49:41 UTC 2018
INIT: Entering runlevel: 5
Configuring network interfaces... Successfully initialized wpa_supplicant
udhcpc (v1.24.1) started
  Sending discover...
  Sending discover...
  Sending discover...
  No lease, forking to background
done.
Starting system message bus: dbus.
Starting Dropbear SSH server: dropbear
Starting HOSTAP Daemon: Configuration file: /etc/hostapd.conf
Failed to create interface mon.wlan0: -95 (Operation not supported)
wlan0: Could not connect to kernel driver
Using interface wlan0 with hwaddr b8:27:eb:44:86:da and ssid "test"
wlan0: interface state UNINITIALIZED->ENABLED
wlan0: AP-ENABLED
hostapd.
Starting syslogd/klogd: done
Setting GPIO... Done
Starting Test program : helloworld... Done
Poky (Yocto Project Reference Distro) 2.3.2 estei /dev/tty1
estei login: root
Password:
=ESTEI=
root@estei:~#
```

- Device tree
 - Interruptions
 - Mises à jour

Conclusion



Composant	Valeur	Ref Constructeur	Ref FARNELL	Quantité	Prix unitaire HT (€)	Prix total HT (€)
Header	2x8 ; 2,54mm ; 7mm	76342-308LF	1098053	1	1,58	1,58
Bouton poussoir	Off – (On)	KSC521GR0HS	2320052	7	0,446	3,122
R	470Ω ; 0805	MCWR08X4700FTL	2447662	10	0,0068	0,068
R	100kΩ ; 0805	CR0805-FX-1003ELF	2333538	10	0,0392	0,392
C	100nF ; 0805	CC0805KRX7R9BB104	3019949	10	0,0463	0,463
LED	Vert ; 2mA	KPT-3216LVZGCK	2610424	1	0,316	0,316
					Prix total HT (€)	5,941