ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Ecole Polytechnique Fédérale de Lausanne
EPFL

China Hardware Innovation Camp

2nd milestone – May 1 2015


vesta

Structure

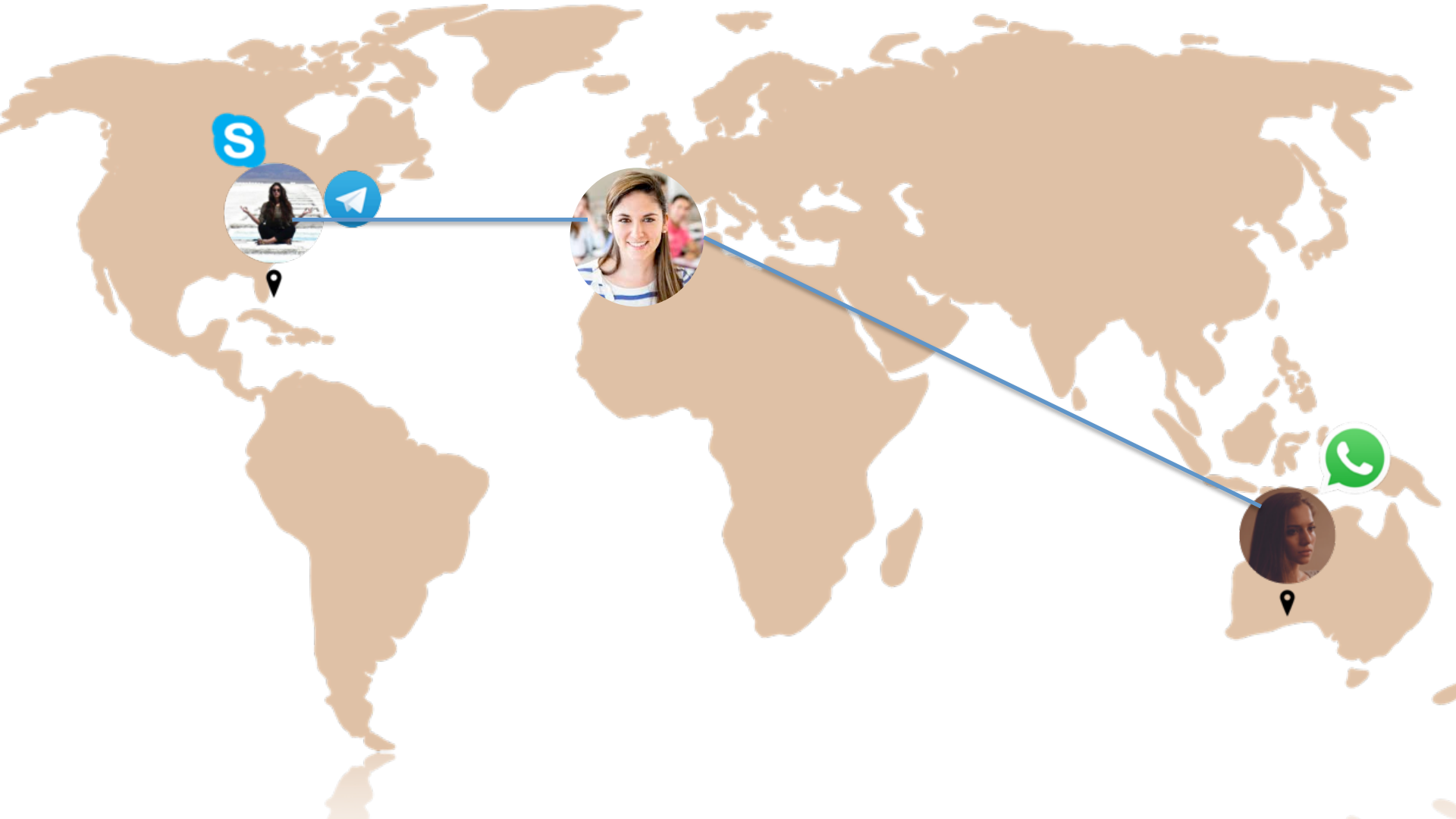
- Business
- Industrial design/mechanical design
- Material
- Electronics
- Software/Firmware
- Take-away

Business

- **Problem**
- Solution
- Market

+65

Problem



Problem


Okay Grandpa. step number one Turn on the computer.
No, grandpa. That's the fridge

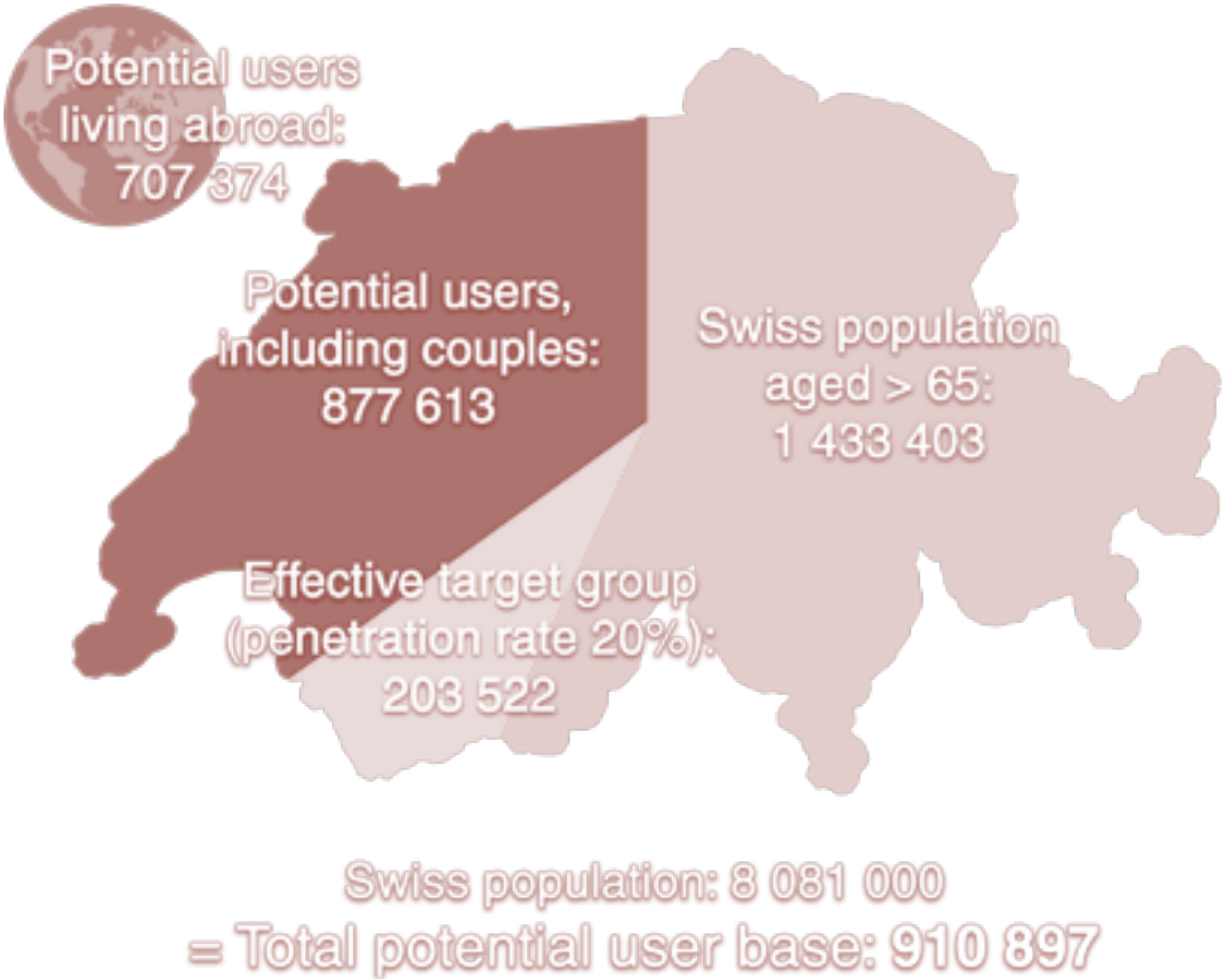
Solution

A device that is thought especially for elderly to include them in our technology

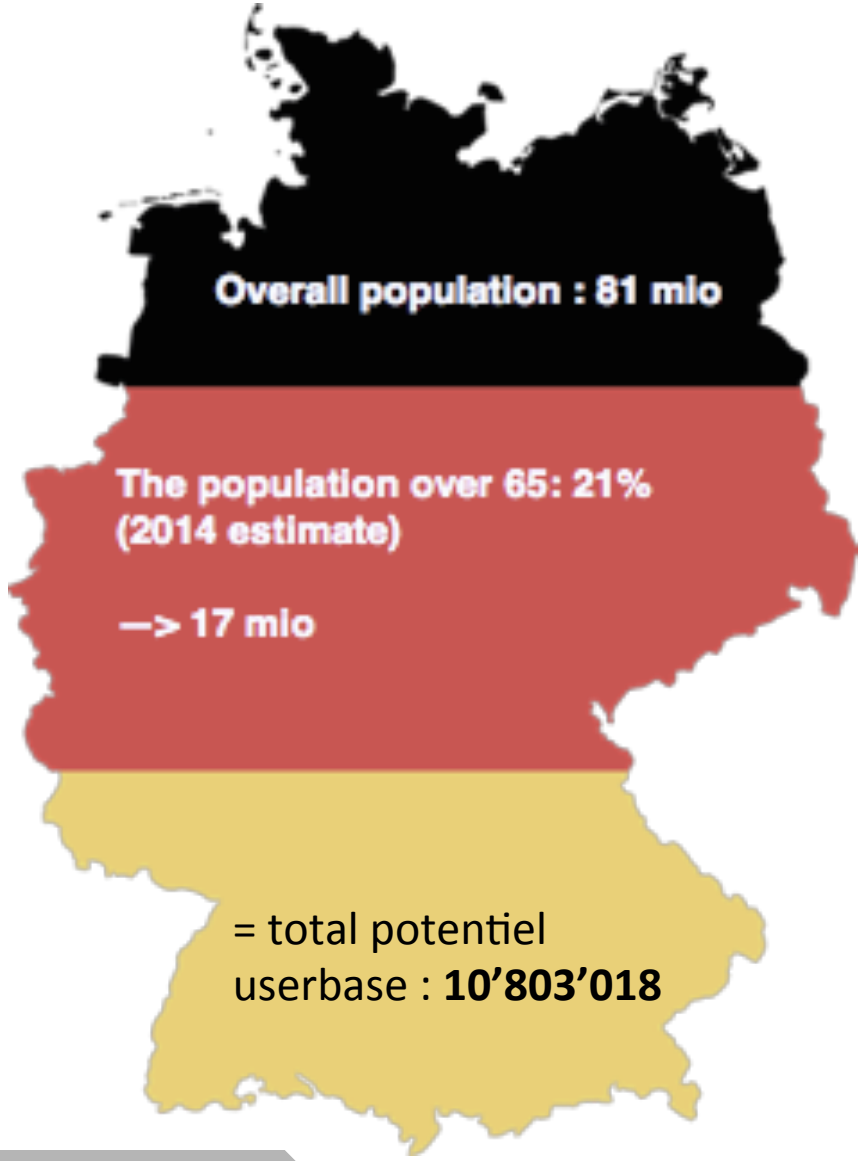
- Easy to use
- No need to manage it
- Manageable by the family
- Adapted to their environment

Solution

Market


Potential users living abroad: 707 374
Potential users, including couples: 877 613
Swiss population aged > 65: 1 433 403
Effective target group (penetration rate 20%): 203 522
Swiss population: 8 081 000
= Total potential user base: 910 897

Market


Overall population : 81 mio
The population over 65: 21%
(2014 estimate)
—> 17 mio
= total potentiel
userbase : **10’803’018**

Problems encountered

- Reaching users of other markets (Asian, or else)
- Getting informations from elderly
- Targetting a market that has multiple users
- « The Elderly » are very different

Sketch of the app for the young people

User – test results

- The ergonomy is good
- The font size is good
- We were able to compare the logos and choose the right ones for the elderly
- They can see the utility of this product

BUT ..

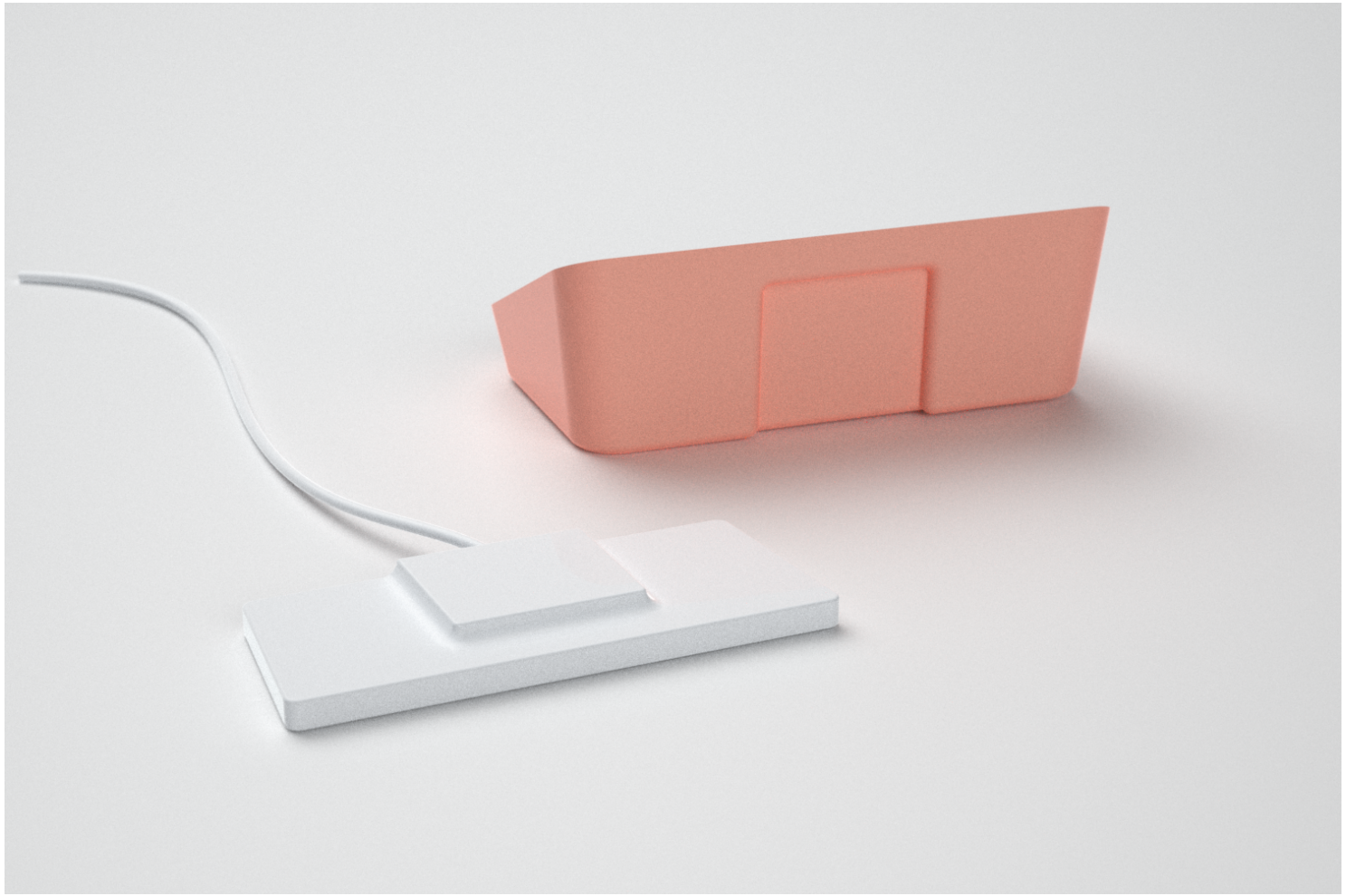
- They don’t value it (monetize it)

Industrial/mechanical design

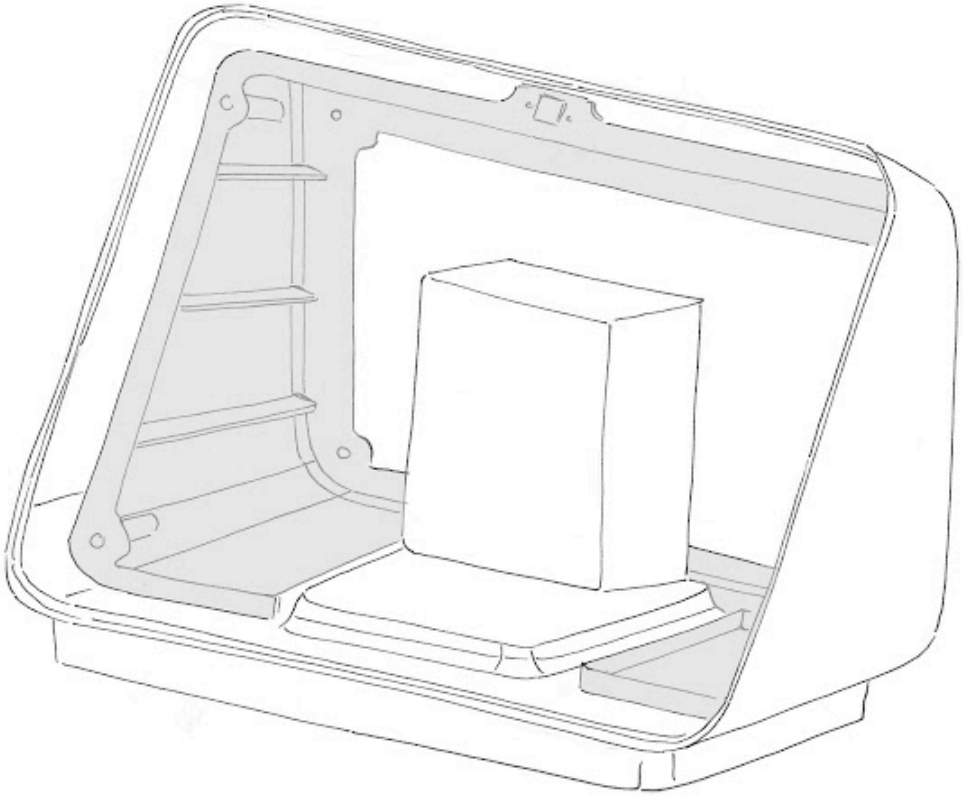
Industrial/mechanical design

Industrial/mechanical design

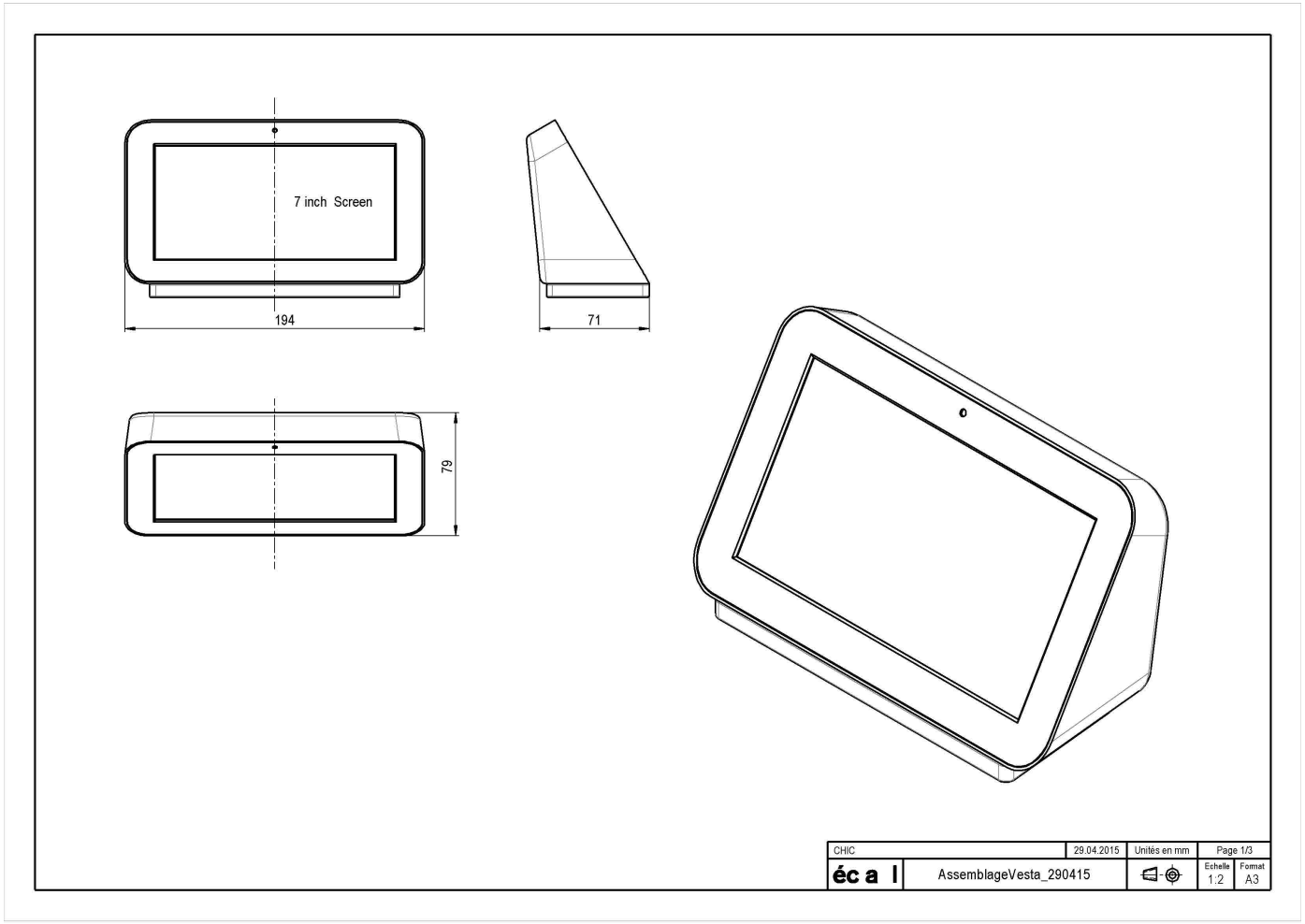
Industrial/mechanical design

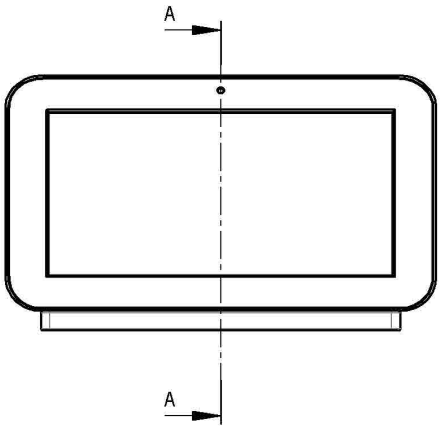


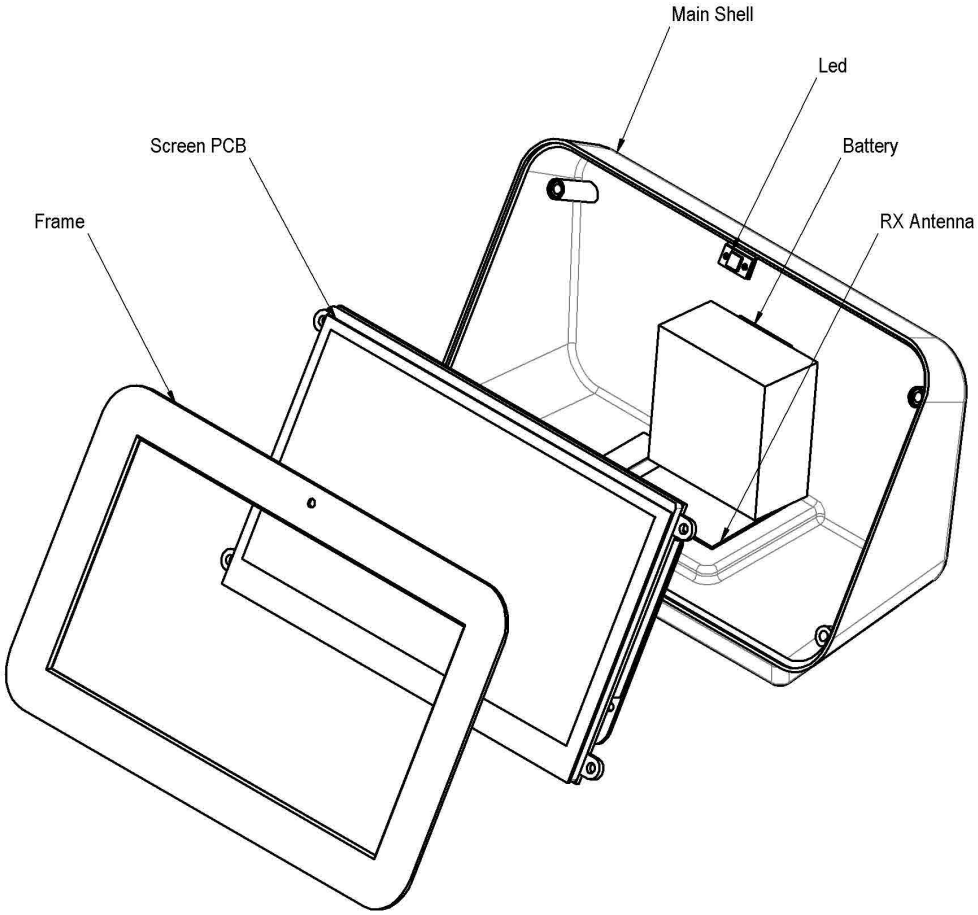
Industrial/mechanical design

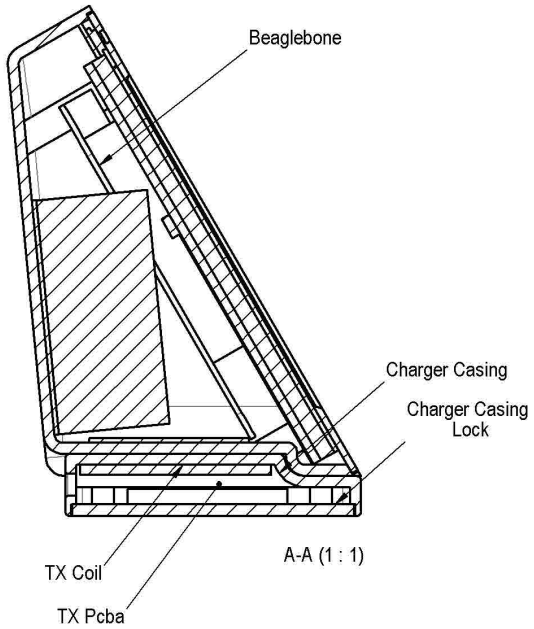


Industrial/mechanical design



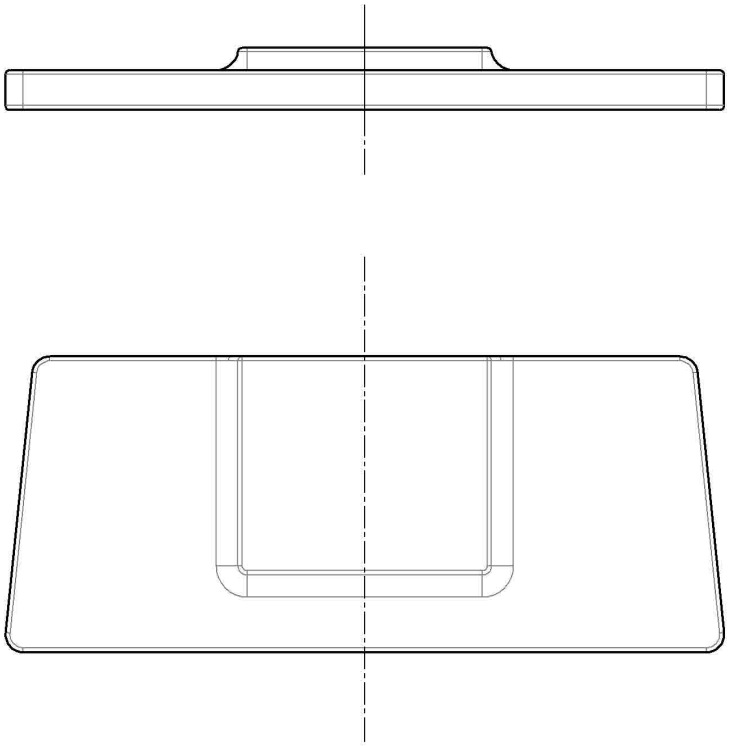


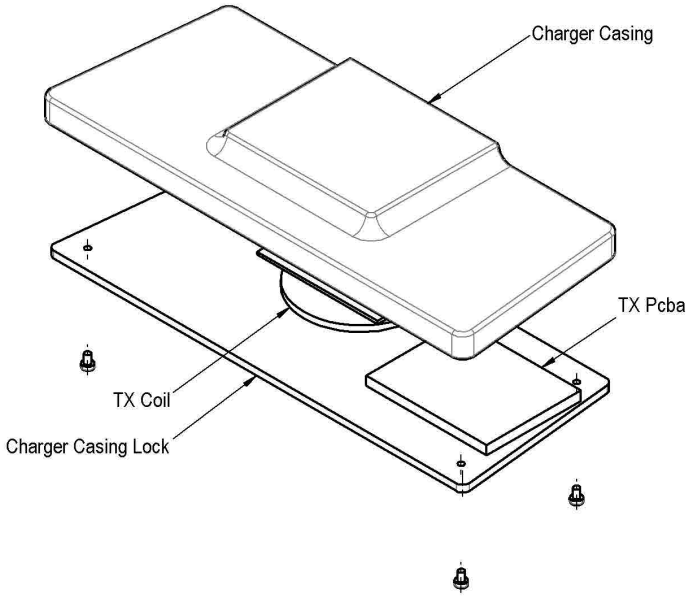




A-A (1 : 1)

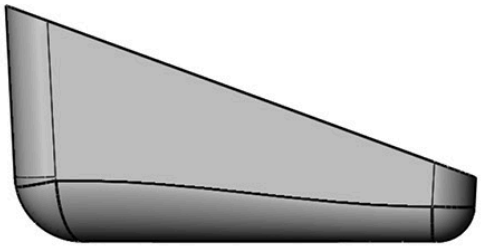
CHIC	29.04.2015	Unités en mm	Page 2/3
éc a l	AssemblageVesta_290415		Echelle 1:2 / Format A3



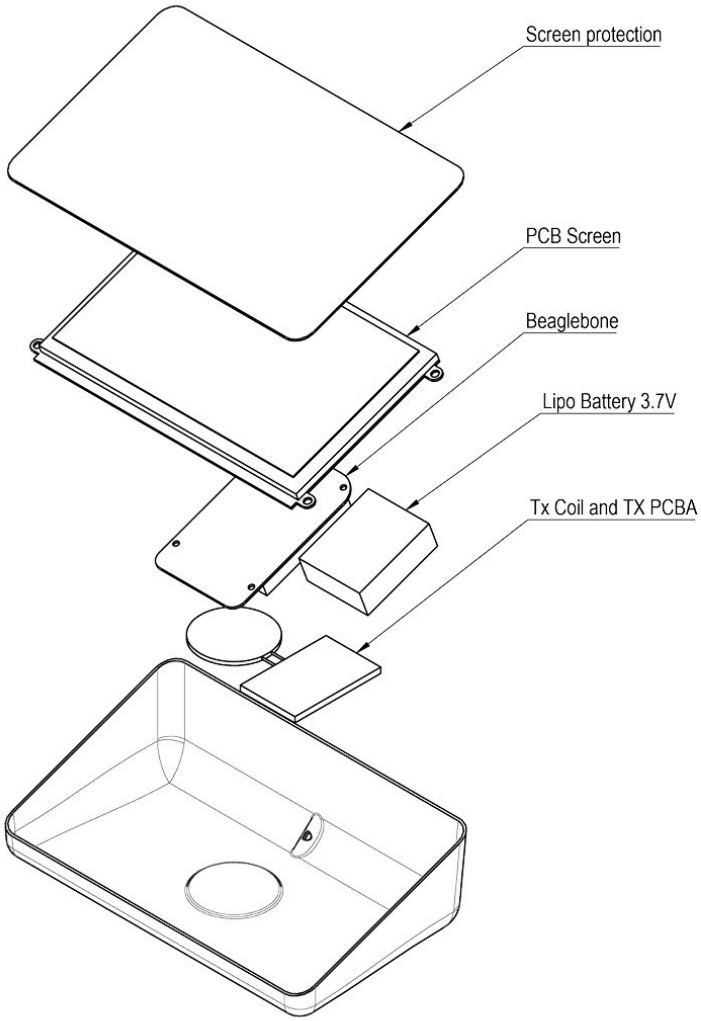


CHIC	29.04.2015	Unités en mm	Page 3/3
écal AssemblageVesta_290415			Echelle 1:2 / Format A3

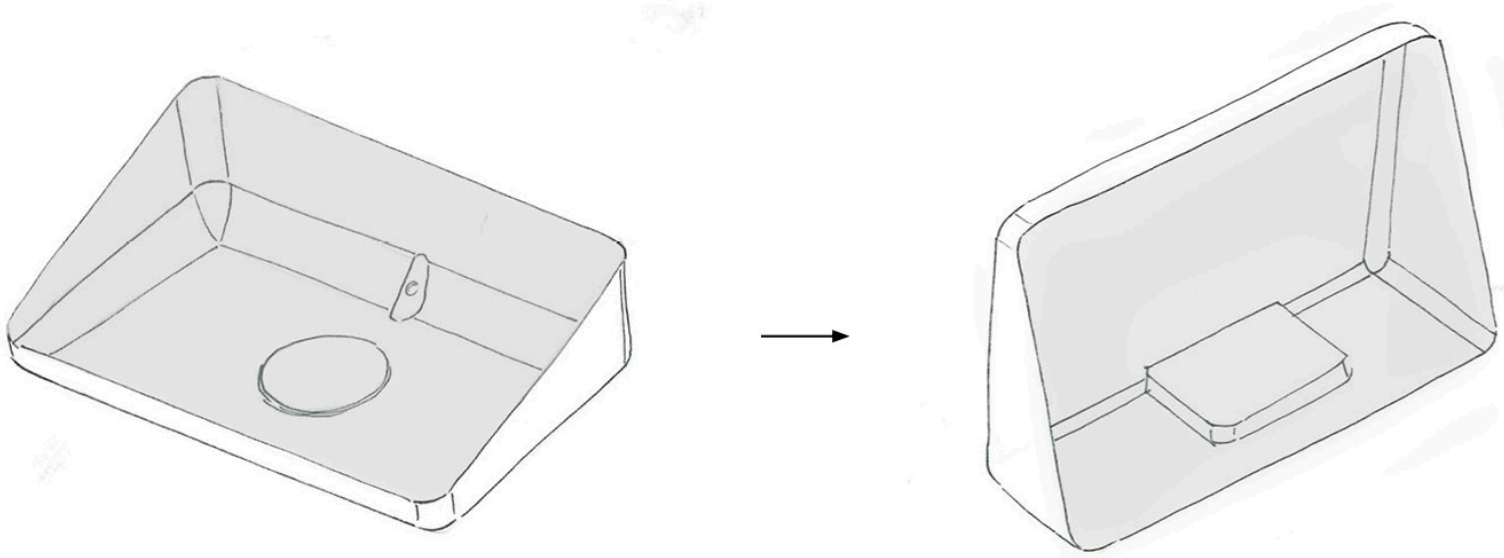
Industrial/mechanical design



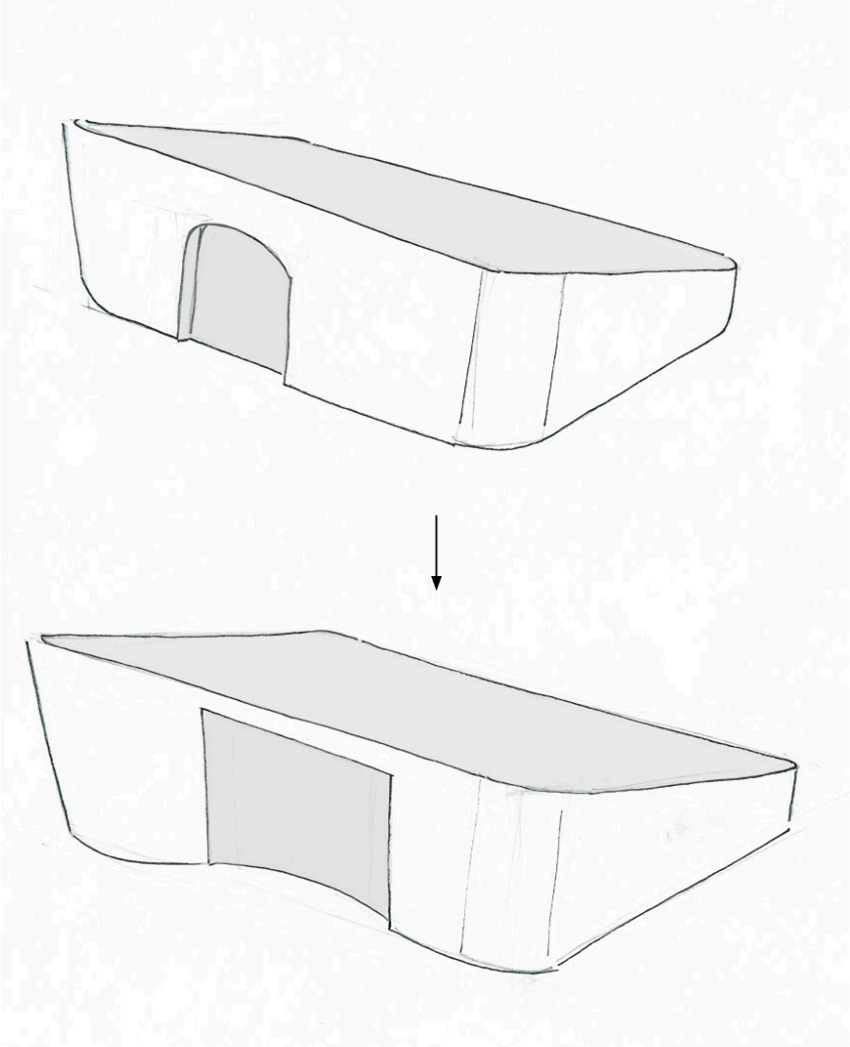
Industrial/mechanical design



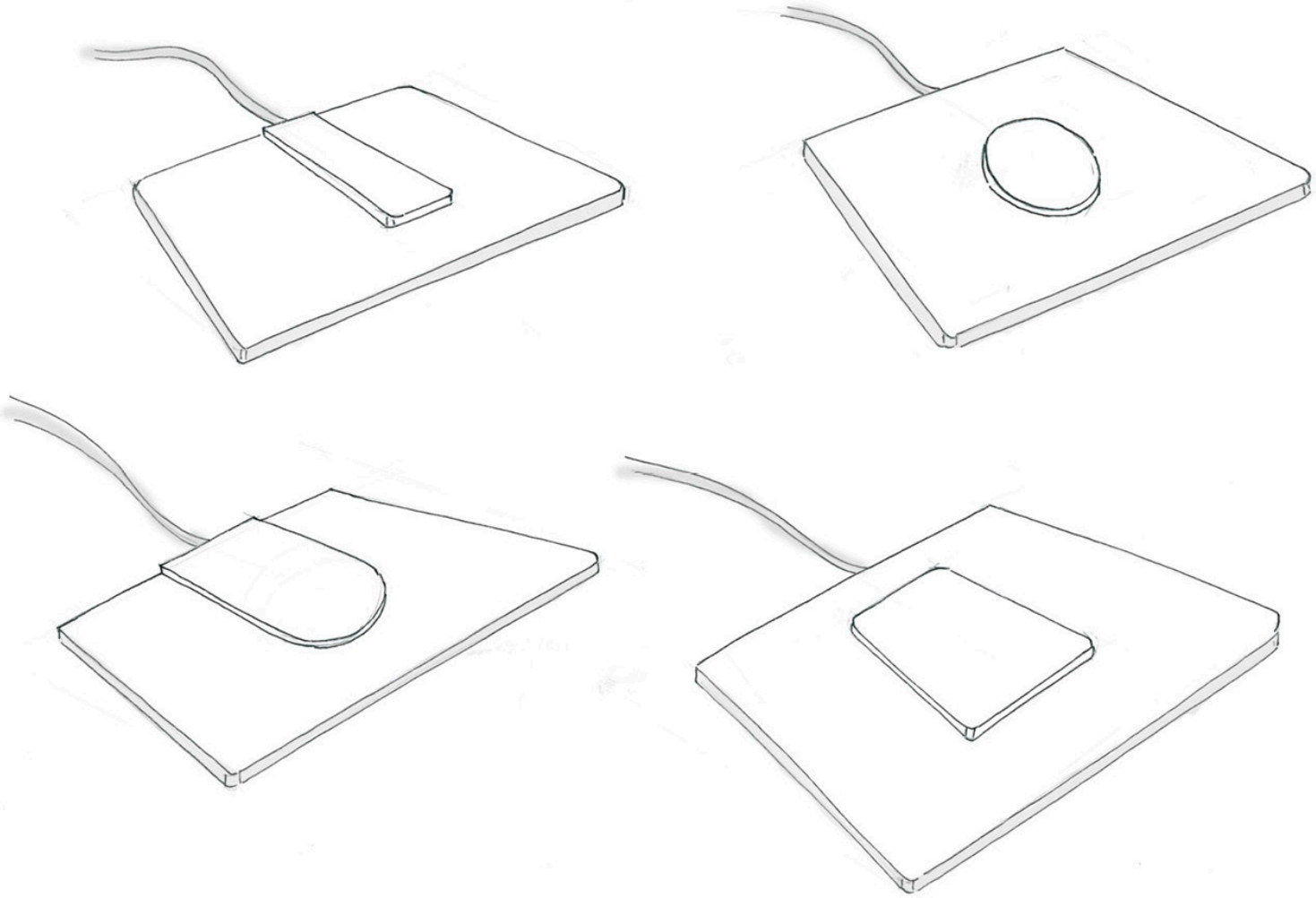
Industrial/mechanical design



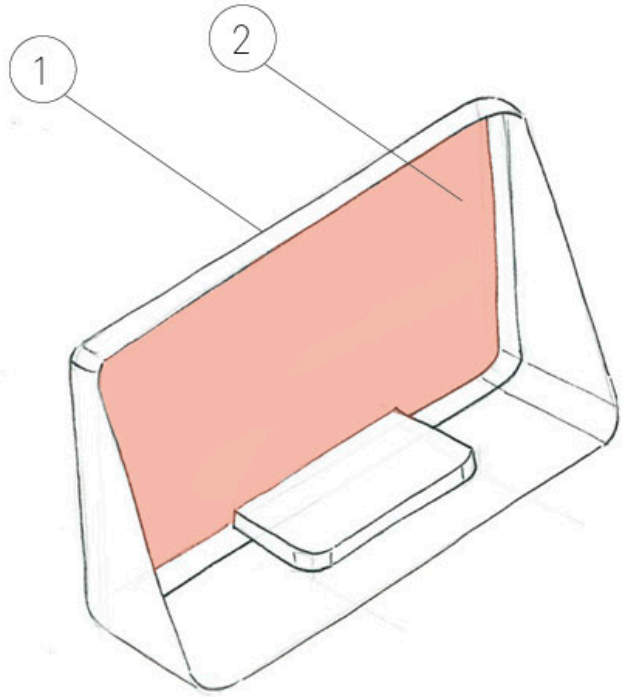
Industrial/mechanical design

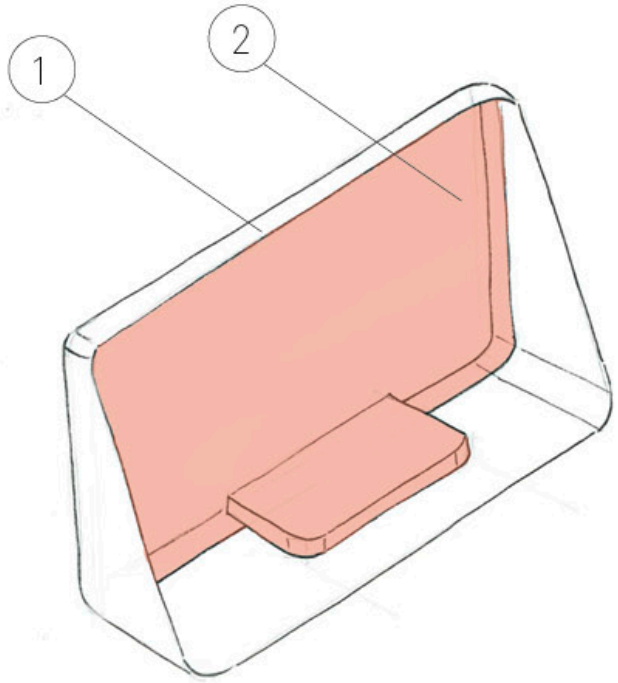


Industrial/mechanical design

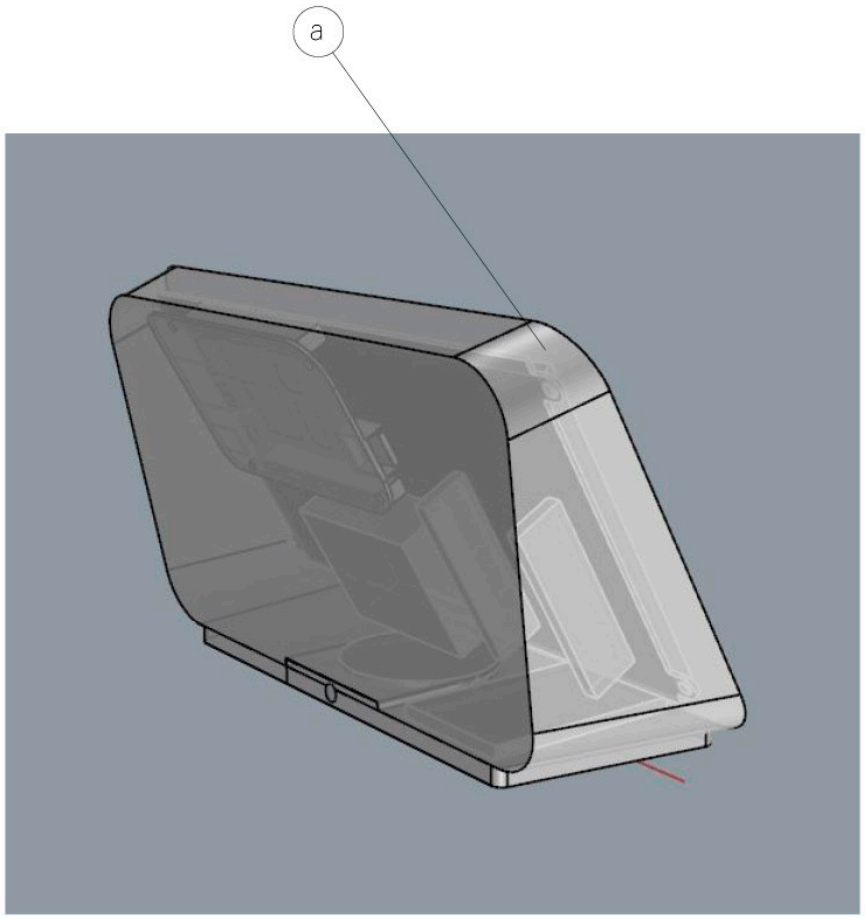


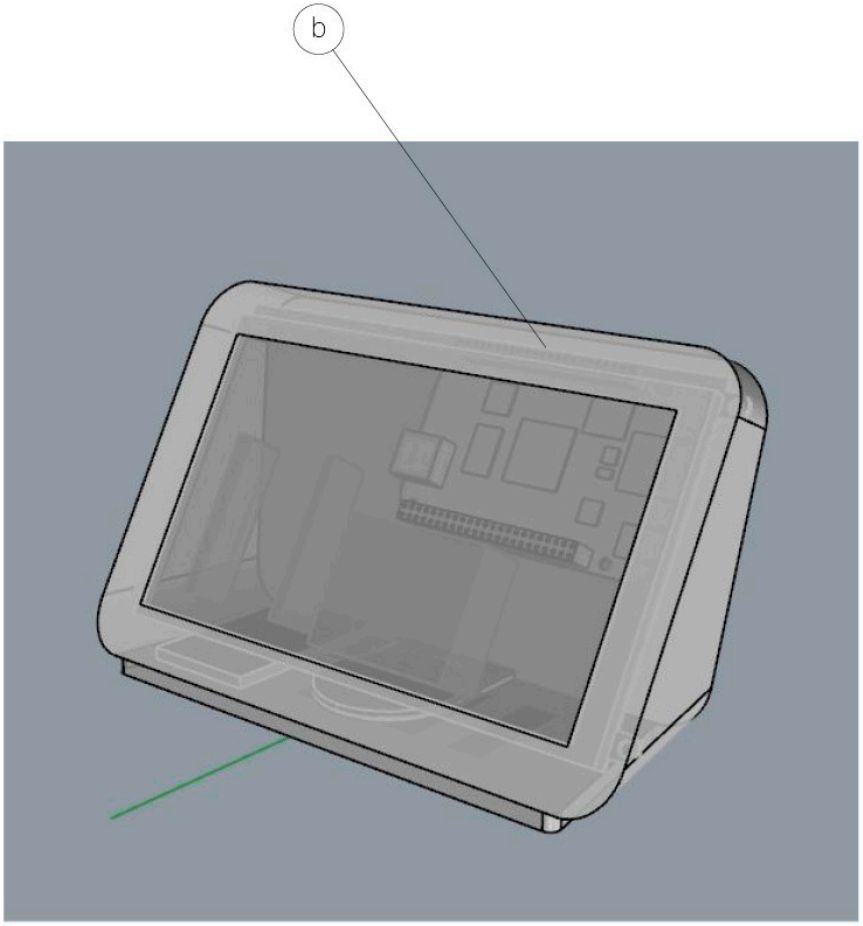
Industrial/mechanical design





Industrial/mechanical design





Industrial/mechanical design

a Vesta

b Vesta

c Vesta

d Vesta

e Vesta

f Vesta

g Vesta

h Vesta

Industrial/mechanical design

a 

c 

e 

g 

b 

d 

f 

h 

Industrial/mechanical design

Vesta

Vesta

Vesta

Vesta

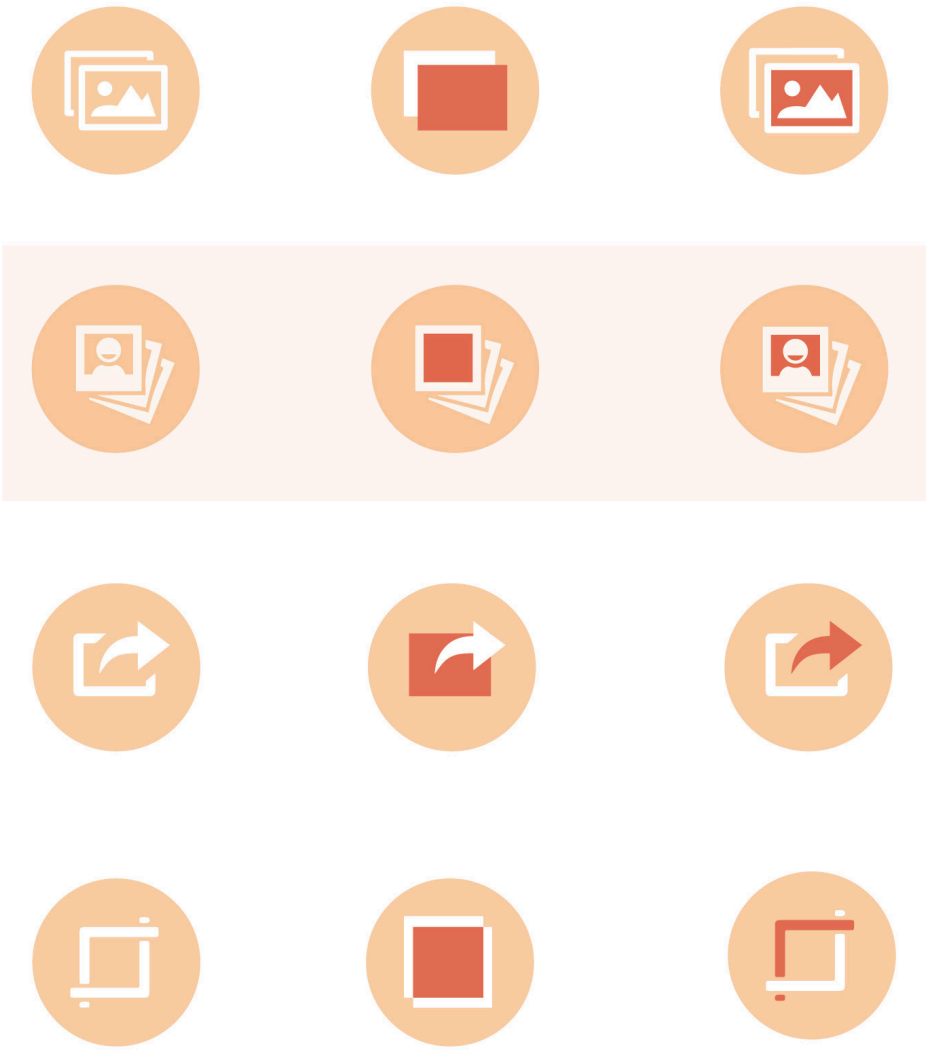
Vesta

Petplan

fiverr

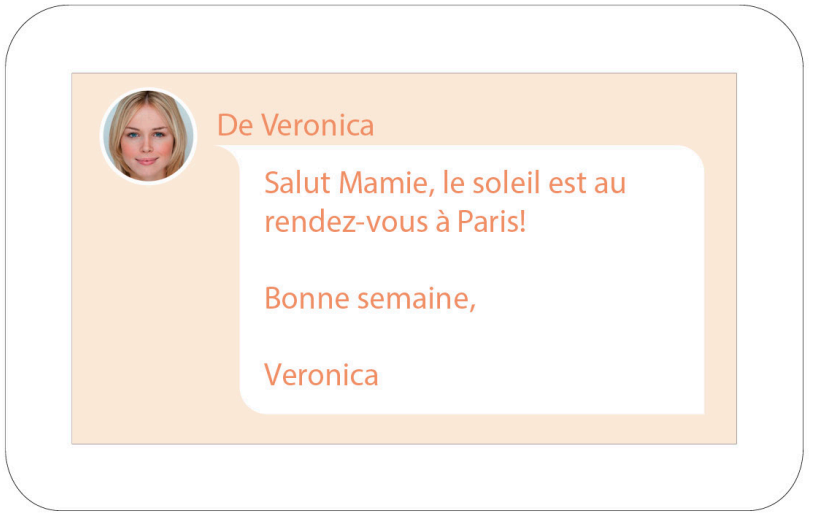
Vesta

Industrial/mechanical design



Industrial/mechanical design

Industrial/mechanical design



Materials

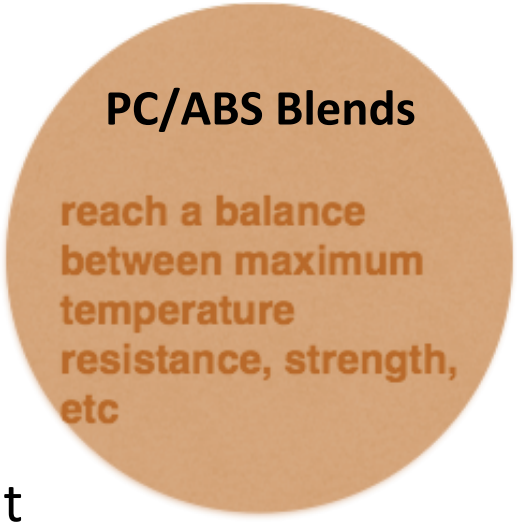
ABS
Acrylonitrile-butadiene-styrene

ABS is a synthetic terpolymer of the three different kinds of monomers

dispersed rubber particles of butadiene in the matrix of SAN (Styrene-Acrylonitrile)

PC
Polycarbonate

high modulus, high toughness, high impact strength but difficult processability



Materials

Injection moulding

- Injection moulding is used to create most plastic products available today.
- It is ideal for producing high volumes of the same object

- Extrusion:Melt the raw materials in Extruder (see fig1.)
- Injection: Use a plunger to force molten plastic material into the mould cavity (see fig2.)

Fig 1.

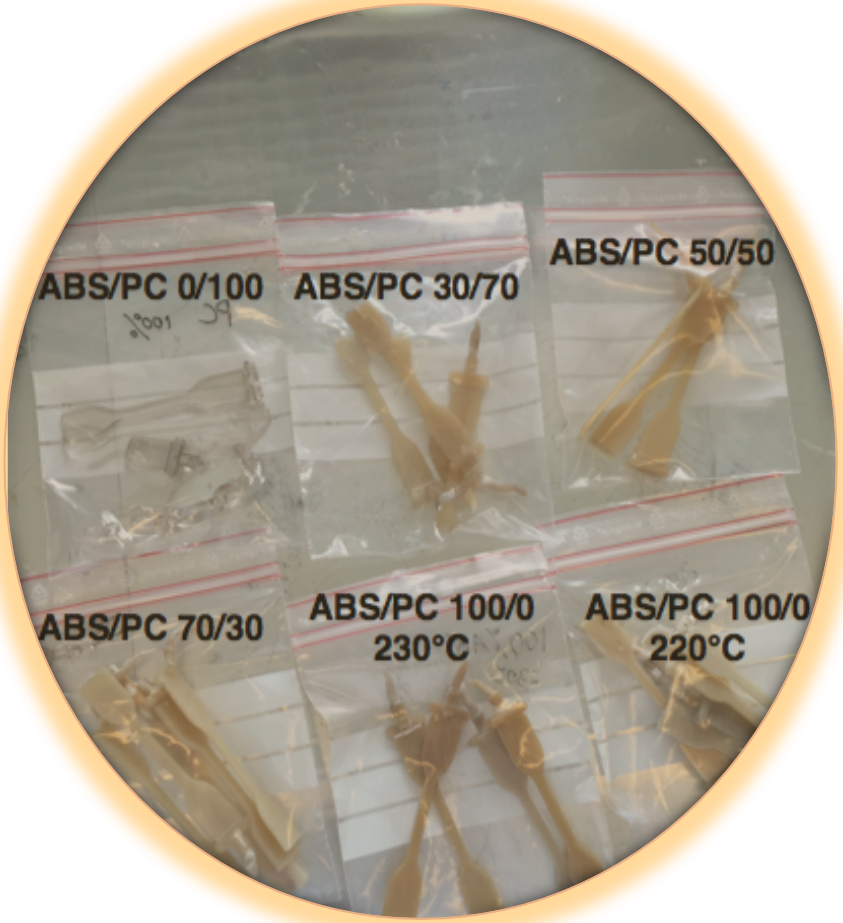
Fig 2.

Materials

- ABS/PC: 100/0 70/30 50/50 30/70 0/100

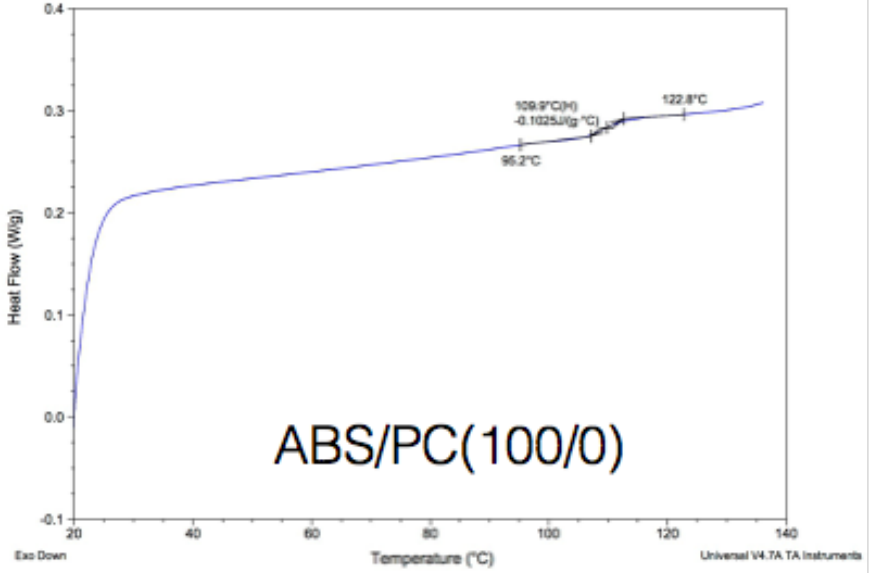
- Temperature

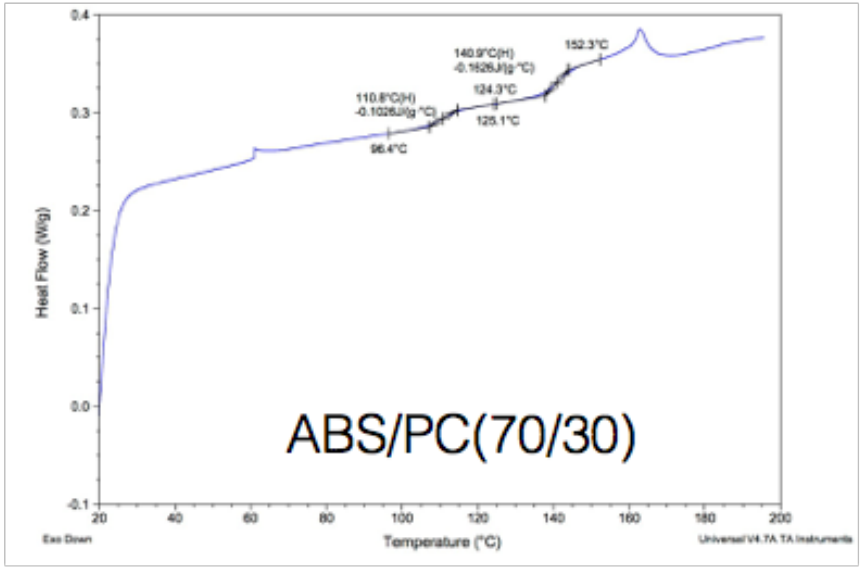
pre-dry: 90℃ 10h
process: 100/0 215℃ 220℃ 230℃ 2min
0/100 250℃ 2min
others 230℃ 6min

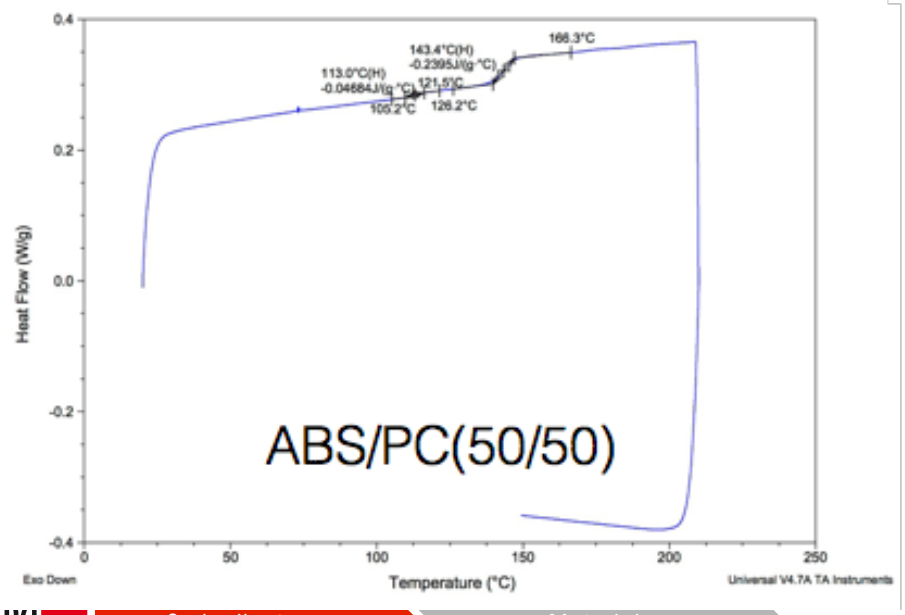


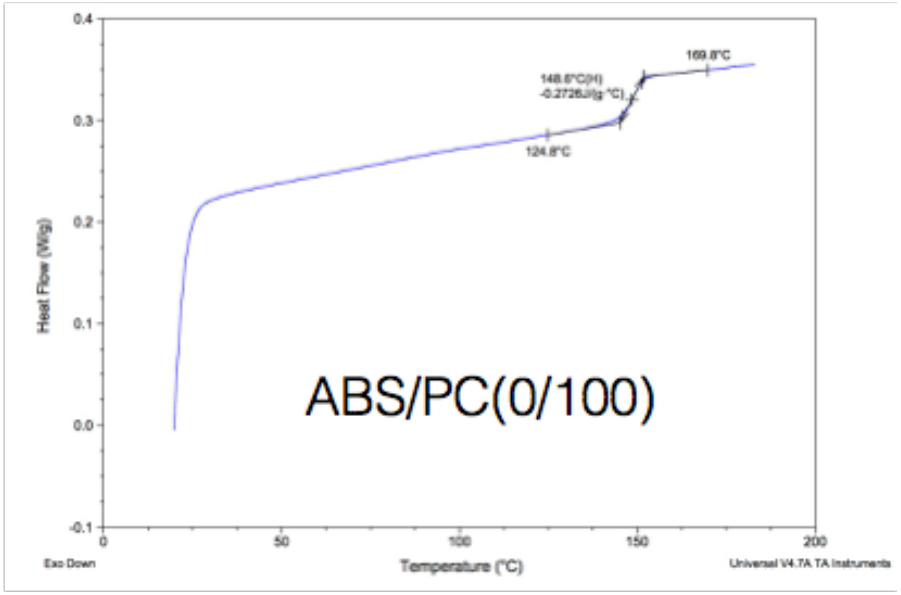
Materials

DSC Test – Phase separation



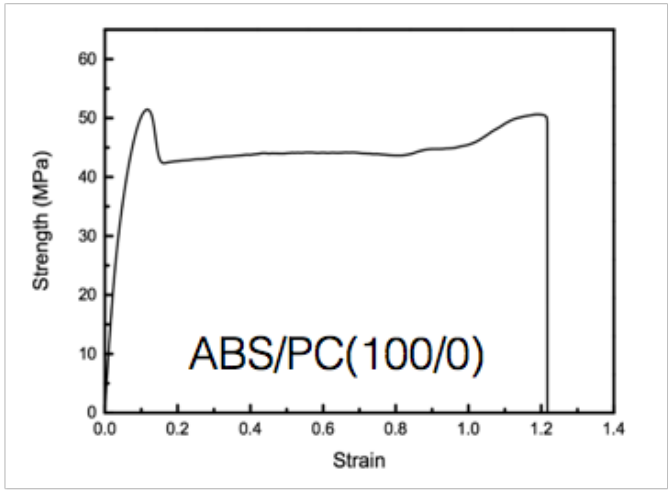


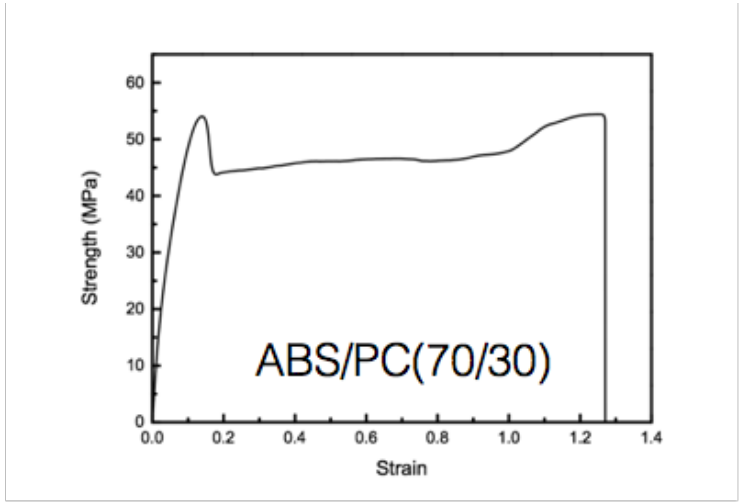


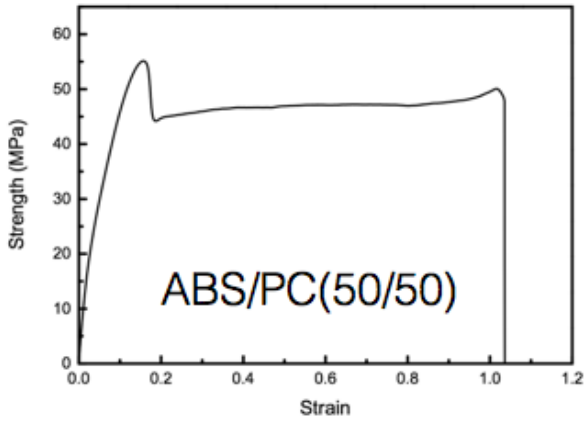


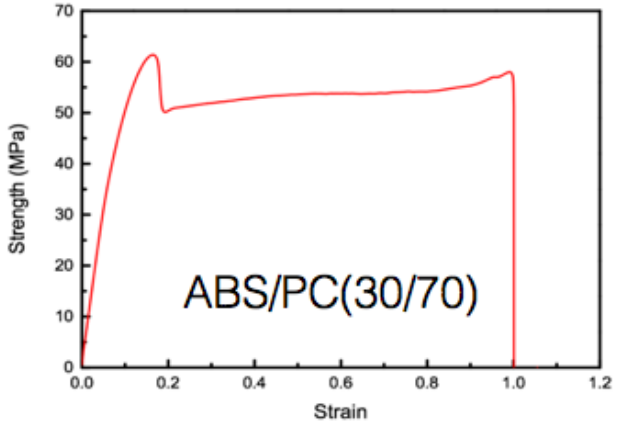
Materials

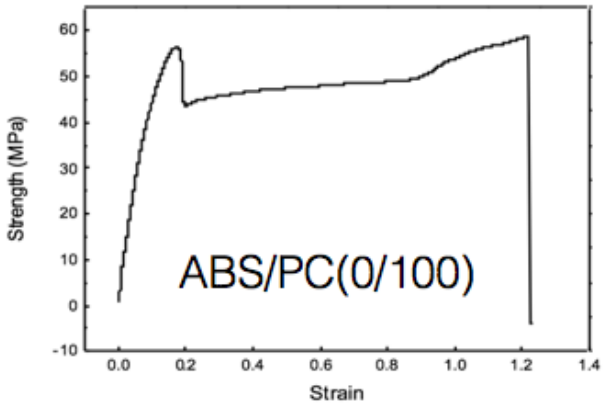
Tensile test





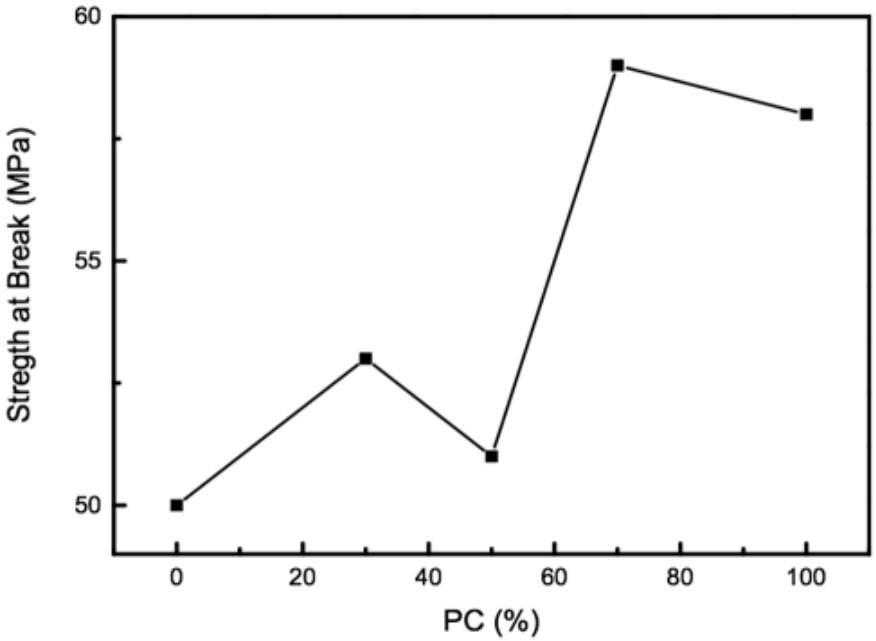


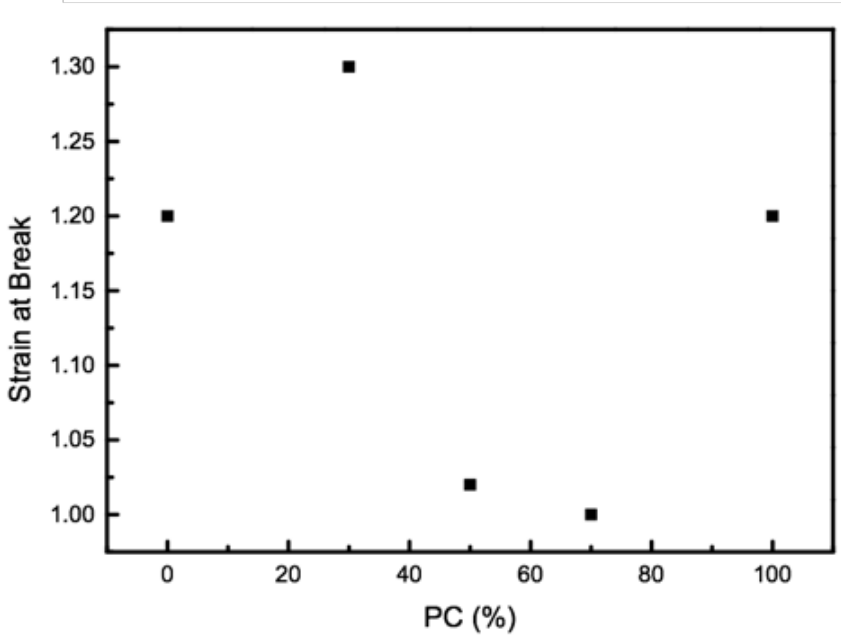




Materials

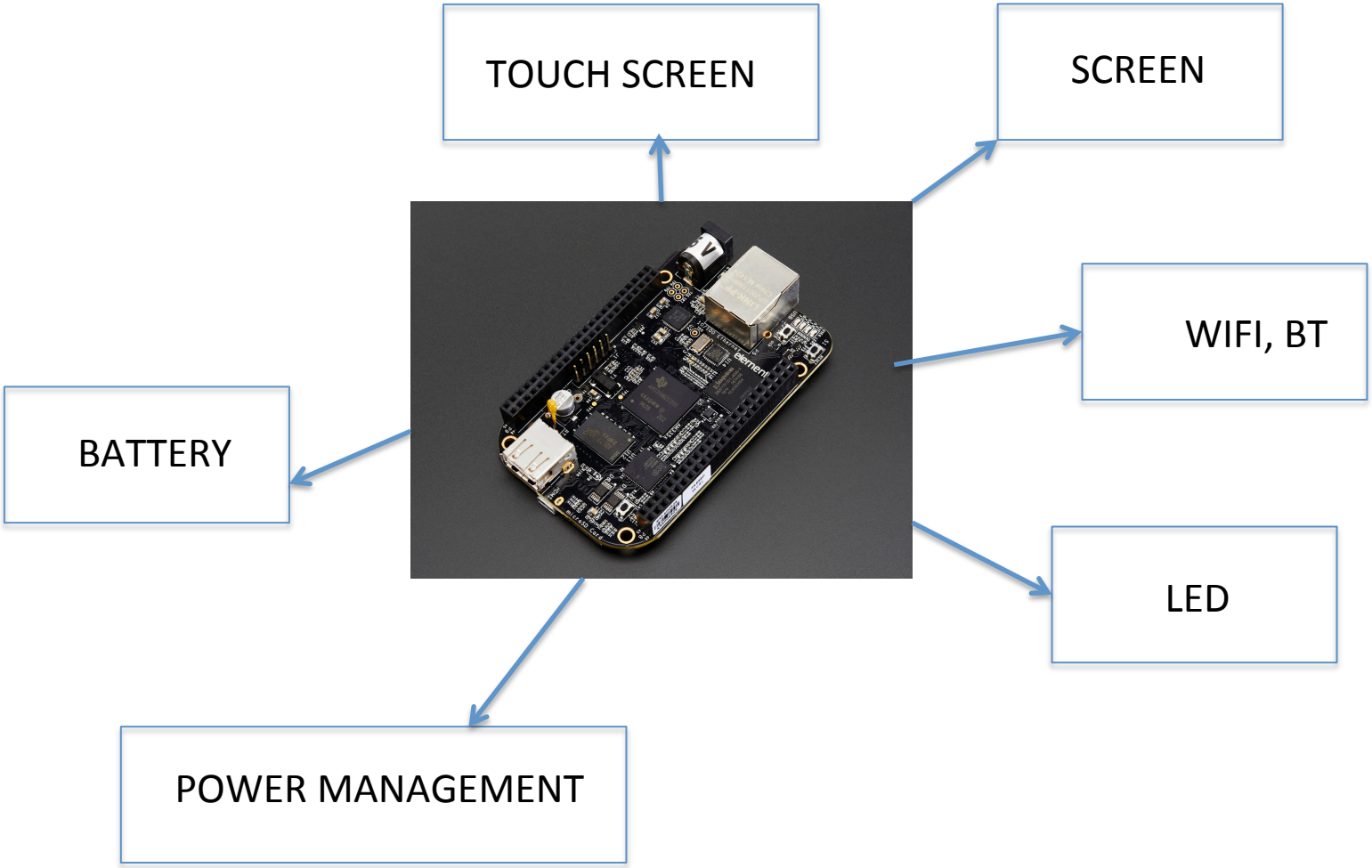
Tensile test



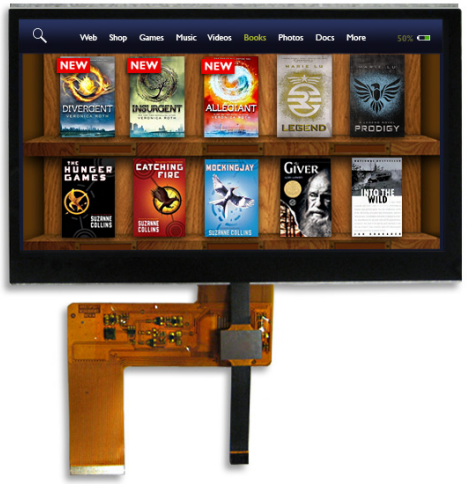


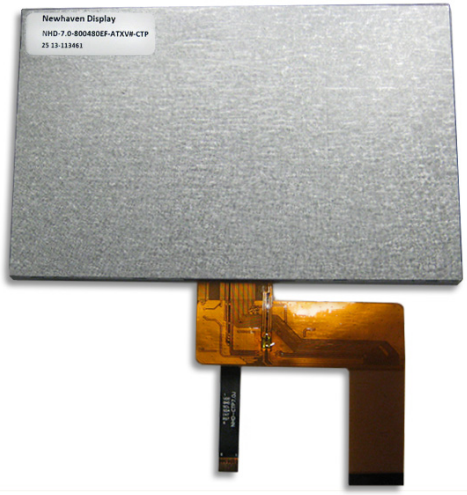
Maximum strength achieved when we have 30% ABS in PC

Electronics: OVERVIEW



Electronics: SCREEN + TOUCHSCREEN





SCREEN

- 7 inch 800X480 p
- 3.3v 24 bit parallel RGB interface
- Bright backlight
- 120 mA max output current

TOUCH SCREEN

- Capacitive
- I2C interface

Electronics: Connectivity

WL1835

WIFI

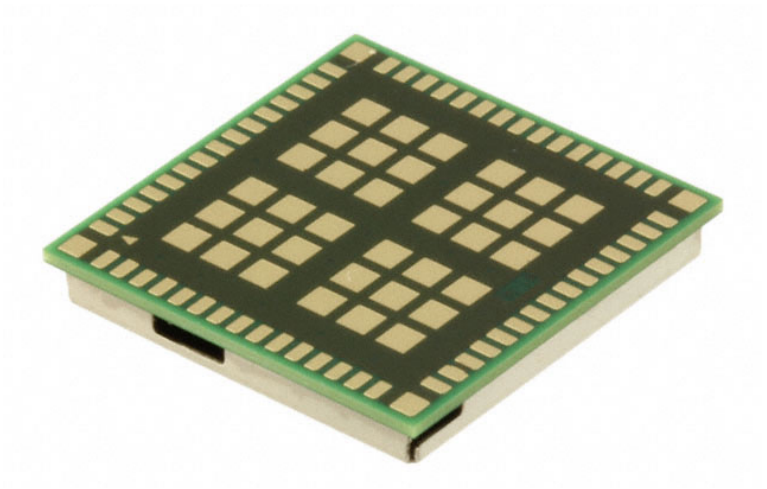
- 802.11bgn MIMO, +100Mbps
- SDIO interface

BLUETOOTH 4.1

- UART interface

BEAGLE BONE

- Wifi module uses eMMC interface
- Has no 1.8V accessible source.



Electronics: Battery and power management

Battery

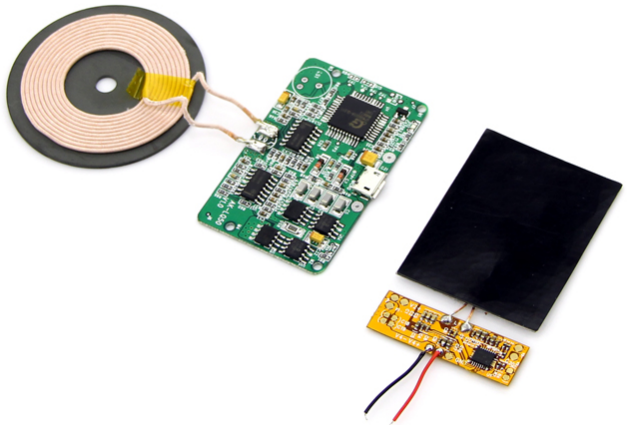
-Lipo 3.7-4.2V 6600 mAh

Power needs

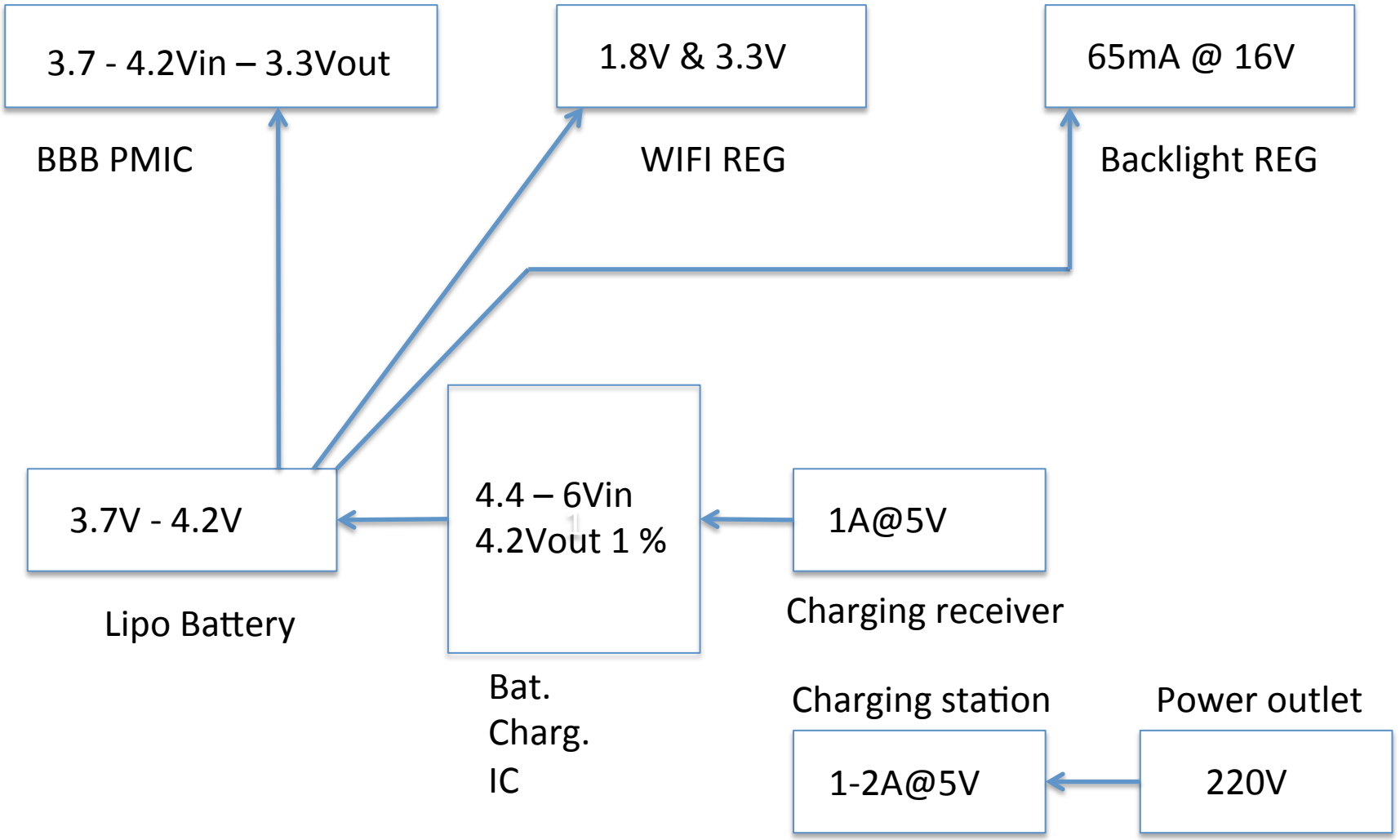
- Screen back light: 65 mA @ 16 V
- WL1835: max 400 mA @ 3.3V

Power source

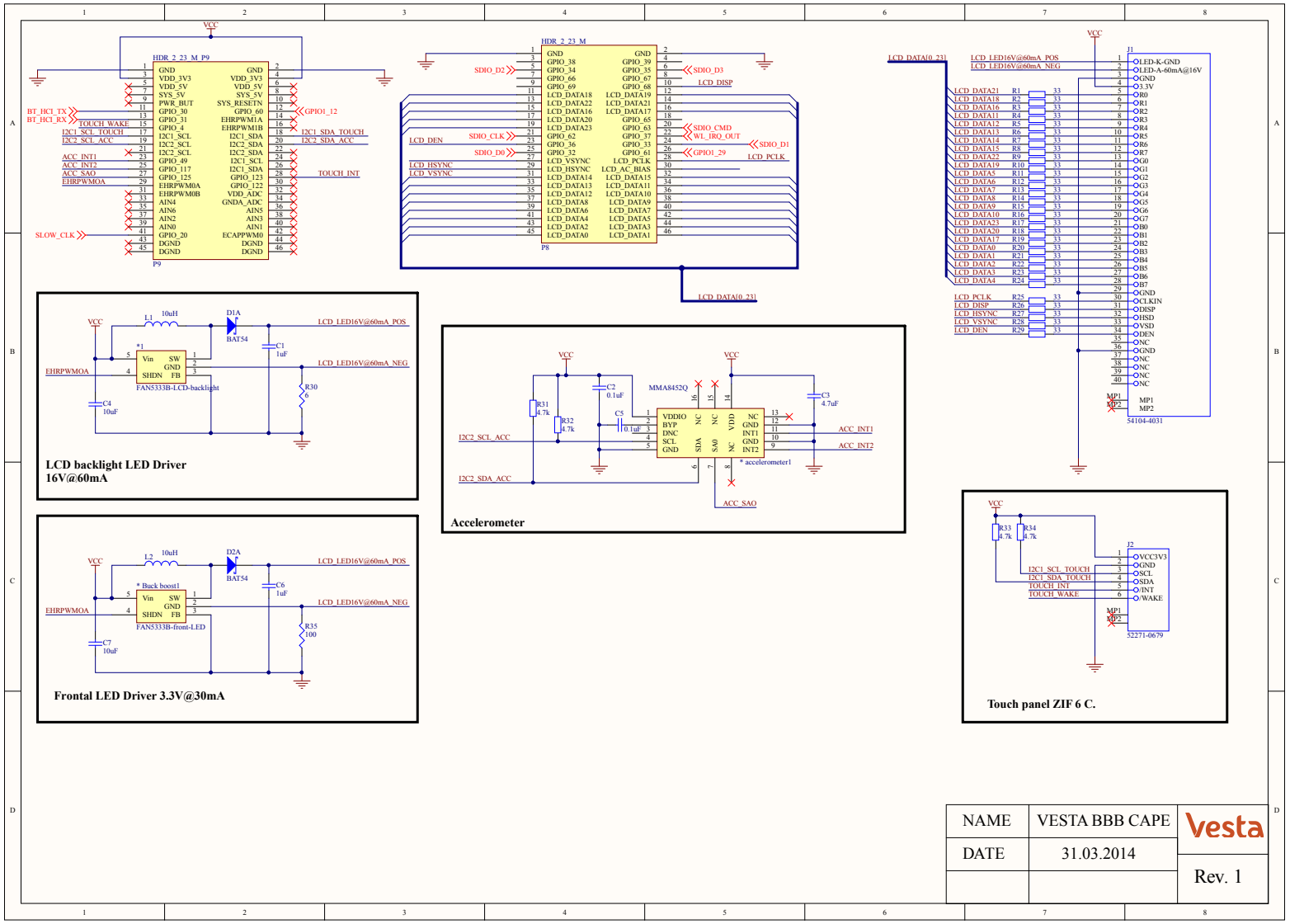
- Wireless charger 1A @ 5V
- CN 3065 4.4 – 6Vin 4.2V 1 %



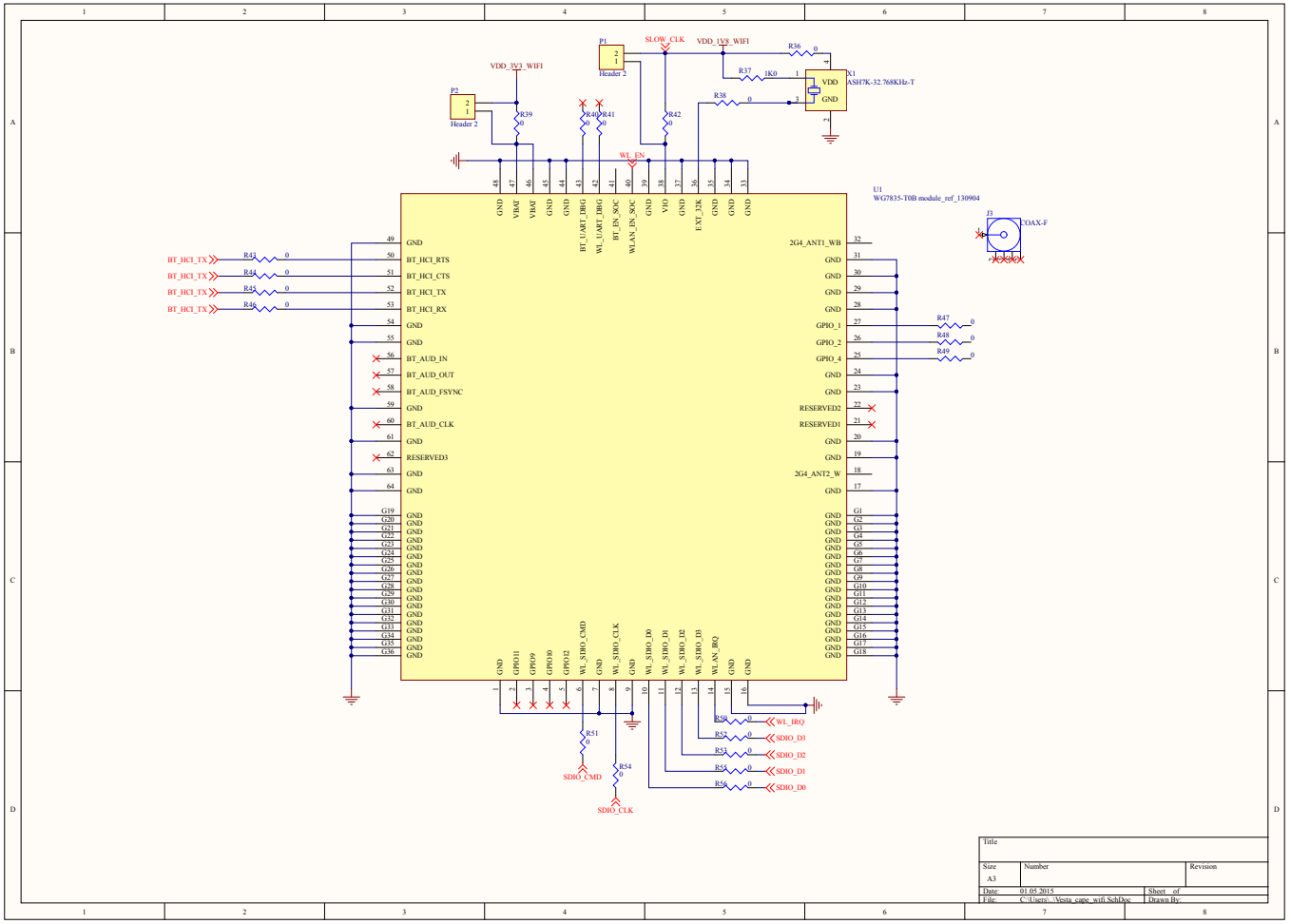
Electronics: Power Cycle



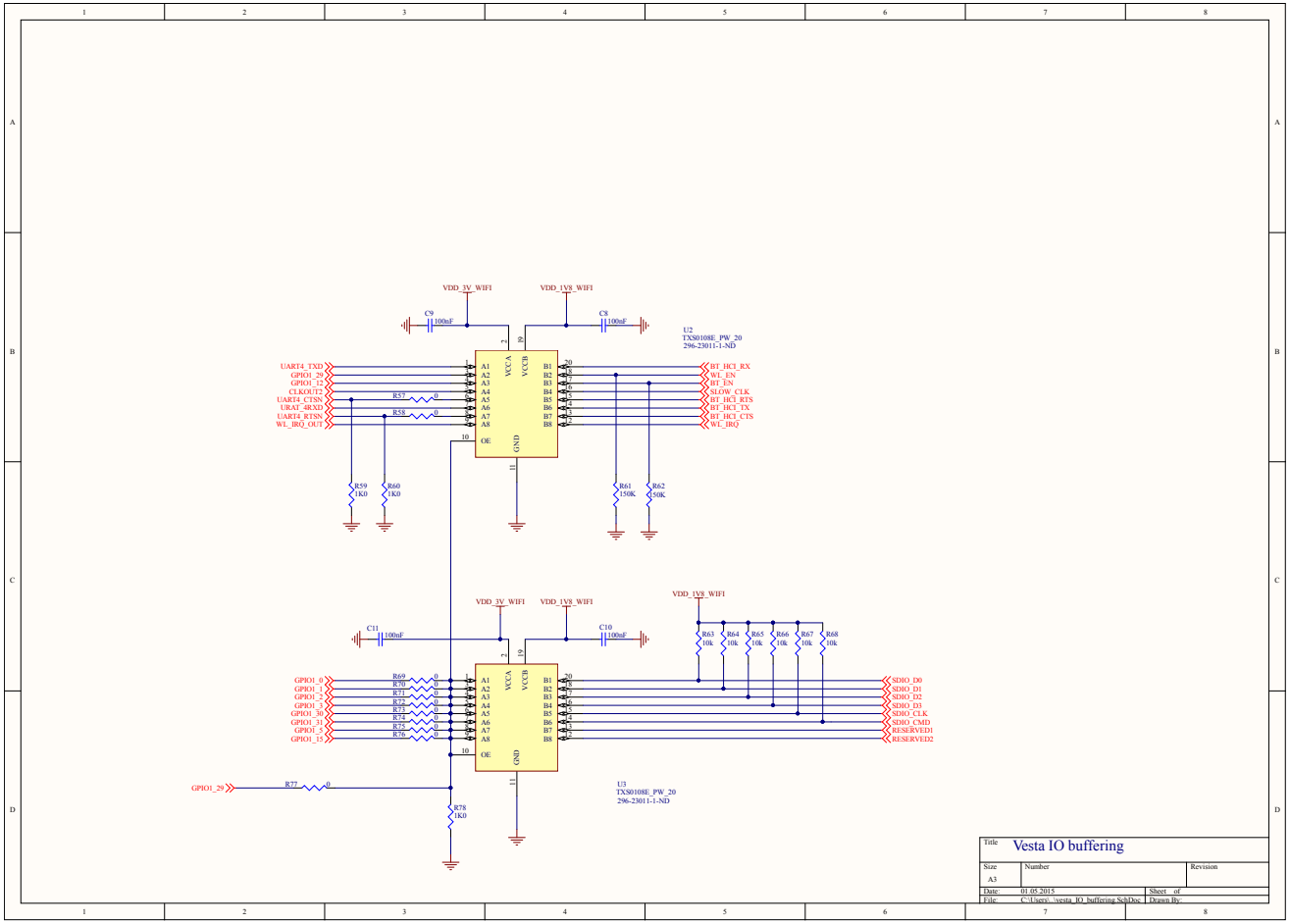
Electronics: Schematics



Electronics: Schematics



Electronics: Schematics



Electronics: What I have learnt and problems

Learnt

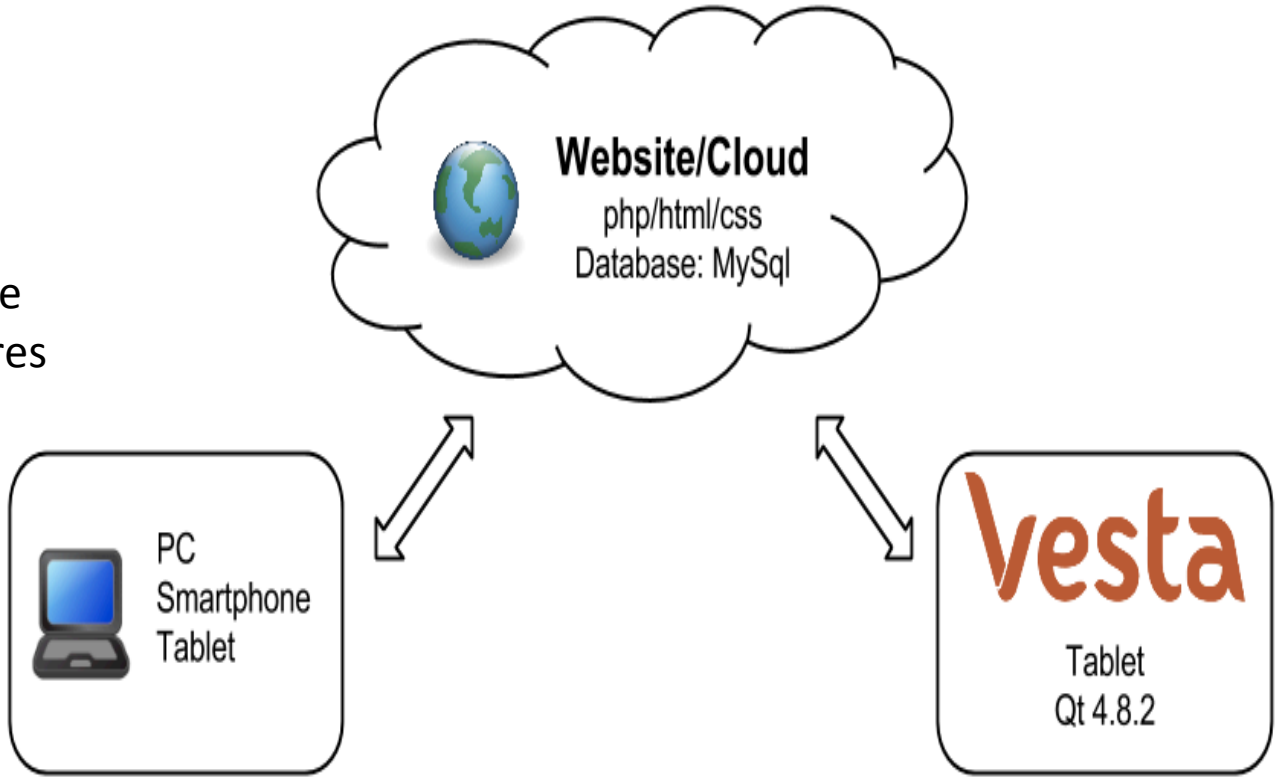
- Alitum designer
- source components
- Working with people in remote locations.
- Digging linux

Problems encountered

- Difficulty in getting clear information from manufacturers
- Sourcing components.
- Getting linux drivers to work
- Routing in altium

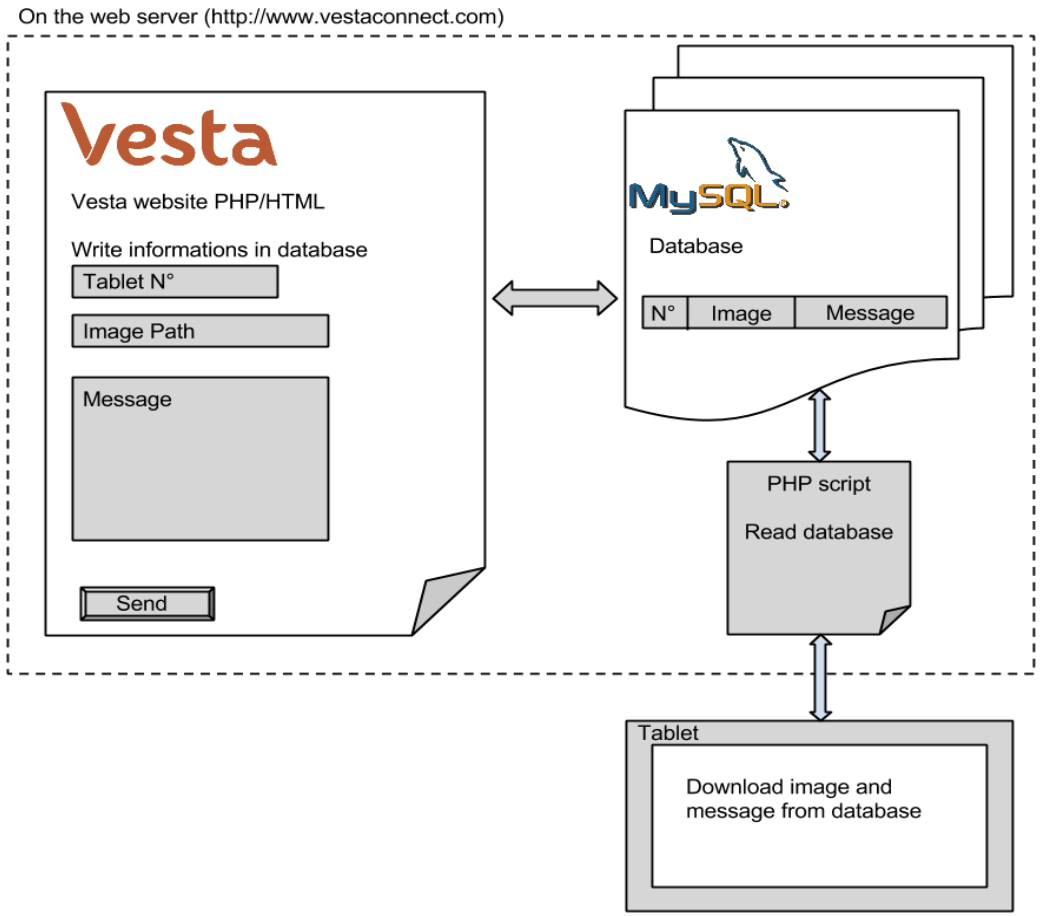
Software/firmware

- Access from a PC to the website to pose pictures and messages
- The Vesta tablet is connected to the website and download the pictures and messages



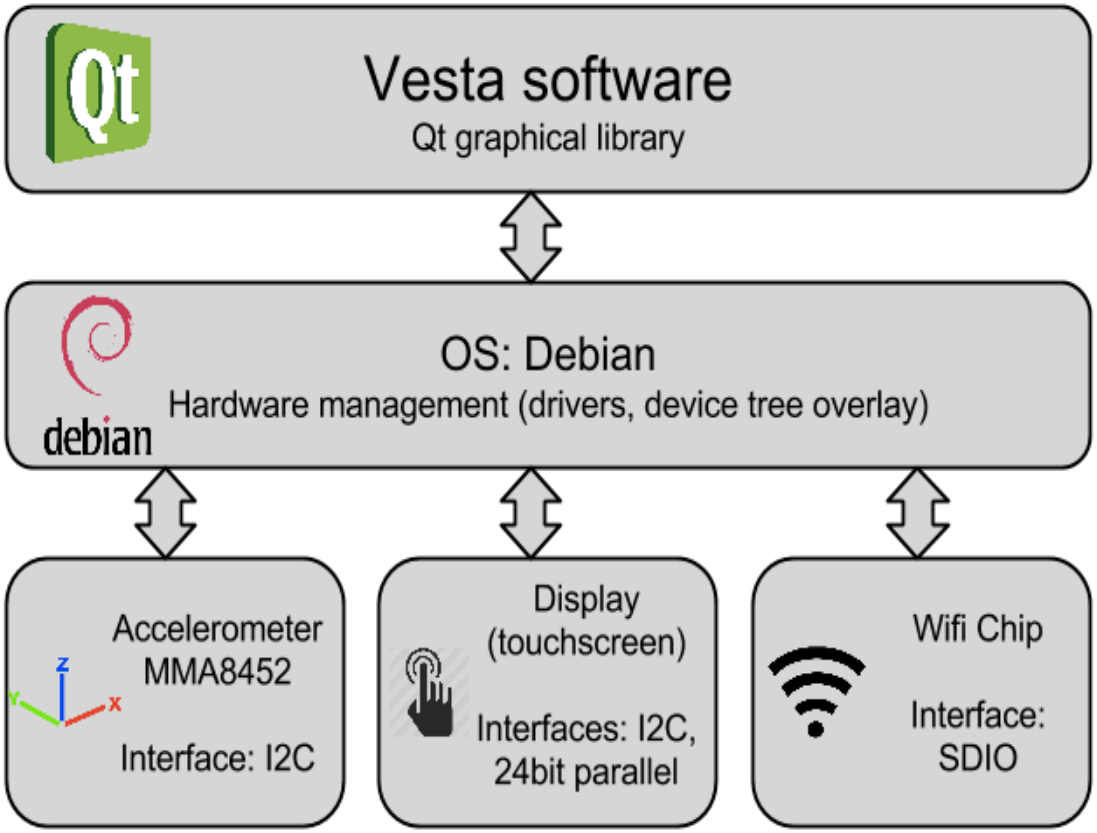
Software/firmware

- The website is made in php/html5/css
- The database on the webserver is MySql
- A php script give access to the tablet on the database



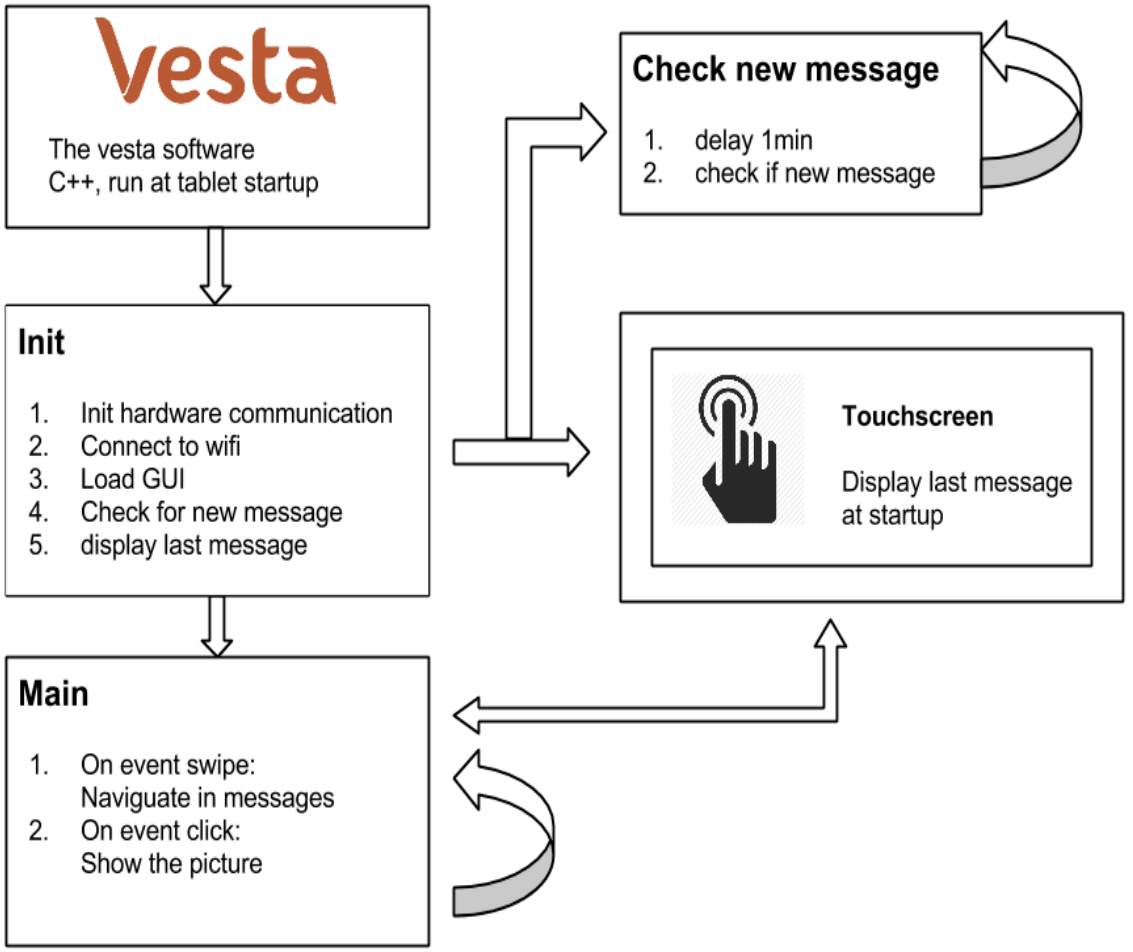
Software/firmware

- The software on the tablet is made in C++ with the graphical library Qt
- It works on the linux OS debian
- The OS manages the differents hardware



Software/firmware

- The software begin by connecting to the Wifi and load the graphical interface
- It checks if a new message is received and download it
- You can move between pictures/messages by clicking or swiping



Software/firmware

Actual graphical interface

Vesta

Image Upload

Image to upload: Parcourir... Aucun fichier sélectionné.

Message

Send message

Website

Software on the vesta tablet

Software/firmware

Next steps

- Work on the graphical interface
- Display the messages (at the moment only pictures)
- Add some popup that show a new message is received
- Control the wifi connection from the soft
- Optimizing the code

What have we learned and where do we need help

- Finding time fitting to everyone's schedule
- Finding a confortable place to work

Sponsors and partners

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

UNIL | Université de Lausanne

écal

swissnex China

seeed Open Hardware Facilitator

canton de vaud