Projet configuration de claviers

Requirements Gathering

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1. Vocabulary

Since our project involves desining keyboard, we must precise some vocabulary related to the subject.

You can go directly to Section 2 and go back later.

1.1. Physical Keyboard

A key is the thing that is pressed in order to produce some behaviour on the device.

It is made up of a **switch**, and a **keycap**

Keys are placed on a **PCB**

1.1.1. Switch

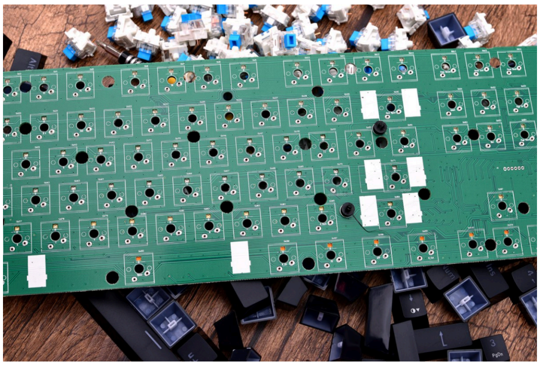
The switch is the physical button under the key, translating the movement into an electric signal.

1.1.2. Keycap

Keycaps are plastic pieces touched by the fingers.

1.1.3. PCB

A Printed Circuit Board (PCB) is the electronic material where all keys are placed.



1.2. HID/USB

The HID/USB protocol is the main protocol being used for usb and bluetooth keyboards.

It sends **keycodes** and **modifiers** to the os.

1.2.1. KeyCode

A keycode corresponds to the geometric location of a key. For example “Right Arrow”, “KEY_A” and “F12” are keycodes.

Importantly, The “KEY_Q” keycode can output a A on the computer, if the layout is set to azerty. A keycode does not correspond to a character.

1.2.2. Modifiers

A modifier is a special key. There are only 4 modifiers:

- SHIFT
- ALT
- CTRL
- SUPER (or WINDOWS)

The modifiers are sent to the OS, and they change the behaviour of the touches being pressed at the same time.

1.3. Layout

A layout is a way to map the **Phyical keycodes** to **characters** and **actions**

The OS often comes with a default layout for each locale (nationality / country).

For example AZERTY in France, “QWERTY multilingual standard” in Canada and QWERTY in the US.

Arbitrary layouts can be created, especially for custom keyboards.

2. Our goal

Our goal is to design a keyboard prototyping software for custom keyboard enthousiasts.

Designing a custom keyboard involves mainly 2 different phases:

- designing the physical keyboard, namely the size and placement of keys
- designing the layout

In general, people who end up designing a custom keyboard have a broad technical knowledge. We can nontheless differentiate 2 kinds of users:

- **makers**, who have eletrical engineering knowledge and build custom PCBs. They may not have a perfect understanding of how keyboard protocols work, but they know the basics
- **hobbyists**, who buy keyboard in kits and build them. They want to create their own layout and may not know how keyboard protocols work.

We focus on the first category of users, but our software should still be usable for the second category.

The 2 phases are not completely independent: the choice of how many characters are needed impacts the number of keys. The way keys are placed can in turn impact which characters and actions are easier to perform.

There is currently no software that allows to do the 2 parts in the same integrated tool, and that is what we want to do.

3. The problem with keyboards

The process of designing a custom keyboard or a custom layout requires to have some **conceptual understanding** of how keyboards work.

It is possible to mitigate part of this complexity if the software do things automatically for the user, but as soon as the user want a specific feature, we cannot hide the complexiy anymore. Imagine builing a custom car: you don't need to understand everything to change the colour of the car, but if you want add a pedal then you must be more informed.

As a consequence, the software has an educational role: the way the user understand the keyboard conceptually (its states, what is possible and what is not, how the OS will resond to unusual combos) may be wrong, so the software must help having a better understanding of keyboards. In particular, the way the software represents keys and character has to be somewhat coherent with the way it works in reality.

4. Usability criteria

TODO :

- easy to do incremental changes
- easy to go back
- fast to setup common keys (letters, numbers)
- templates for common layouts and geometries (time gain)
- tips for unknown features

5. Evaluation

As building custom keyboard is pretty niche and requires some technical knowledge, we will have to set the scene by giving missions and goals to test users.

TODO :

- users in different filieres (SE, IGR, other)
- list of tasks
- how do we evluate the "Tips" of the software ? The user does not know he needs these features on his keyboard, but they may be really useful