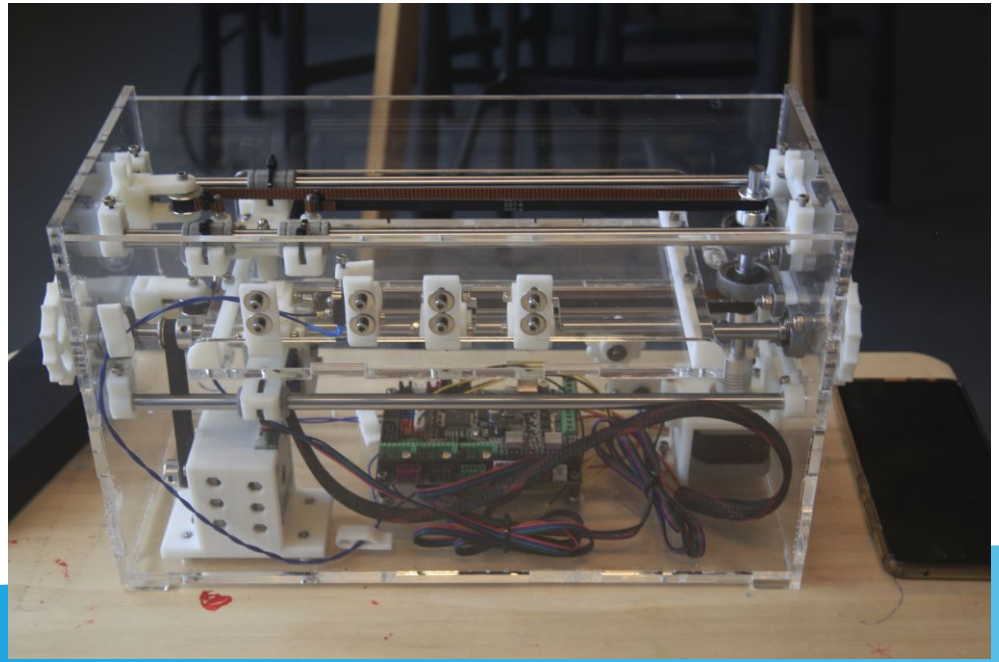
BrailleRAP

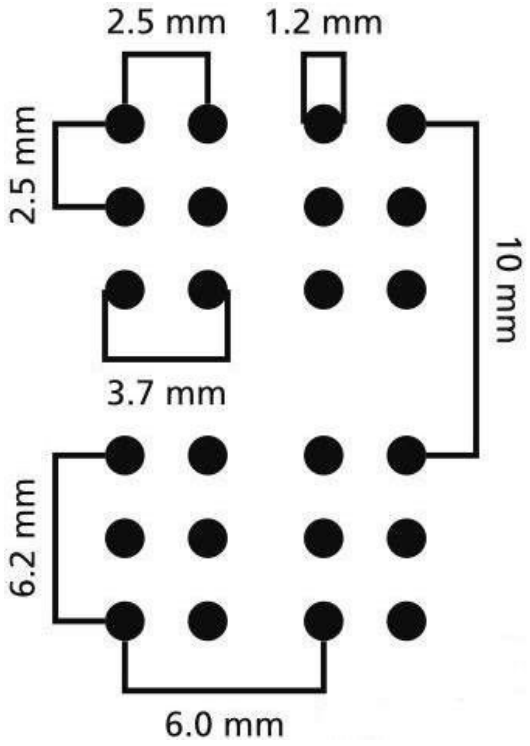
From Hackaton idea to the Hackaday Prize



What is Braille

Imagined in 1829 by Louis Braille. Braille is a tactile alphabet for unsighted people. Historicaly made of a grid of 6 dots , recent standards use 8 dots grid.

Each Braille cell correspond to a letter or an escape code to specify capitals, numbers or punctuation mark.



What is Braille

Due to the limited number of combinations in a cell, each country as adopted is own Braille standard.

In French :

a =  A =  1 = 

In English :

a =  A =  1 = 

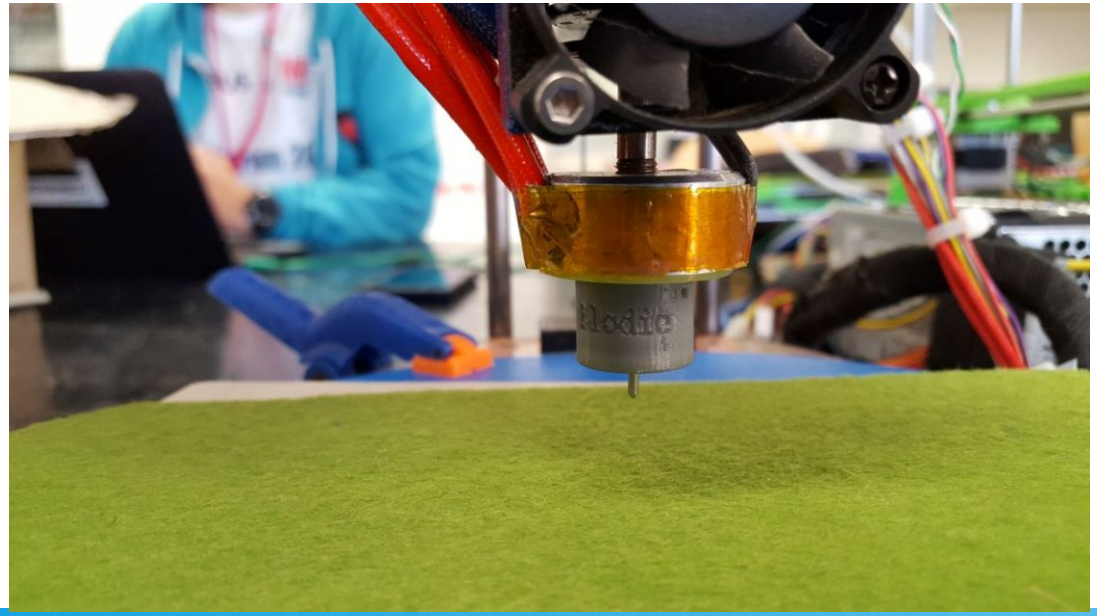
Braille in Makers movement

Making Braille documents for unsighted people has been a topic for a long time in makers movement. From BraillGO to Open Braille, many projects tried to produce Braille documents.

Many of these projects were some kinds of proof of concept, producing Braille with some succes, but hard to reproduce.

Braille in Makers movement

In 2016 My Human Kit, a french non profit organization organize a hackathon where they start with customized 3D printer and a piece a software that translate text into Braille and Braille into GCODE.



BrailleRAP

In 2018 all these projects made us think that we must start a Braille embosser project :

- Open source (CERN 1.2)
- Easy to build in a Fablab
- Widely available parts

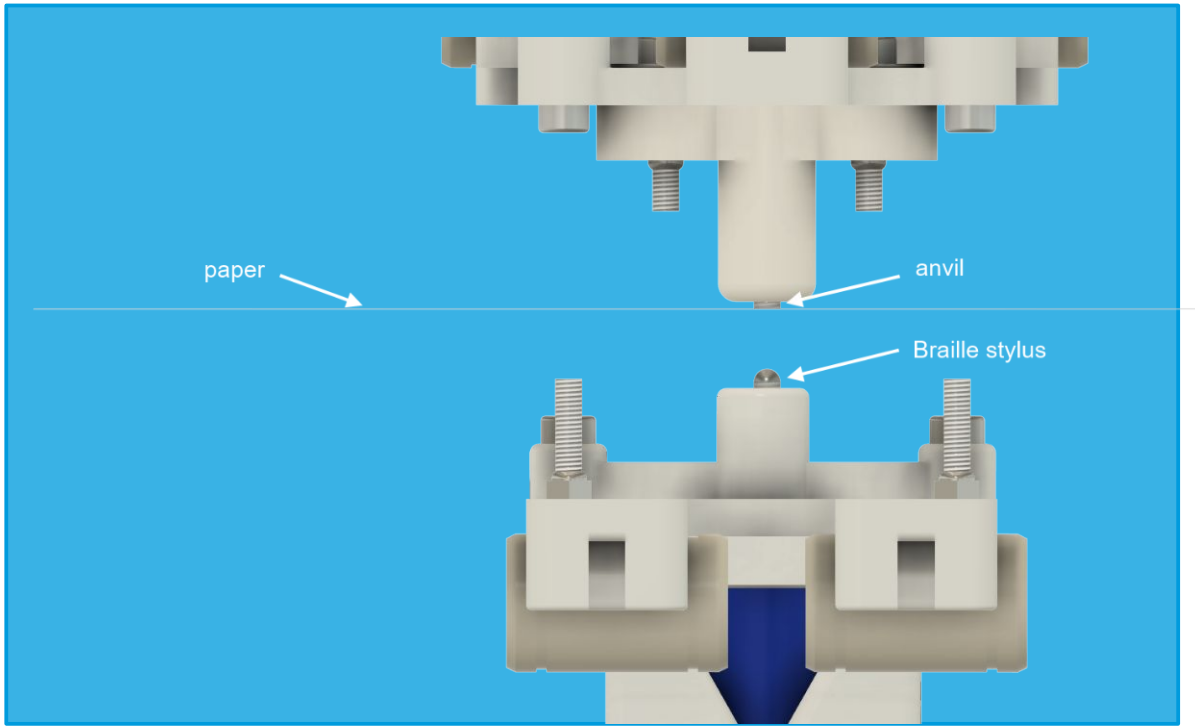
BrailleRAP

The first point was making Braille Dots, as all other project use servo-motor or motor to pinch a sheet of paper between a Braille stylus and soft material, we choose to use a solenoid.

Solenoid are strong, fast, cheap and easy to operate. So we put a Braille needle at the end of a solenoid.

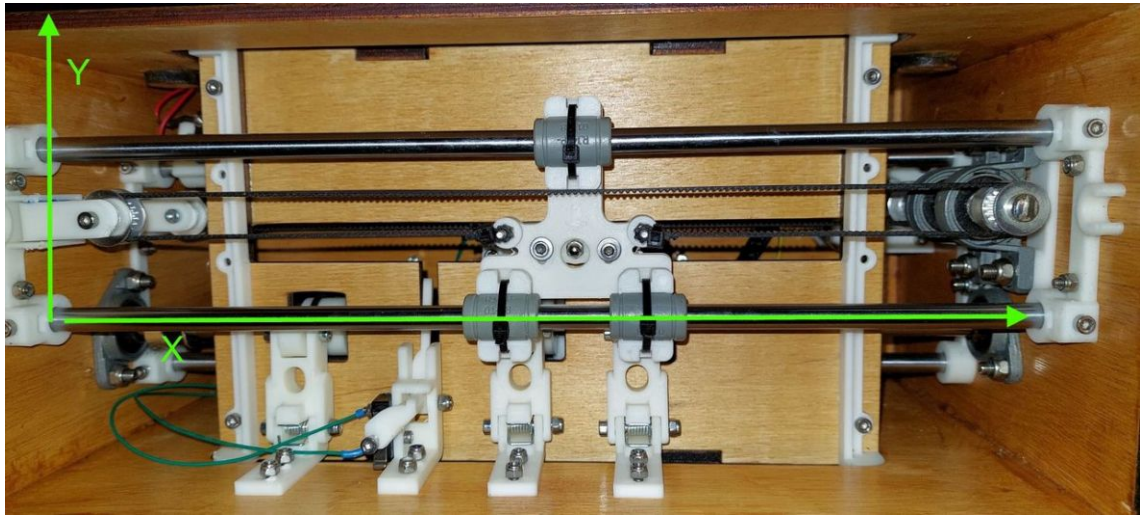
BrailleRAP

Pinch the paper between the needle and an anvil, work incredibly well.



BrailleRAP

Once we had a tool to emboss Braille dots, we need to move the tool along X and Y axis of a paper sheet. This is a standard X, Y design with the sheet of paper passing between two synchronized carriages, one at the bottom and the other at the top.



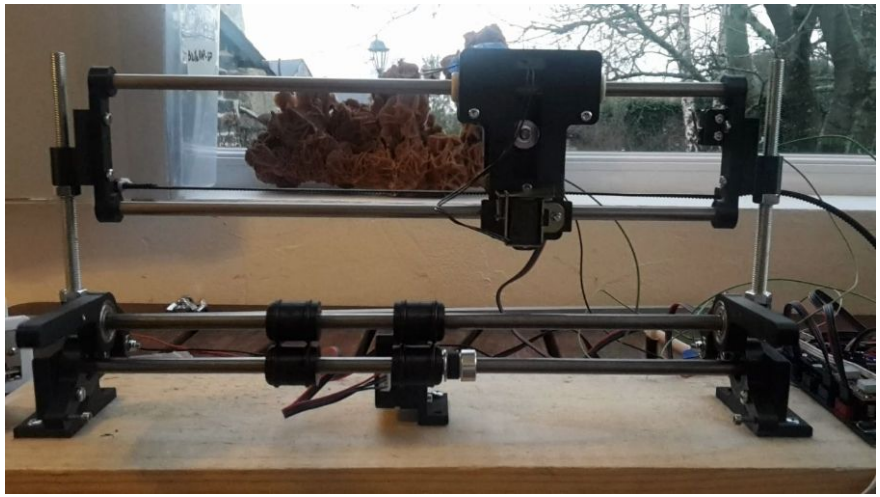
BrailleRAP

And actually this is what is BrailleRAP, a numerical control machine with a specialized tool to emboss Braille dots. Something like a RepRAP with an embossing tool.

- Laser cut frame in plywood or PMMA.
- 3d printed parts.
- 3d printer gears like linear rods, steppers …
- 3d printer controller board with customized Marlin firmware.

BrailleRAP

And because designing a satisfying machine is a kind of journey, we improved the design from time to time.



BrailleRAP

Handling the paper sheet without paper jam was challenging. Paper is a strange material, it seem very smooth, but in some situations it is incredibly strong, strong enough to lock a Nema 17 stepper.

- Do not force a piece of paper, just tell him where to go !

The software

2018 BrailleRAP

A piece of javascript software written during the Fabrikarium

- Braille translation is in French
- The software generate GCODE files. We needed Pronterface to send the GCODE to BrailleRAP.

Not very user friendly

The software

2019 NatBraille

NatBraille is an Open Source Braille translation software in Java.

- Braille translation is in French.
- Just a print button, no more file handling.

Java evolution bring compatibility issues.

The software

2023 AccessBrailleRAP

- Braille translation is operated by LibLouis library => 200 Braille standards are availables from French to Chineese passing by Swahili, Arabic ...
- Accessible software, fully tested with NVDA screen readers.

The software

Coming soon

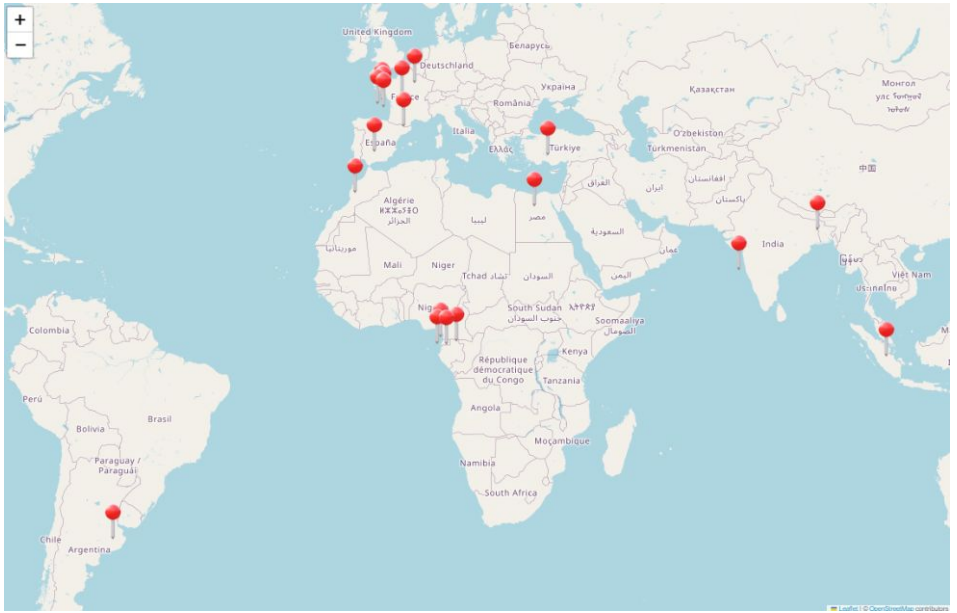
- ESPBraille, an esp32 extension to use BrailleRAP with a smartphone, funded by the CCLab.
- DesktopBrailleRAP to mix vector graphics with Braille text.

What made the difference

Since 2018 and the earlier version, BrailleRAP has been reproduced in several countries and notably :

- BrailleRAP Cameroun, a CCLab operation, 6 BrailleRAP in 4 workshops in 4 cities.
- Fab 23 Buthan by the ALU team

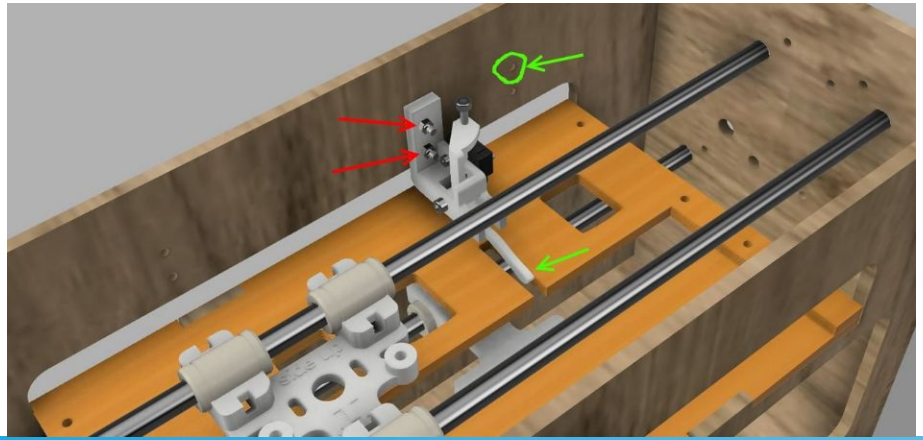
...



What made the difference

Mainly for one reason : The documentation / assembly guide

- A never ending story. We work hard on it again and again.
- ~160 pages of step by step assemby guide.
- 3d rendering is better than photo, you show what you want.



And now ?

Braille availability is still an issue all over the world even in our countries.

- BrailleRAP may be a solution for small organizations or individuals, how can fablabs take a part in distributing the solution ?
- More widely, how can open source/hardware promote/provide inclusive solution.

Open Source

BrailleRAP and all the software ecosystem are licenced under free licence (CERN, MIT, GPL …)

These projects use many open source bricks, we can count more than 200 open source contributors. Let this be another opportunity to thank them.

Thank you for your attention

BrailleRAP is supported by :

More info

Some resources to go further :

Web :

https://www.braillerap.org/en

https://hackaday.io/project/191085-braillerap-diy-braille-embosser

https://github.com/braillerap

https://forgecc.org/?AtelierBraillerapCamerounGrandPublic

Assembly guide :

https://braillerap-en.readthedocs.io/en/latest/index.html

Video :

https://www.youtube.com/channel/UCdn-9dWhULfwamQSaogn55A