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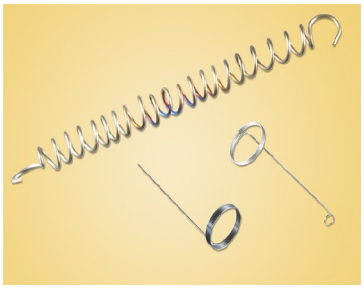
Texture the Braille Reader

If we look into the current scenario of consumer electronics, we see that everyday there are people trying to make the devices feel better and cost lesser, with iterations of each product coming every few months, hence making them better and better. Now the same cannot be said about the products for the handicapped, whatever they may be, one design sticks for a decade or so ,with the users having to be content with mediocre experience with the devices,with this sort of a approach we are saying “after all what more can you expect?” to the people who use them. On top of all this all the braille devices are insanely expensive costing around 4000 $ (please refer to humanware's product line). Obviously it is out of the reach of the common man let alone the lower income groups. Another thing which we felt was necessary was a change in the image in peoples mind when they think about such “special” devices, they have an image of a bulky poorly designed contraption.

Hence ours is an effort to address all the above issues

- To make braille readers more affordable.
- To make them blend in with other common devices rather than stand out oddly.
- To spread the experience we acquired during building it so that others can join in the effort(read open source)

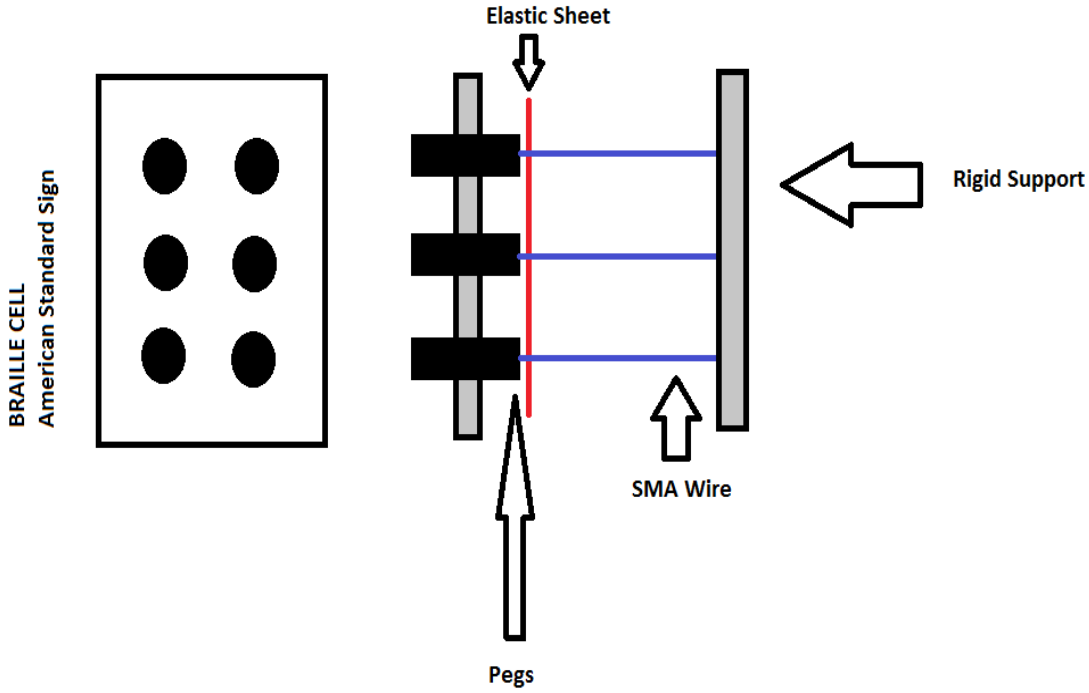
In the following sections I will try to describe the braille reader and how we are tackling the issues we mentioned above, it is only a proof of concept device which we hope to develop further in both functionality and design.



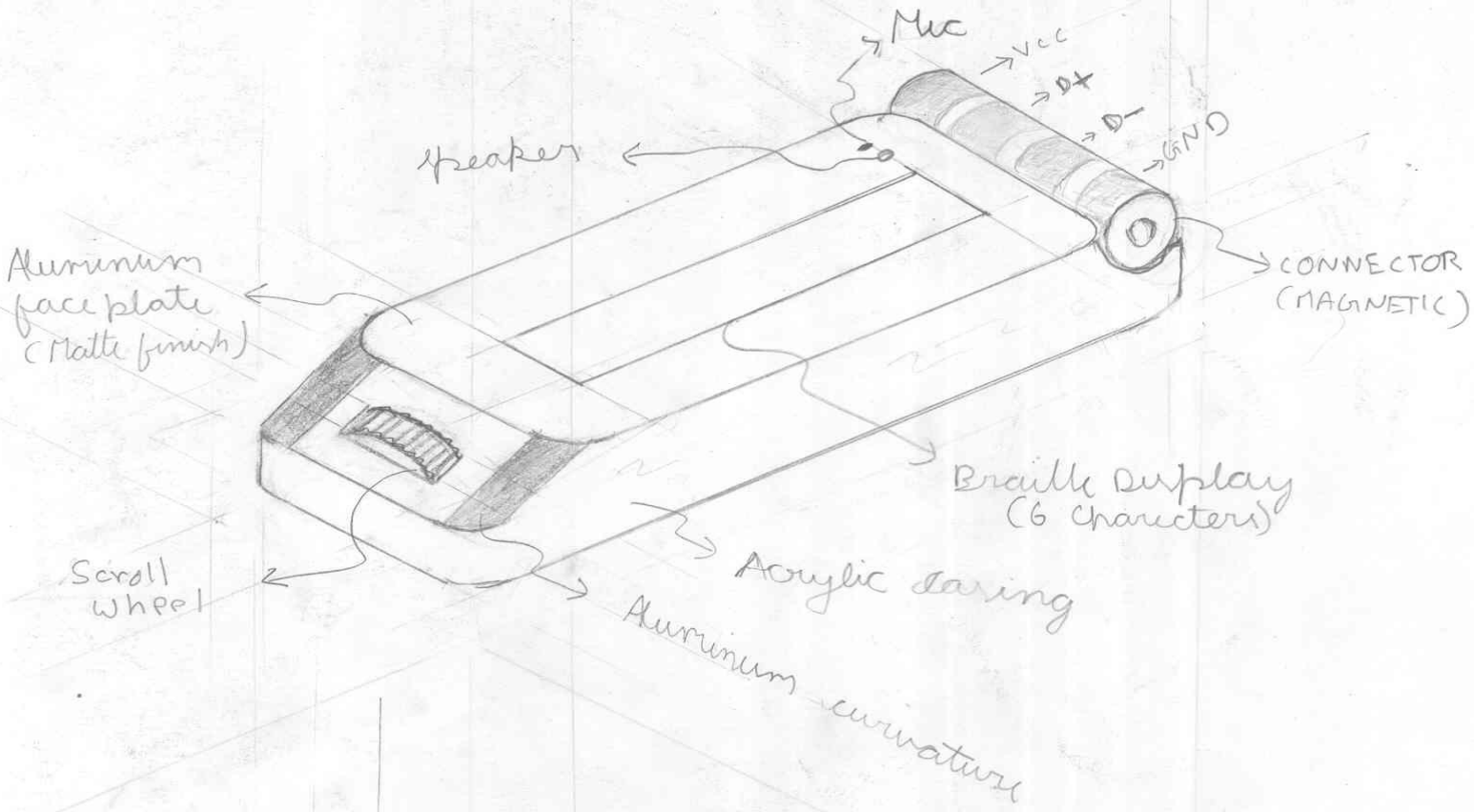
The key component of the device is using Shape Memory Alloy (Nickel Titanium alloy), the use of shape memory alloy gives us the advantage of reducing the cost compared to using solenoids or piezoelectric actuators. The only disadvantage being that the response time is slow(of the order of 1 second) compared to that of the alternatives mentioned above, but his can be mitigated by rendering an entire line instead of a single character so that the user does not have to wait for the character to get rendered.

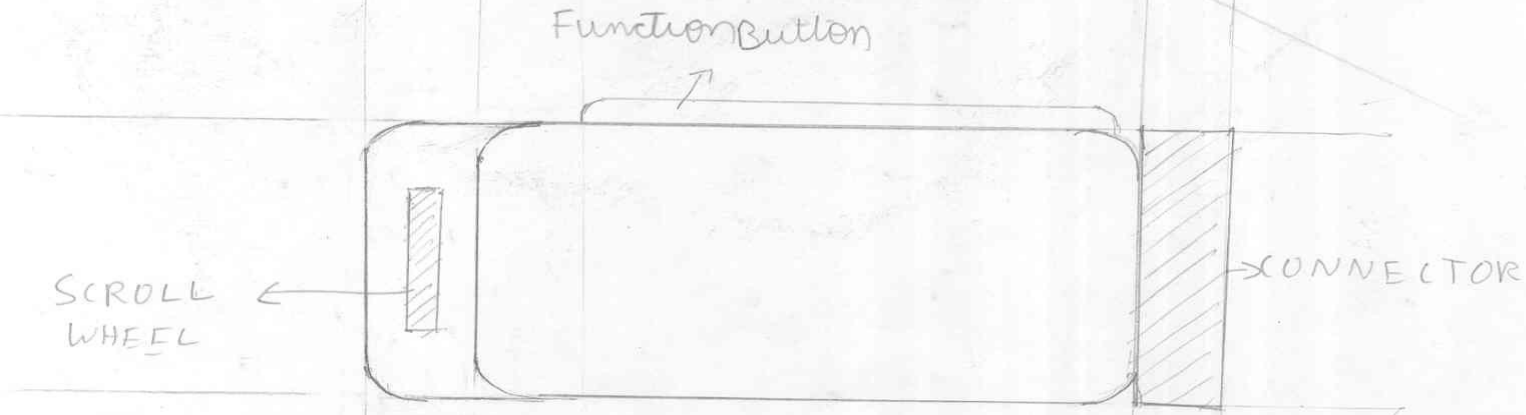
The “pegs”(we used zener diodes as they were of the appropriate dimensions) which form the braille dots are attached to these SMA wires and when they contract , the pegs retract into the device to a distance of 0.5 mm, whenever released an elastic sheet restores them to the original position. This way the braille characters are rendered.

Below is a **schematic of how the actuation works**



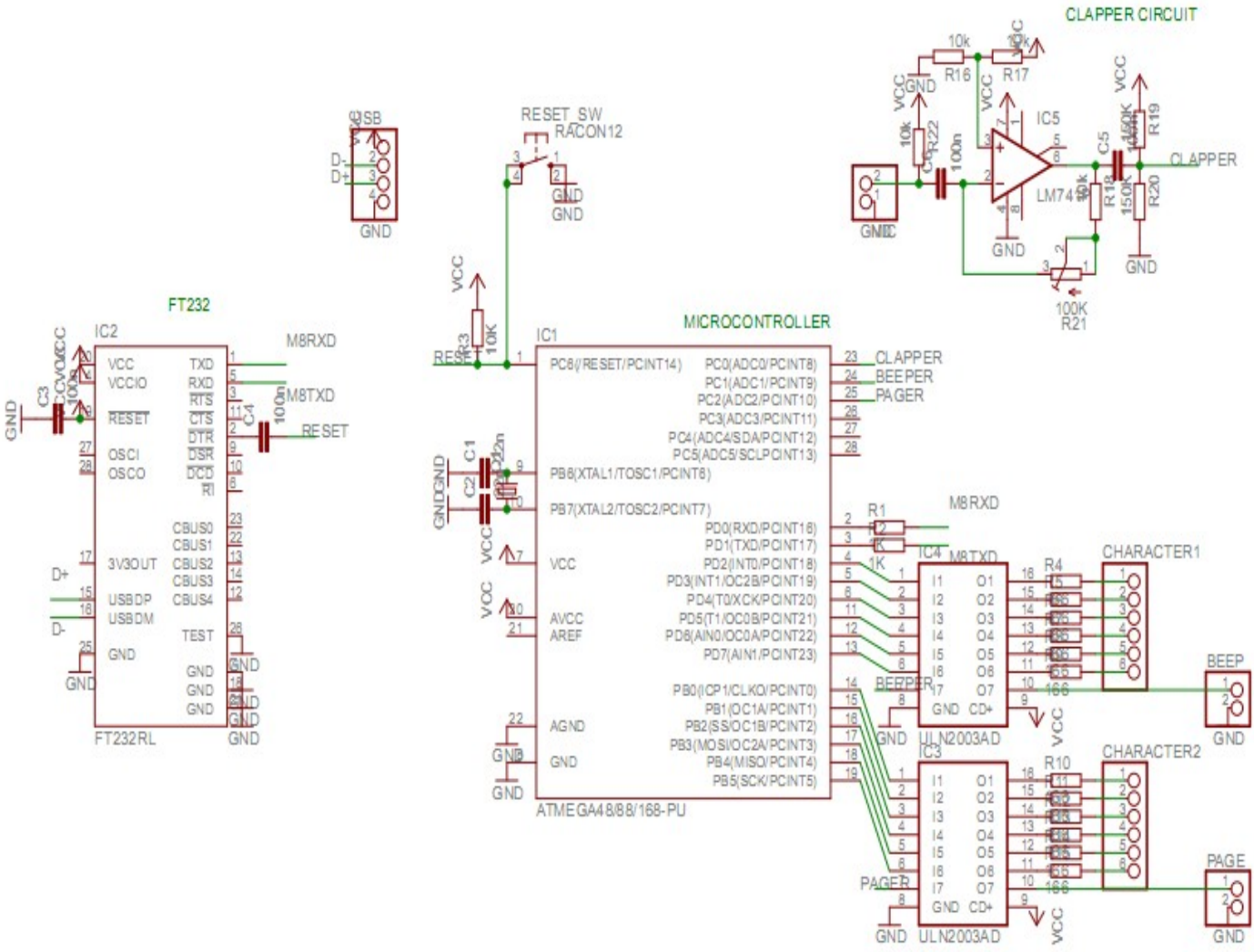
Here is the **DESIGN BLUEPRINT** of the braille device


Mic
Vcc
D+
D-
GND
Speaker
Aluminum face plate (Matte finish)
CONNECTOR (MAGNETIC)
Braille Display (6 Characters)
Scroll Wheel
Acrylic casing
Aluminum curvature

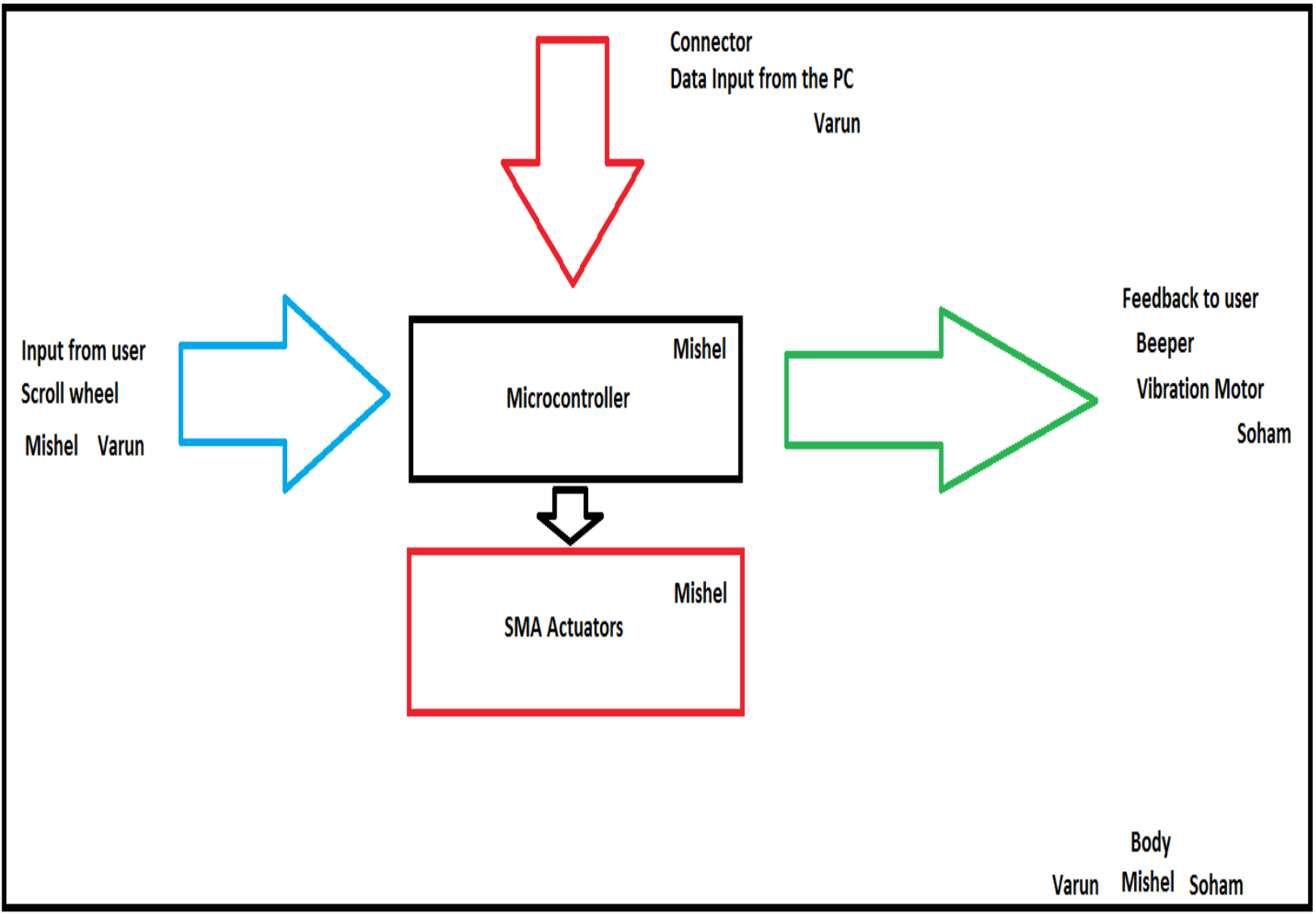

Function Button
SCROLL WHEEL
CONNECTOR

TOP VIEW

This is the circuit **SCHEMATIC** of the braille reader



Below is the **BLOCK DIAGRAM**



PARTS LIST

• Shape Memory alloy	- from Mondotronics
• Scroll wheel	– from usb mouse
• Aluminum sheet	- Workshop
• Acrylic	-Workshop
• FT232	- Visha electronics
• ULN2003	-Visha electronics
• Assorted resistors and capacitors	-Visha Electronics
• Arduino Board	-Lab
• 4 pin jack	-Champion connectors
• PCB	- PCB lab
• Zener diodes for the pegs	-Visha Electronics
• Elastic sheet (cut out balloon)	-general stores

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Prof. G.G.Ray for his valuable inputs on the design
and everybody in the workshop for helping us build the device