Cybernetic Prosthetics

M.J. PR. 1
(A Process)
### by Goretti Pombo
& Jamir Fecunda

Our idea was to make use of the PinArt toy to make a humanoid. This idea came from the term "uncanny valley". It describes our strange revulsion towards things that appear nearly human, but *not quite right*.

This was very interesting to me as it connects in my opinion with imaginary things. Imaginary things often provoke wonder too. So in some way, the M.J. PR. 1 was supposed to cause wonder in the viewer.

Jamir Fecunda and I, were playing with a PinArt toy and we had the idea to make an automated version of it:
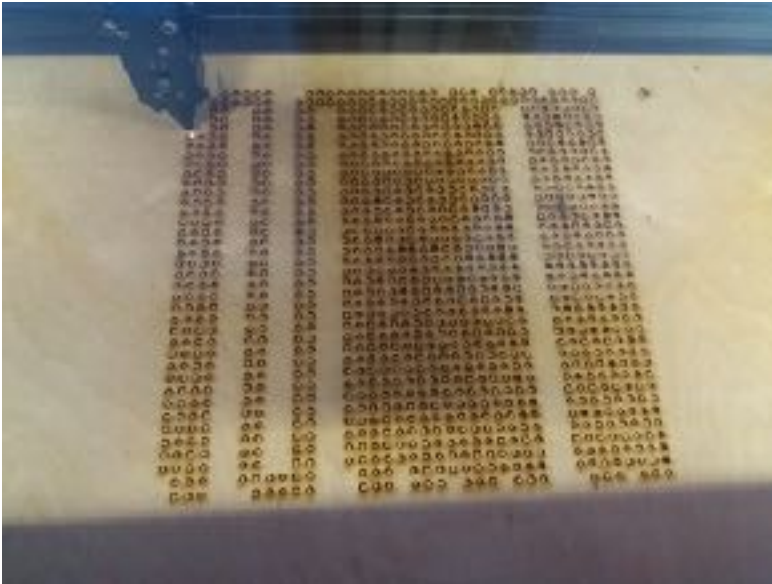
The first step was to make the frame for the PinArt.
We used a laser-cutter to do this.
This panel has almost 2000 holes.

Then we had to create the pins. We decided to use wood skewers as we thought it would be something that could be done quick. After all, it would have to be 2000 pins. Since we had defined that the length of the pin had to be 10 cm, we had to cut almost 2000 sticks by hand. And after this we also had to glue beads to them as to create the head of the pin. This took way too much time.

When we had a considerable amount of pins, we started putting them into the panel. We noticed the sticks were crossing each other behind the panel.

Upon closer study of the normal PinArt toy, we realised it has two panels that - at the right distance from each other - hold pins straight. So we laser cut another panel. Another thing we overlooked was that the toy has a see-through plastic that will keep the pins from falling out of the holes when pushed.
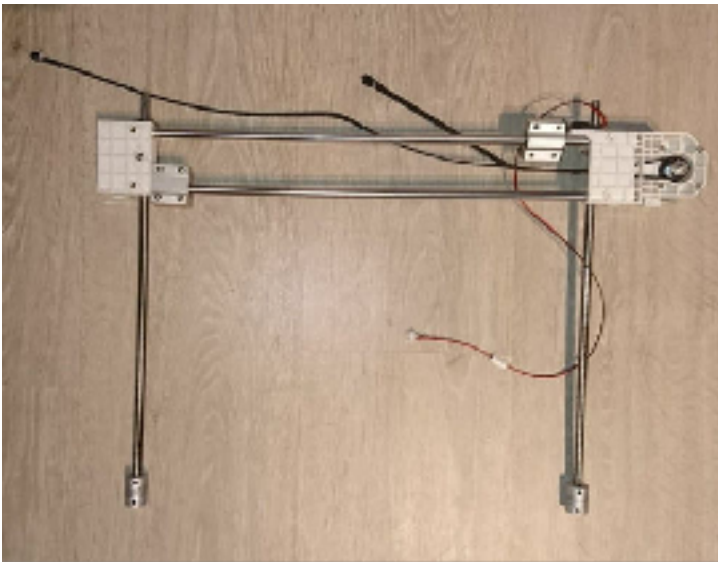
For the PinArt to be automised, we had to think of a way in which the pins would be pushed out by the machine itself. So, if we had something that could move in the x, y and z axis, it could push each individual pin to a certain distance to create the 3D impression.

My partner, Jamir, had a 3D printer at home which he deconstructed to get the spindles to use for the x- axis.
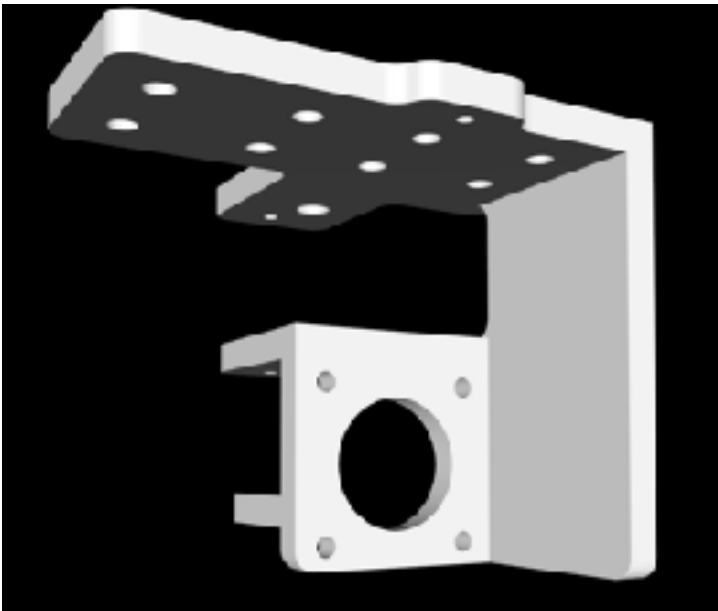
To create the z- axis, Jamir created an object that would be attached to the belt of the y-axis. He also created a pin that would have the function of pushing out the wood skewers. This pin would go in the above-mentioned object. And would roll out with the help of a toothed belt.This toothed belt also came from the 3D printer.
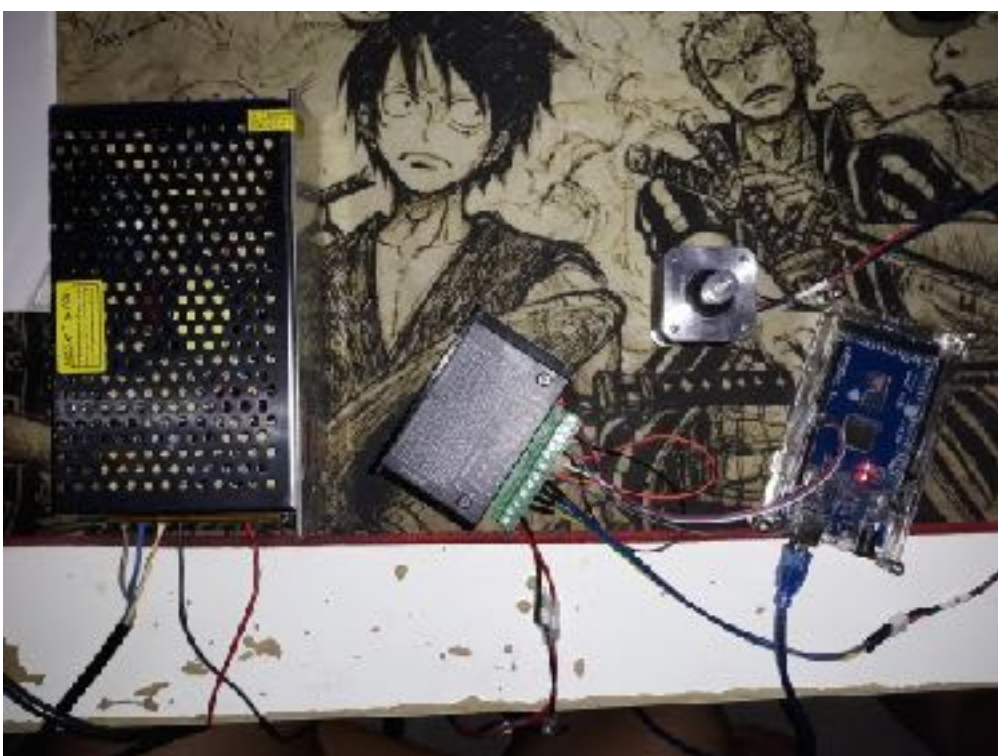
We 3D printed both the object and the pin.
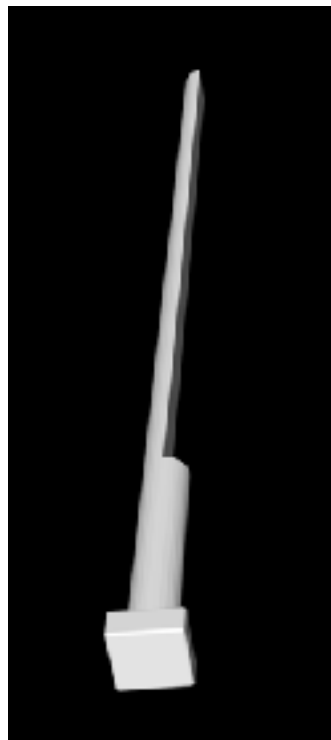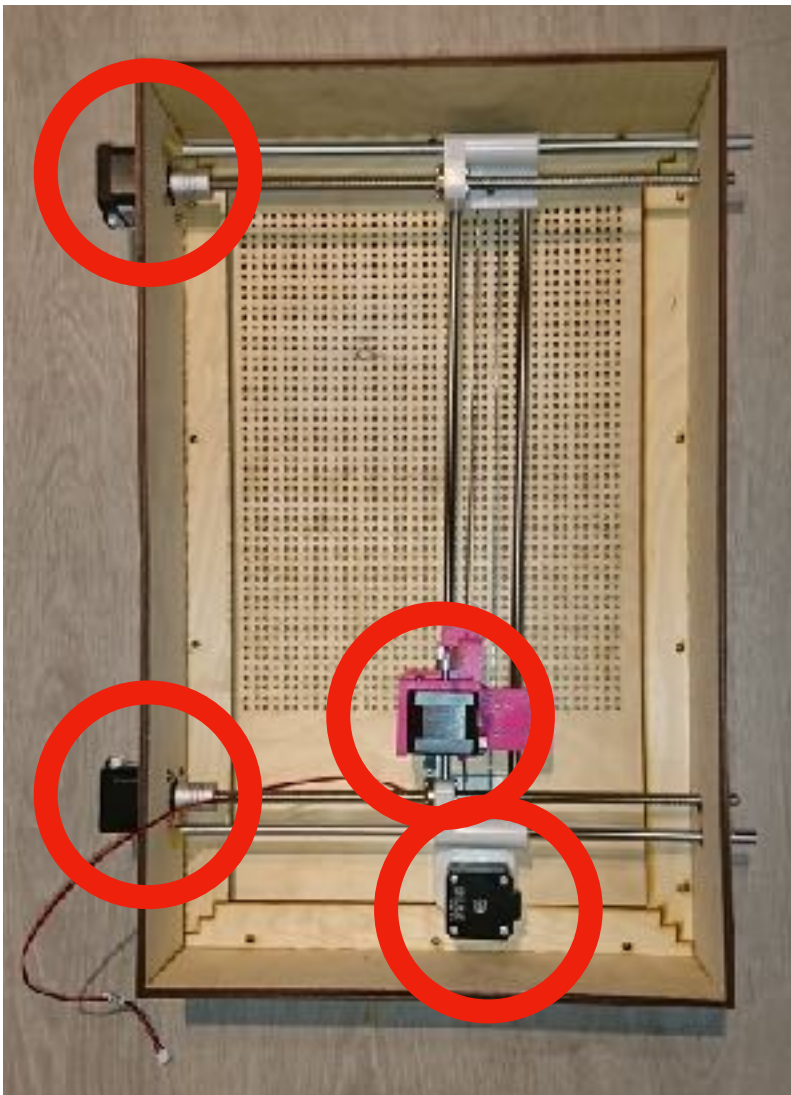
To make the axes move, we had to install four stepper motors.

Two for the x-axis. One for the y-axis and another one for the z-axis. And then we attached the two panels to the rest of the frame.

Then we had to experiment with the Arduino, power supply, stepper motor and the stepper motor driver. The Arduino needs to control the direction and speed of the stepper motors and that's only possible because we have a power supply that can give enough current and voltage to our stepper motors and the driver allows this current and voltage to be controlled by the Arduino.

The current state of where we're at is coding.
Coding is taking a long time.
Right now we're trying to define all of the functions for the motors first. When this is done, hopefully we can fill in the code of something simpler than a face to test out and actually see the pins being pushed out.

Then we assigned each pin a position on the code. So then we could make shapes. In the image on the left you can see a smiley face. The numbers mean the distance in which the pin shall be pushed.

But there is a lot of trouble shooting to do because our machine won't even make this smiley face….

If we had more time, we would want to:

1.Use a linear motor or a linear actuator for the z-axis. This motor would solve the problem in which the 3D-printed pin couldn't be roll correctly on the belt because it was crooked. Also, this linear motor would make a faster pathing system like a CNC machine.

2. Do the facial recognition.
3.Use another material instead of wood to make the panels and the pins to avoid the friction. We think some kind of plastic will be a better option.
4. Experiment with using another material instead of beads as the head for the pins. The goal of this would be to try to create a weirder texture an appearance.
Ideas:

Breakfast in Fur
by Meret Oppenheim
Paris, 1936

5. Paint at the sides of the pins so when they come out, the viewer can see another image forming.
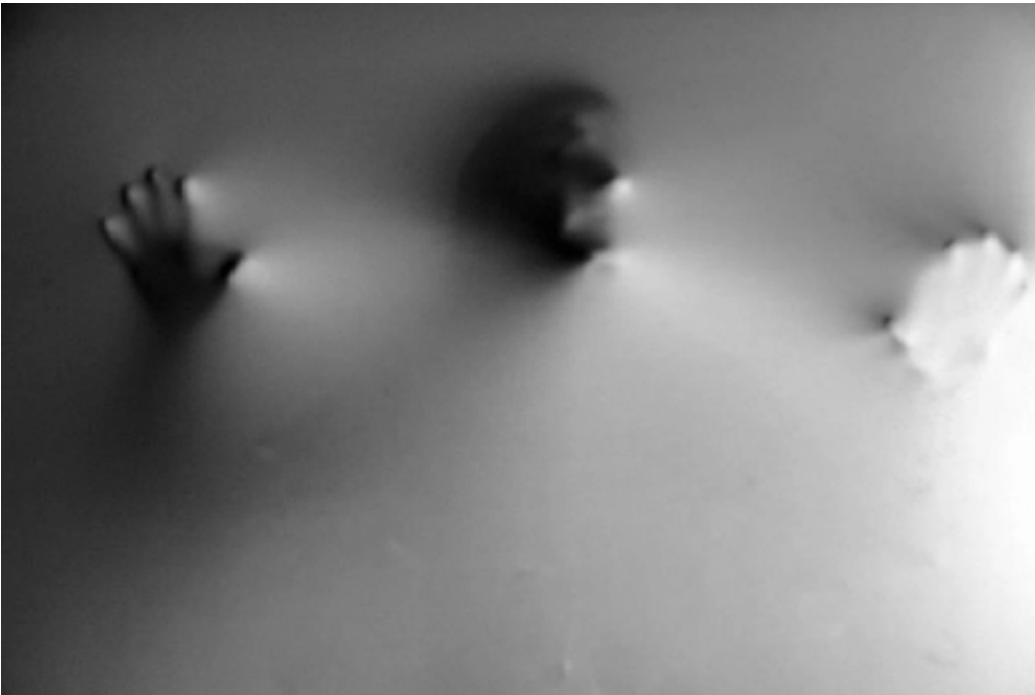Ideas:

Yes/No
by Markus Raetz

6. Focus more on the appearance of the machine as a whole.
Ideas:

Kissing booth & Fortune Teller booth at the Circus.

7. Maybe add fabric to the equation. In the sense of: Maybe print an image on a piece of fabric and then our machine would push through the fabric in different points to create distortion.

From Devices to Systems
The journey to make this machine was for me kind of the assignment *From Devices to Systems* but backwards. Instead of opening up a black box and finding out how it works, Jamir and I were creating our own black box. And for me this was such an enlightening experience because I am really not a technical person. So as I was working on this project, I had to to learn at a pretty high speed how a lot of the elements of our machine work. So this was my way of executing the *From Devices to Systems* assignment. I studied the PinArt toy and made an adaptation of it.
This was my way of learning how something works and to adapt in some way.