PLOTTER – ELECTRONIC DIGITAL PRINTER

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ABSTRACT

This article describes the process of building a homemade plotter. Authors present the list of parts required for this project, where they can be found, and how to put them together. The practical realisation of mechanics, electronics and software is also described.

1. INTRODUCTION

The main goal of this project is building a plotter, which can offer highest possible quality of printed shapes at a reasonable cost of build.

2. MATERIALS

Materials for building this machine are very expensive; accordingly, it is better (cheaper) to use some second-hand parts. In my project, I used an old table-scanner, a printer and a cd-rom. I also used universal circuit board, piece of sheet steel and screws.

3. CONSTITUTION

In the beginning, I brought the scanner, printer and cd-rom to pieces. From scanner I removed the lamp, electronics and all other elements except the stepper motor, and the bar with the tape. Next, I took the bar with the cartridge's trolley, tape and motor out of the printer. From the cd-rom I took whole laser with mechanics.

3.1. MECHANICS

I put together the printer's mechanics and the printer trolley (the construction must be multi-level and move easily along the bar). I also put the cd-rom mechanics on the printer trolley. You can see this in Figure (2a).

The next step is to put a pencil on the laser's head. You should be able to remove it easily in order to sharpen it. This can be seen in Figure (2b). Afterwards, I assembled the mechanics of the Y axis on the printer trolley (Figure 2c).

Finally, I put a mat for paper. The whole plotter can be seen in Figure (2d).

3.2. ELECTRONICS

For controlling the motors, I need a driver. Constructions of this driver depend on types of motors used. In my case, I used hybrid motors. For building a driver, I used the circuit shown in Figure (1a). This driver gave me the possibility to change the rotation by changing states on "KIER" input, and the possibility to stop the motor by blocking the generator's signal on the "GEN" input. For the Y axis, I used another driver, which is shown in Figure (1b). For controlling this motor, one signal line is sufficient. This motor is used for moving the pencil up or down. The last move is to set the coordinates of the pencil tip. To do this, I use four switches to move along X and Y axis. The last unused pin is used for a "stop printing" button (shown in Figure 1c). [1]
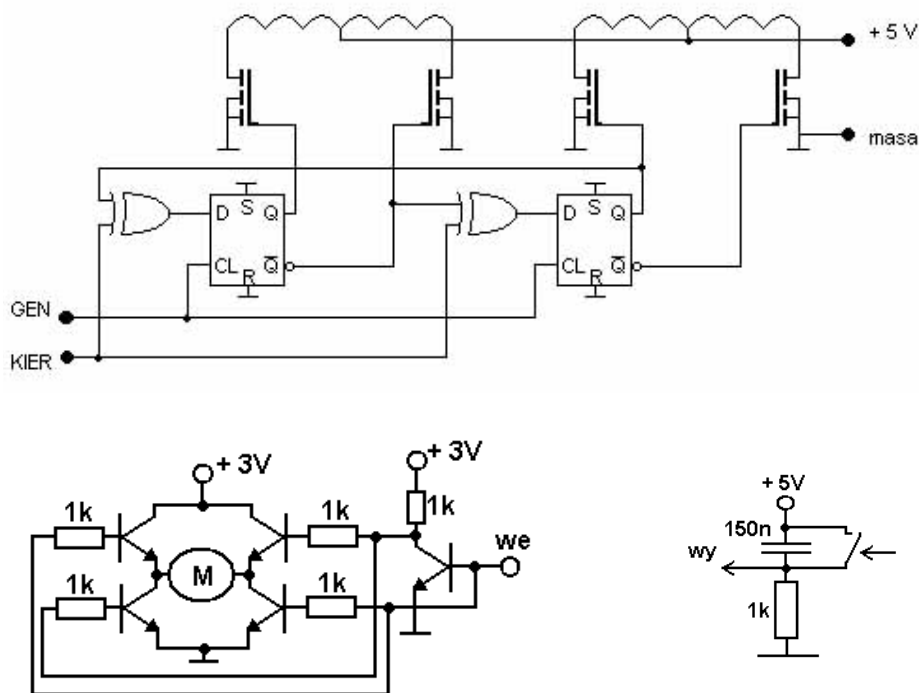
Obrázek 1: a) stepper motor driver, b) current constant motor driver, c) switch

3.3. SOFTWARE

The whole plotter will be managed by CNC molding machine driver - MACH2. This driver is very expensive, but the demo version of it is enough for this plotter. The LPT port is used for the communication. The MACH's configuration needs adjusting for a specific equipment, so I'll need to look into documentation of this driver which is available on-line. [2]
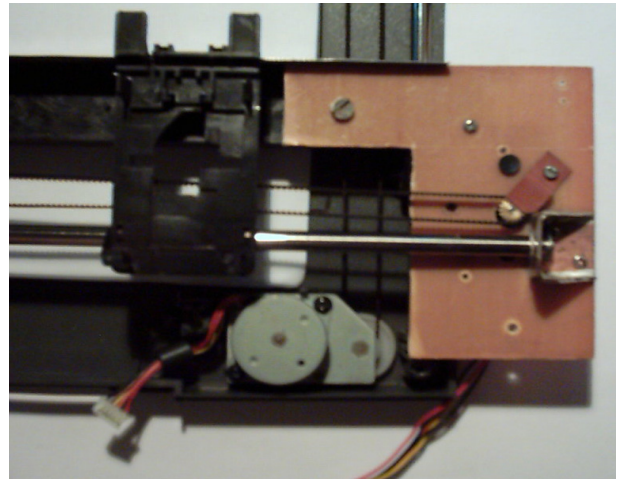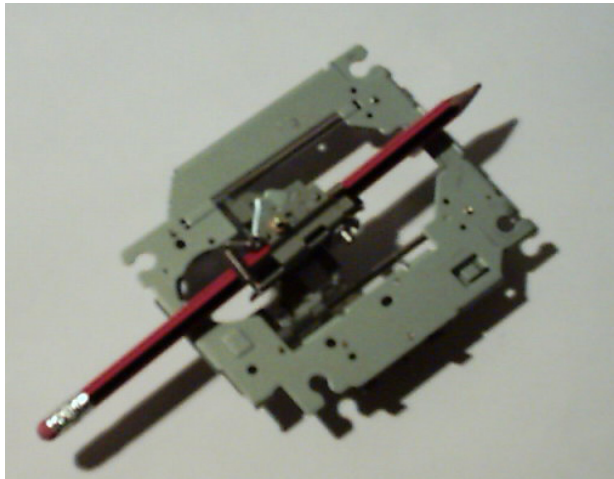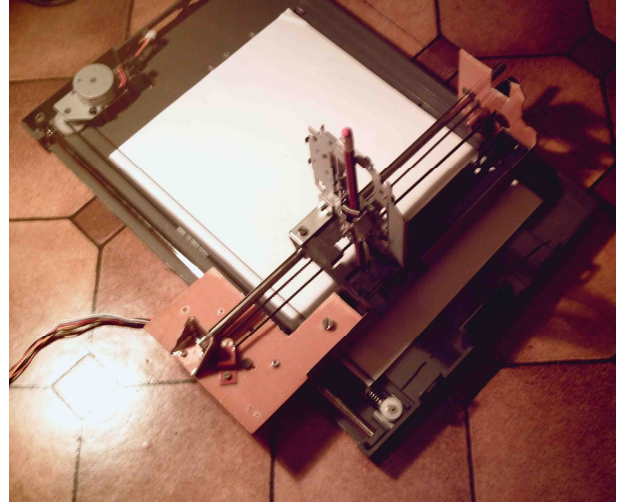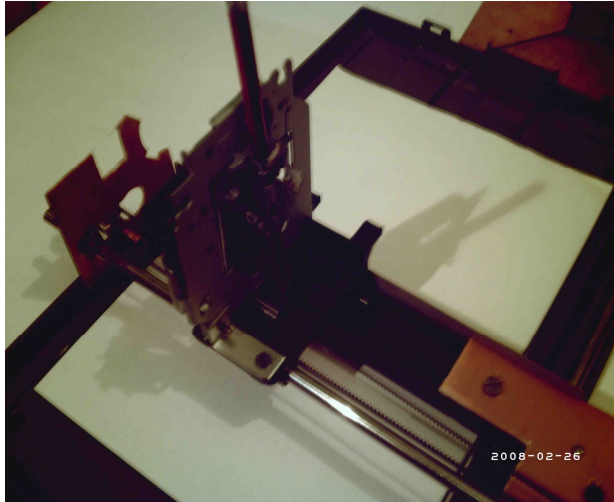
Obrázek 2: a) plotter mechanics, b) plotter mechanics, c) axle Y mechanics, d) joint axles

4. CONCLUSIONS

Building this device seems to be an easy task. In fact, it appeared pretty difficult. The most difficult was creating the mechanical part using available materials. Electronics was made from a scratch and it allows further development. By changing the Y-axis mechanics and attaching e.g. drill the plotter can be converted to a precise molding machine (able to work with soft materials).

5. REFERENCES

[1] Pióro B, M.: Podstawy elektrotechniki, WSiP, Warszawa 1997, ISBN 83-02-06661-3

[2] ArcSoft Int., Mach2 documentation, available online:
http://www.artsoftcontrols.com/documentation/