I built a completely homemade, fully functional 3D printer, using parts from an old Dell desktop computer that ran Windows 98. This little printer actually rivals the quality of commercially available 3D printers, and it cost me practically nothing to build. Here’s how I did it.

If you’ve ever wondered how a 3D printer works, you’d be surprised to learn that the process is actually fairly simple. 3D printers work just like their 2D counterparts, but also have the ability to move up and down, meaning they can print layers on top of each other. In this way, a 3D printer can literally build almost any object, by adding layers and layers of melted material on top of each other. All I had to do was take that theory and use it to create a functional 3D printer.

The first step was to go to Instructables.com and look up a tutorial. I’m not joking, this is actually where I got the idea for this project. I used the site for reference multiple times throughout the building process. It was was a great starting point for me, and I’ll leave a link in the video description in case you want to check it out yourself.

I used the plans from the Instructable to build the printer frame, the part that holds everything else together. Using a bandsaw, I cut the design out of fiberboard and then glued the pieces together.

Next, I needed motors that could move in different directions and give the 3D printer its ability to move in three dimensions. This is where the Windows 98 computer came in. It had multiple Optical Drives inside of it, the components that spin CDs around and read them. By taking the Optical Drives apart, I could access the small stepper motor each one had inside. These presise motors would move the laser that could read and write a CD. Each motor also had a metal mount attached, making it perfect for a 3D printer.

I removed all the former lasers from the motors are replaced them with the parts I needed to convert the CD motors into 3D printer motors. I actually used a different 3D printer to custom make these attachments so they would fit perfectly to the motors. I outfitted one stepper to become the print plate, the surface that the printer would print on. The other two motors were attached to each other, so the printer could move back and forth as well as up and down.

The next step was to mount the newly converted 3D printer motors to the frame. With a few nuts and screws so I could level all the motors later, I had a printer that could move in three dimensions!

Then I added the internal organs of the printer: an extruder motor. This motor pulls the plastic material from a spool, then pushes it through a long tube into the hot end. Like the name suggests, the “hot end” gets very hot, around 200 degrees Celsius. This melts the extruded plastic and allows it to squirt onto the print plate. Thanks to a well-placed thermistor, I can accurately monitor the temperature of the hot end and make sure that the printer is running smoothly.

But heating up the hot end and moving the motors takes a lot of electricity. To power my printer, I took a standard computer power supply and attached it to an adapter that let me take electricity straight from a wall outlet and turn it into the 12 Volts my printer needed to run smoothly.

Finally, it was time for the brain of the printer. Thanks to two thumbscrews at the back of the printer, the motherboard, that controls the entire 3D printing operation, is easily accessible. This MKS circuit board is what actually runs the entire printer; it communicates with the stepper motors, extruder, hot end, fans, and the computer that tells it what to print. Every single one of those wires lets the motherboard tell the parts of the printer exactly what they’re supposed to do. Once the motherboard was working properly, the entire printer ran like well-conducted orchestra of electrical mechanisms and parts.

With the addition of the small, red, end stop switches you see attached to the end of every motor, the physical components of the printer were complete! All of the components working together formed a fully functional, homemade, 3D printer.

But while the physical part of the printer was complete, it couldn’t print anything just yet. The MKS board needed its firmware, and I needed to tell the board exactly what it should do. Setting up and configuring the software actually took longer than building the entire printer, so that’s content for different video.

After a ton of headaches and integration issues, I finally got the printer running smoothly. I could send it a 3D file, and then it would print it out of plastic! Once it was working, it was really fun to play with.

--Long time lapses—

In the end, this 3D printer was an amazing project. From when I started taking apart that old computer to now, it’s been almost a full year! There were multiple times that I got frustrated and set the project aside for months at a time. But I stuck with it, and I’m glad that I did! It was an awesome learning experience that taught me a ton, and let me have fun while I was doing it. You don’t have to go out and build your own 3D printer from scratch, but I encourage everyone to find something out of their comfort zone to work on. You’ll likely learn something new while doing it, and might just discover a new passion. I’ll see you next time.