Modular Numerical Controlled Prototyper

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Many machines that are used for building prototypes of electronical devices have a similar setup but although every machine must be bought, it is rarely necessary to use all of them at the same time. The solution for this problem is to use only one machine with exchangeable modules for different tasks like milling, 3D-printing or laser cutting. In addition to that, we developed the hardware and software for the controlling of the machine and the different modules. We developed a system for mounting different modules with all the necessary electrical and pneumatic connections on the movable bracket of the base machine. The heart of the hardware is the main microcontroller which controls the motors for the movement of the axes. It also communicates with a PC and all the other microcontrollers in the hardware which are responsible for controlling the modules (for example the heating and filament supply for the 3D-printing module). On the PC, a self-written control program is running which lets the user configure and monitor the tasks that are executed by the machine. Modularity is our leading principle and does not stop after the mechanical part. Therefore, the hardware of the module control units can be easily exchanged so only the required units have to be bought and the look of the software can be customised by the user. Our project showed that such a machine is useful for the development of electronical devices or for hobby electronics engineers.