Creation of an FDM 3D Printer Constructed Entirely by Parts Created with Additive Manufacturing Techniques

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The Falcon 9 rocket can put up to 22,800 kg into Low Earth Orbit when the first stage is not recovered; however, the payload only represents ~4.1% of the total mass of the rocket. The rest of the rocket is devoted to ascent, the phase of an orbital mission when the rocket is leaving the atmosphere. A more efficient spacecraft design, called a Von Neumann probe, is a spacecraft that can be launched from Earth once, but reach limitless numbers of planets through the process of self-replication and in-situ resource utilization. As a step toward creating true self-replicating spacecraft to solve the issues listed above, the world's first fully 3D printable 3D printer is being created. A prototype of a fully 3D printed motor has been modeled and constructed successfully; however, a custom filament that is more conductive than the stock filament has been created to increase the performance of the motors required for the printer. Along with this, a program has been developed to convert GCode files into flexible data strips that the printed printer can use similarly to how a mechanical organ functions. The models for the electronics to read the data strips and the kinematics of the printer have also be designed. In the coming years, the printer’s electronic and kinematic components will be finalized and put together to complete the printer.

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