p5.fab: Direct Control of Digital Fabrication Machines from a Creative Coding Environment

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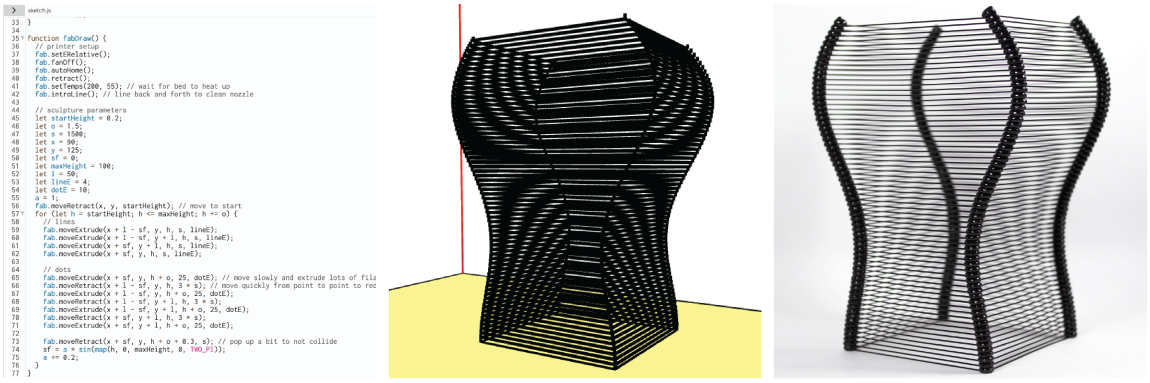

Fig. 1. Our system, p5.fab, controls digital fabrication machines from the creative coding environment p5.js. We programatically generate toolpaths using our library (left) which we can visualize in our user interface with a render command (center). We stream these commands to a desktop FFF 3D printer for fabrication; a photo of the resulting print is shown (right).

Beyond model geometry, machine settings and tuning are critical for digital fabrication outcomes. However, experimenting with toolpath attributes such as acceleration or position in the work envelope requires several roundabout user steps in various software environments. We seek to enable more direct and programmatic control of digital fabrication machines. To do so, we demonstrate p5.fab, a system for controlling digital fabrication machines from the creative coding environment p5.js. p5.fab includes of a library for programmatic control of machines within p5.js, a user interface to visualize toolpaths, and GUI elements for sending commands and receiving positions. Compared to the roundabout control offered by popular CAD and CAM software, we offer low-level control over machine toolpaths. These commands can be sent directly and immediately to the machine. We demonstrate our system through a series of example workflows which center material exploration. Beyond maintenance work, we find that toolpath control and associated tuning routines prompt us to work *with* the machine in new ways.

Additional Key Words and Phrases: calibration, maintenance, craft, interactive fabrication, computational design, p5js, 3d printing

ACM Reference Format:

Blair Subbaraman and Nadya Peek. 2021. p5.fab: Direct Control of Digital Fabrication Machines from a Creative Coding Environment. In *SCF '21: Symposium on Computational Fabrication, October 28–29, 2021, Virtual.* ACM, New York, NY, USA, 1 page. https://doi.org/10.1145/1122445.1122456