Human Computer Interaction
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Closed Loop Calibration for Laser Cutters

When fabricating 3D models using a laser cutter, users rely on manual calibration processes to determine both the settings for the machine and the parameters with which the model should be adjusted. This includes the power and the speed with which the laser itself should be operated and how this influences the model being cut. This manual process and the afford that is needed to reproduce 3D models holds the field back. In the past some of the processes have been automated. However, they require some time and still prevent users from directly starting with the fabrication task.

Your objective: Implement a calibration process that can run while cutting. Take [1] for inspiration: They apply Reinforcement learning to provide closed loop control for direct ink writing, while [2] evaluated the use of RGB Cameras to control a FDM 3D Printing process. Might the same be possible for subtractive fabrication technologies, such as laser cutting?

Action items: Implement a system that allows for calibrating while fabricating. Handle all common design elements as inputs. Select sensors (cameras, touch probes, photoelectric particle counters, depth cameras, etc.) and build software to control them and the laser cutter. Can you build the latter into laser cutters, allowing them to directly perform your new calibration routines?

Your project: Develop and test the new calibration routine. Test and embed your calibration process in a **real-world** application scenario with **real-world** hardware.

And then deploy. Help thousands of users worldwide save time and resources—and thereby extend the scope of personal fabrication to a non-technical audience.

Contact

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[1] https://dl.acm.org/doi/pdf/10.1145/3528223.3530144
[2] https://par.nsf.gov/servlets/purl/10289449