PictureBlocks: A Language for Creating Tangible Artifacts

Smaranda Sandu '14 and Olivia Kotsopoulos '14
Advisor: Professor Franklyn Turbak
Department of Computer Science, Wellesley College

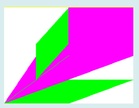
OVERVIEW

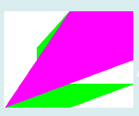
We have implemented PictureBlocks in Java using the OpenBlocks framework. PictureBlocks is the first-blocks programming language for Peter Henderson's picture language [1], which was popularized by Abelson & Sussman [2]. Intricate patterns can be created by transforming and combining simple pictures designed by the user using our Java-based sketching tool. Tangible artifacts can be created from these patterns on laser cutters and vinyl cutters by indicating boundaries to be cut and lines or areas to be engraved.

In PictureBlocks, users construct programs by snapping together jigsaw-like blocks, thereby avoiding many of the syntactic problems (missing semicolons, mispelled words, etc.) that frustrate novices using textual programming languages.

BASIC OPERATIONS

Putting pictures one over the other



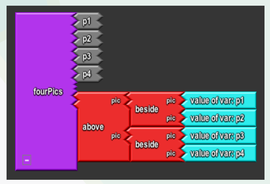


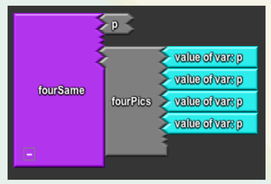
Putting pictures above or beside another

Flipping and rotating pictures

ABSTRACTIONS

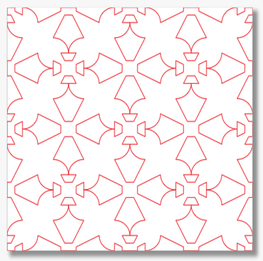
Function declaration

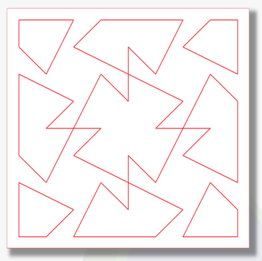


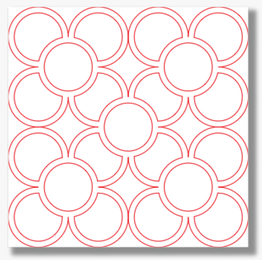


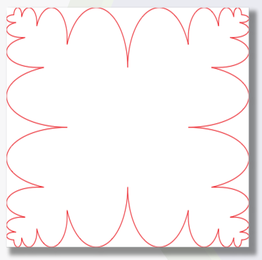
Function invocation

Some user designs

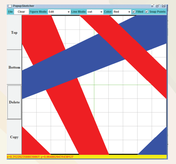




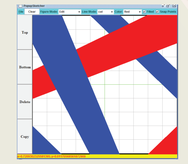




YOU SKETCH YOUR PRIMITIVE PICTURES

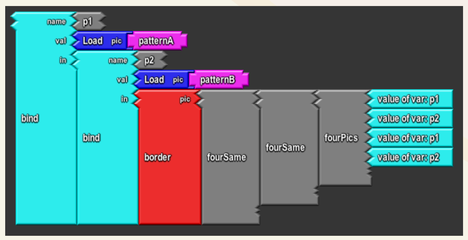


patternA

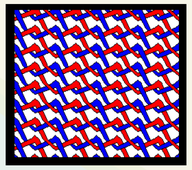


patternB

YOU TRANSFORM AND COMBINE THEM TO MAKE MORE COMPLEX ONES

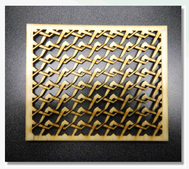


FOR THE RESULTING PICTURE...



...YOU SPECIFY BOUNDARIES TO BE CUT AND LINES/AREAS TO BE ENGRAVED...

...AND THE LASER CUTTER PRODUCES A TANGIBLE ARTIFACT!



REFERENCES

[1] P. Henderson, "Functional geometry," in ACM Symposium on Lisp and Functional Programming, 1982, pp. 179–187.
[2] H. Abelson, G. J. Sussman, and J. Sussman, Structure and Interpretation of Computer Programs (2nd ed.). MIT Press, 1996.