A Toolkit for Tinkering with Tangibles & Connecting Communities

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Abstract

In this hands-on Studio, you'll explore Modkit [1], a new toolkit for creating tangible interfaces (e.g., bike handlebars with interactive lights and sounds). Modkit makes it possible for novices and experienced programmers/designers to bring tangibles to life by offering graphical command blocks inspired by the Scratch programming environment [2]. Modkit tools work with the Arduino [3] platform's library of code (such as C/C++) to enable users to participate in a community rich with project ideas and sample files. Modkit supports multiple representations of code – graphical command blocks can become editable text-based code to offer additional avenues for learning and sharing. The Studio welcomes members of the research, industrial, academic, maker, and I-just-want-to-have fun communities of all experience levels to participate. Participants will have opportunities to use Modkit in personally-meaningful ways. Participants who wish to extend Modkit tools with new functionality will have opportunities to do so. The organizers will conclude the Studio with a discussion around activities, example projects, and approaches to adapting the toolkit to different settings. Participants will contribute to brainstorming about potential uses, future directions, and collaborations.

Keywords
Graphical programming, Modkit, construction kit, Arduino, Scratch, educational technology, sensors

ACM Classification Keywords
K.3.1 Computer Uses in Education. D.2.6 Programming Environments. H.5.2 User Interfaces (prototyping)

General Terms
Languages, Design.

Introduction
Developing tangible interfaces often involves creating or selecting an electronic circuit as well as writing code to run on a microcontroller. This Studio explores new ways to enable novices and experts to explore designing tangible interfaces using a new toolkit called Modkit that builds upon approachable yet extensible platforms. Modkit offers a graphical programming environment that features Scratch-like command blocks. The interface (shown in Figure 1) allows users to drag and drop commands – snapping the blocks together to create programs that are not susceptible to syntax errors. Blocks in Modkit's pallete are labeled to closely match text commands that control Arduino boards. Modkit blends the easy-to-understand blocks interface with connections to the C/C++ language aspects of Arduino programming to support both novices and experts in exploring programming of the physical world through making tangible interfaces.

This Studio will introduce Modkit as a means for designing systems that involve sensing, actuation, programming, embedded design, and crafting. Each participant will have varying experience in each design capacity. Participants with experience using tools (such as Mindstorms NXT [4], Fritzing [5], or Phidgets [6]) that also help people develop one or more of these design capacities are welcome to explore the merits of Modkit for prototyping.

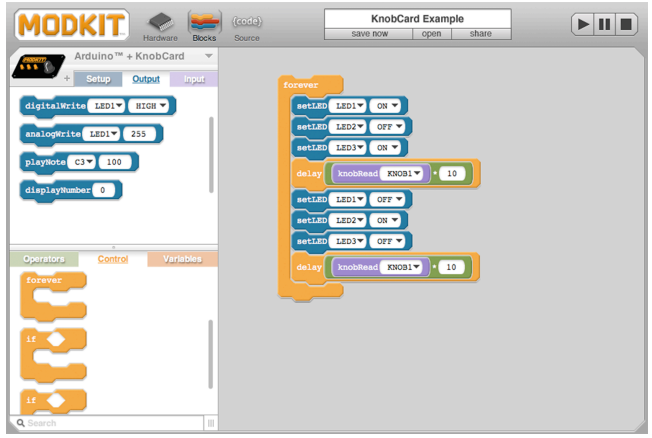

Figure 1 The Modkit graphical programming interface

Studio Overview
The Studio focuses on two main themes: Exploring and Extending. First, the organizers will invite participants to share what they would like to take away from the Studio. Participants will then explore Modkit programming by using Crimp Cards - easy-to-assemble kits of hardware components (shown in Figure 2). (No soldering will be necessary in this phase of the Studio.) After tinkering with connecting sensors and actuators to Arduino-based boards, participants will extend their initial explorations into mock-ups and prototypes - by combining components of different crimp card kits and/or soldering or breadboarding new circuits.

Studio organizers will lead a discussion about the range of projects participants created or attempted to create.

The discussion will offer ideas to participants about ways they could adapt Modkit to better meet the needs of the projects they envisioned. Participants will then have opportunities to add code or hardware components to Modkit – extending the experimental version of the toolkit to meet new needs. During a culminating discussion at the end of the Studio, the organizers will go over the approaches to introducing physical and computational toolkits to diverse communities. We will end the discussion by covering approaches to designing toolkits.

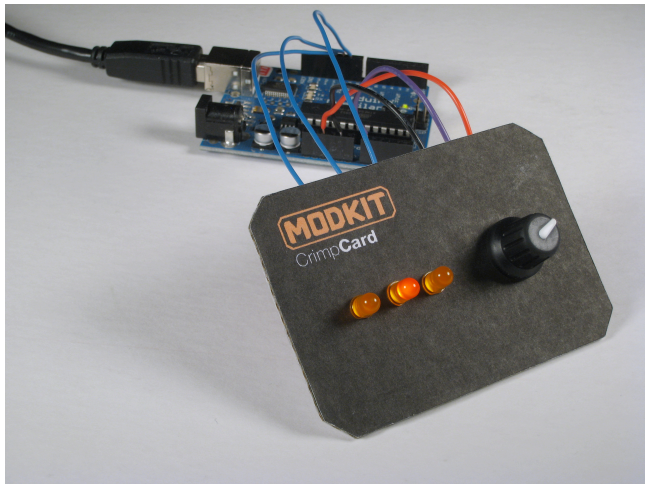

Figure 2 an Arduino board with a Crimp Card project attached

Studio Learning Goals

The organizers welcome both novices and experts to leverage their professional, hobbyist, and life skills as they collectively explore projects. Doing so will put participants in a position to leave with better understandings of how to:

- Use Modkit to create and program tangible interface sketches and prototypes.
- Incorporate found and manufactured materials into interactive projects – combining them in unexpected ways.
- Translate feedback from different types of sensors into light, motion, or sound.
- Apply knowledge of computing to personal and community/societal needs.
- Determine if Modkit meets a project's needs or when peer platforms are more appropriate.
- Develop Modkit activities for future designers from all backgrounds.
- Extend Modkit to better support certain applications or user groups.

Studio Supporting Web Documents

See http://modk.it/tei11.

Acknowledgements

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References

[1] Modkit. http://www.modk.it

[2] Scratch. http://scratch.mit.edu

[3] Arduino. http://arduino.cc

[4] LEGO Mindstorms. http://mindstorms.lego.com

[5] Fritzing. http://fritzing.org

[6] Phidgets. http://www.phidgets.com