Near-Instant Prototyping of Multi-User Digital-Physical Interactions

Robb Mitchell
University of Southern Denmark
Universitetsparken 1
Kolding DK 6000, Denmark
robb@sdu.dk

1. INTRODUCTION

This is a demonstration of a platform and approach that can enable creatives without any skills in either programming or electronics to almost immediately explore and innovate in combining physical objects, and movement sensing with dynamic visual outputs.

2. MULTI-USER PROTOTYPING IS TOUGH

Designing multi-user digital-physical art or other tangible or embodied interaction experiences to foster or leverage social experiences and collaboration in museums etc. can be challenging. Compared with designing for individual use, prototyping novel multi-user experiences can be more technically difficult regarding both hardware and software, and much more difficult conceptually.

In my previous teaching experience, it is typical for many students to only truly appreciate some of the nuances and complexities of multi-user experiences once they have managed to implement and deployed technical solutions. But this happens normally close to the end of a project when it is too late to make much, if any conceptual improvements.

Compounding these challenges, another difficulty for institutions that are not located in big cities is that many students typically lack direct common experience with a wide range of interactive installations. This can make it much harder for both students and staff alike to build a shared understanding and a common language concerning multi-user digital-physical experiences.

3. OUR APPROACH

To address these challenges, I have been developing an approach that turns upside down some traditional approaches to teaching physical computing. Namely, we have developed software that enables students with no programming or electronic skills to creative experimentation with collaborative digital-physical experiences from the very first hours of our teaching.

3.1 How it Works

In our most recent deployment, the approach comprised providing:

a) Pairs of BBC micro:bit micro-controllers with built-in accelerometers onto which we preload software. An untethered micro:bit wirelessly transmits movement data to the creatives’ laptop.

b) Software standalones developed using Max MSP. These enable plug and play manipulation of an image or images of the creative’s choosing/making. The accelerometer data thus instantly can control the rotation, size, or position of single images, or control the sequential display of any image folder. Images can be displayed full screen or outputted to a second screen or projector.

c) diverse forms objects of a scale that affords manipulation by two people (e.g. broomstick, tablecloth, large cardboard box) and some simple temporary fixatives (e.g. string, sticky tape etc.).
Users attach their untethered microcontroller to one of the large objects and instantly explore how it is to share control of the image outputs through sharing physical control of the objects. And with a couple of clicks, they can repeat with different images. And of course, not limit their physical explorations to the found objects that we initially provide.

4. ACKNOWLEDGEMENTS

Big thanks to Jussi Mikkonen and Asbjørn Kruger Mønster for insightful discussions, members of the Cycling’74 Max forums for sharing great expertise, and ITPD students for their creative efforts.