

Simple Multi-Touch: A framework for teaching multi-touch computing

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Introduction

With multi-touch surfaces becoming increasingly ubiquitous in our everyday lives, there is a need to teach multi-touch computing to current students to satisfy the growing industry.

There are existing multi-touch toolkits that may be used for this purpose[1-3], but they tend to be too complex for teaching practices.

Simple Multi-Touch

We present 'Simple Multi-Touch', a simplified multi-touch framework meant to be used to teach the fundamentals of multi-touch computing.

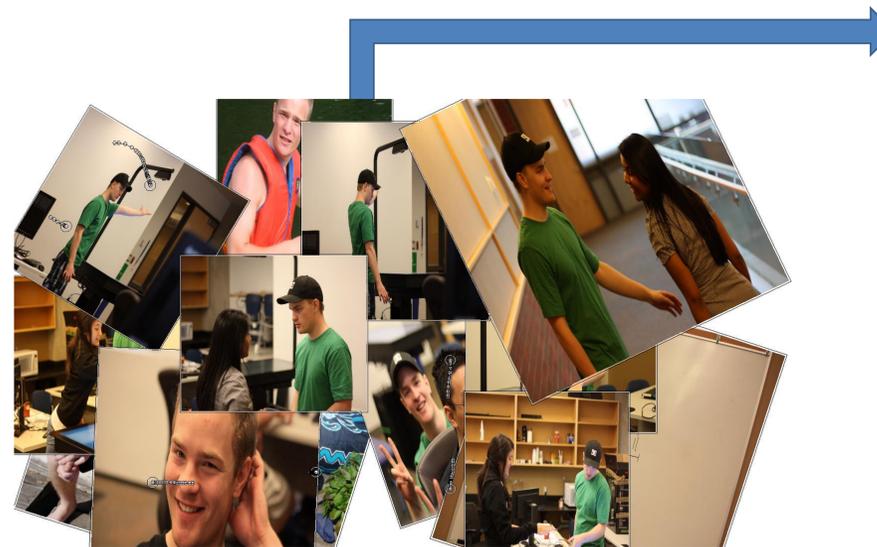
Our framework:

- has a simplified syntax and graphics programming model as it uses the Processing language and its IDE[4].
- follows the Processing paradigm as events may be recognized or ignored.
- allows students to concentrate on implementing the principles of multi-touch computing without being hampered by complex code.
- supports many different types of multi-touch interfaces, since it implements the TUIO protocol[5].

Pinch Gesture on an ImageZone



Figure 1 [6]: Scale event triggered by pinch gesture



Zones

Creating multi-touch applications centers around creating, and grouping zones and drawing scenes into them. This was done with help from the 'tuoZones' library[7] for Processing. The zones included are:

- RectZone: The most basic zone in the shape of a rectangle.
- ImageZone: Extends the RectZone. Automatically draws the image passed in the instantiation of this zone.

The zones and the scenes drawn into them are able to be manipulated by the included gestures such as drag, RNT, throw, pinch, and rotate. These gestures will either trigger their default gesture actions, or the actions implemented by the student.

mouseToTUIO

Problem:

Multi-touch surfaces cost too much, they are not freely available to students for testing multi-touch applications.

Solution:

We have created and included an overlay called 'mouseToTUIO' that converts mouse events to TUIO messages. Multi-touch gestures are able to be performed, enabling students to run and test their multi-touch applications using their own computers. 'mouseToTUIO' was created with help from reactiVision's TUIO Simulator[8].

Sample Photo Album Application

```
1. import vialab.simpleMultiTouch.*;
2. import vialab.simpleMultiTouch.events.*;
3. import vialab.mouseToTUIO.*;
4. import TUIO.*;
5. import java.awt.BorderLayout;

6. TouchClient client;
7. PImage[] img = new PImage[12];
8. Zone[] zone = new Zone[12];

9. void setup(){
10.    size(screenwidth, screenHeight, P3D);
11.    this.setLayout(new BorderLayout());
12.    this.add(new MouseToTUIO(this, true));
13.    client = new TouchClient(this);

14.    for (int i = 0; i < 12; i++){
15.        img[i] = loadImage(i + ".jpg");
16.        zone[i] = new ImageZone(img[i],
17.            (int)random(0, 800), (int)random(0, 800),
18.            (int)random(300, 400), (int)random(300, 400));

19.        zone[i].setGesture("Drag", true);
20.        zone[i].setGesture("Rotate", true);
21.        zone[i].setGesture("Pinch", true);
22.        client.addZone(zone[i]);
23.    }

24.    void draw(){
25.        background(79, 129, 189);
26.    }
27. }
```

Future Work

Our framework will be used and evaluated at UOIT and at the University of Waterloo in the 2011 fall term.

In the future, we would like to add to our framework:

- 3D multi-touch gestures
- An easy and simple way to create and insert custom gestures
- Different shaped zones
- Porting it over to Processing for Android

References

- [1] Multitouch for Java (MT4j) website August 2011. www.mt4j.org
- [2] PyMT website August 2011. <http://pymt.eu/>
- [3] Kivy website August 2011. <http://kivy.org/>
- [4] Processing website August 2011. www.processing.org
- [5] TUIO website August 2011. www.tuio.org
- [6] Hand from gestureworks.com/support/supported-gestures/pinch-zoom/
- [7] tuoZones website August 2011. <http://jlyst.com/tz/>
- [8] reactiVision website August 2011. <http://reactivision.sourceforge.net/>