

---

# TEI 2010 Development Strategies for Tangible Interaction on Horizontal Surfaces

**Sergi Jordà**

Music Technology Group  
Pompeu Fabra University  
Roc Boronat, 138  
08018 Barcelona, Spain  
sergi.jorda@upf.edu

**Pol Pla i Conesa**

MIT Media Lab  
20 Ames St E15-313  
Cambridge MA, 02139  
pol@media.mit.edu

**Daniel Leithinger**

MIT Media Lab  
20 Ames St E15-396  
Cambridge MA, 02139  
daniell@mit.edu

**Carles F. Julià**

Music Technology Group  
Pompeu Fabra University  
Roc Boronat, 138  
08018 Barcelona, Spain  
carles.fernandez@upf.edu

**Seth Hunter**

MIT Media Lab  
20 Ames St E15-313  
Cambridge MA, 02139  
hunters@mit.edu

**Daniel Gallardo**

Music Technology Group  
Pompeu Fabra University  
Roc Boronat, 138  
08018 Barcelona, Spain  
daniel.gallardo@upf.edu

**Henry Kaufman**

Tactable Incorporated  
20 Walker St.  
Cambridge MA, 02139  
henry@tactable.com

**Martin Kaltenbrunner**

Reactable Systems  
Llull 70, 3-8  
08005 Barcelona, Spain  
martin@reactable.com

**Abstract**

Tangible interactions on horizontal surfaces are increasingly relevant for collaborative applications, embodied interaction, musical performance, and interaction with 3D information. This unique studio opportunity introduces approaches to developing applications on four related platforms: the Reactable: a musical tabletop, and its companion fiducial tracking system reactIVision, Microsoft Surface: a commercial multi-touch table, MemTable: a large interactive tabletop, and Relief: a responsive 3D surface. It will focus on the unique affordances of multi-input and multi-user event handling shared and afforded by each of the four platforms. Participants will work in small groups within some simplified code templates to develop a small applications focused on co-located input by multiple people, combining the use of tangible objects and touch input.

**Keywords**

Tangibles, fiducial, surface, tabletop, multi-user, social, collaborative, music, relational, design, responsive, interactive, relief, Memtable, Reactable, Microsoft Surface

---

Copyright is held by the author/owner(s).

TEI 2010, January 25-27, 2010, Cambridge, MA, USA

ACM

## Introduction

What are the novel application domains opened by systems that support tangible interaction and multi-user input? How do application developers shift from a GUI development framework to an event structure that supports multiple and synchronous user inputs? What design choices are crucial for application development?

This workshop will be a practical hands-on exploration for participants interested in the integration of tangibles in interactive applications. The workshop discussion will focus on the potential of collaborative applications that present new types of tangible interaction. Groups will develop a simple sketch that demonstrates a multi-user interaction at one of the four systems in the workshop.

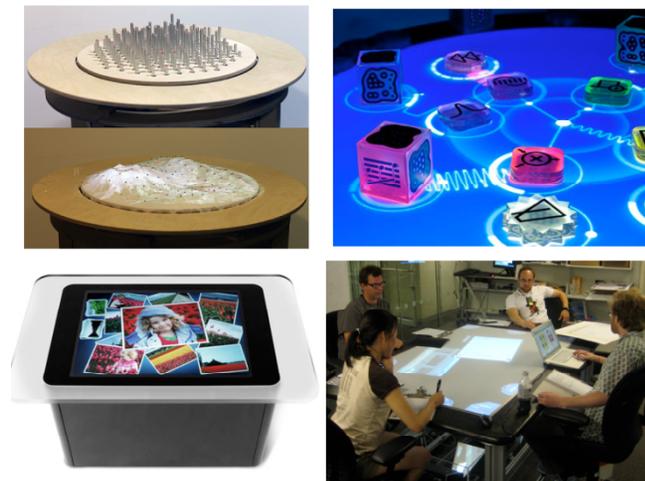


figure 1: Relief, ReacTable, Surface, and MemTable.

During the workshop participants will focus on the collaborative and embodied opportunities that unify

tabletop systems compare the specific advantages enabled by each of the four platforms in the workshop. Participants will have experiential knowledge of one system and reflective understanding of the differences between the systems for application development and user interaction.

## Studio Proposal

Participants should have a rudimentary understanding of programming concepts, and have experimented with development in a language like Java, Processing, or openFrameworks. Novice participants can consult with the organizers to join in the ideation and brainstorming, because groups will be divided to between 4 and 5 people and not everyone can develop at the same time.

*The Studio will be structured into four parts:*

- 1) *General group introduction for 15-20 participants:* Presentation of background work, and contemporary multi-user application examples. The four organizers will then present a high level overview of each of the platforms at the workshop. 60 minutes.
- 2) *Brainstorm:* Four groups will form around the following general themes: Large Collaborative applications, Musical Performance and Composition, Tangible object interaction on surfaces, and 3-D surface input and output. Groups will be facilitated by each of the workshop leaders in a brainstorm to determine an application to develop. Groups will be required to sketch the interaction on paper. 30-45 min.
- 3) *Development:* Each group will work with the code template of their table to develop a simple application that demonstrates their concept.
- 4) *Wrap-up:* The four groups will present a storyboard and the development strategy for their application. If the application is running, groups will demonstrate the

current version. The workshop will concentrate on process of development over the final product produced. 45 min.

### **Studio Topics to be covered**

Topics will include:

- A) Overview of the history of TableTop applications and precedence for collaborative interactions on horizontal surface that support tangible objects.
- B) Practical Strategies for implementation and prototyping with the TUIO protocol, and other data structuring code practices.
- C) Event handling for multi-object and multi-touch surfaces.
- D) Differences between platforms: Technical limitations in hardware and software between a commercial platform like Microsoft Surface and custom platforms.
- E) Discussion of the future of collaborative platforms: Hardware innovations and approaches and commercial integration of multi-touch into computing systems.
- F) What new opportunities for application development for music composition and performance, collaboration, education, game development, and 3-D design and prototyping provided by the platforms?

### **Studio Learning Goals**

This workshop will provide a space for developers to increase their understanding of the potential of collaborative tangible interactions at surfaces within their respective domains. The focus of the studio will be primarily on identifying a domain of applications that support shared and collaborative experiences around a variety of tabletop interfaces and the practical

implementation of one example application for each of the platforms shown in Figure 1.

Participants with no experience in tabletop development will leave with knowledge and tools for implementation. Experienced participants will have the opportunity to discuss their ideas in greater depth, contextualize their work within the development community, and augment their practices with additional practical knowledge from the examples provided during the workshop.

The overall purpose of the studio is to engender a deeper understanding of the existing tabletop platforms and what the future domain of tangible applications will be.

### **Studio Supporting Web Documents**

Studio Participants are encouraged to review the following before participation in the workshop.

Reactable System: The reactIVision framework is available for download at <http://reactivision.sorceforge.net> (source code and compiled versions for most commons operating systems are both available).

Microsoft Surface (commercial platform): <http://www.microsoft.com/surface/Default.aspx>

MemTable (large interactive platform): <http://fluid.media.mit.edu/projects.php?action=details&id=71>

Relief: <http://tangible.media.mit.edu/>