TruthTable: a social, collaborative window onto the web

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1 What is it?

The TruthTable is a large, horizontal interactive surface, which allows several users to interact in the same computational space at the same time.

And it stops your coffee mug from hitting the floor.

2 How do I play with it?

First of all, experiment, and see what happens!

. . . but if you want a cheat sheet:

- the keyboards can be used to create bubbles containing ideas.
- tapping bubbles, photos, pages etc. makes them disappear.
- holding and releasing a bubble asks the table for suggestions related to that idea.
- drawing a line between two bubbles asks for suggestions relating those ideas.
- everything the table suggests will disappear unless it is interacted with.

- drawing a line between a bubble and an InfoSphere (attached to a keyboard) will give more detailed information about that idea.

- drawing pins can be used to hold things in place - drag one out to where you want it and let go. Tap it to make it release.

3 Where does the information come from

The table presents an interface onto "Web 2.0" - user created content. This is content which has been created by the people who frequent certain sites. In this case, information is pulled in from Flickr, del.icio.us and Wikipedia. Several different "backends" are used at once to give a range of different responses.

4 How does it work?

This is an example of a vision based interface. Infrared light is shone into the sides a plastic slab, where a phenomenon called Total Internal Refraction means that it will remain trapped except where something touches the surface. A camera looks at the surface, and sees the infrared glow emitted from any points of contact. These are then sent to the rest of the software, and used to manipulate objects, which are projected onto the screen.

5 Why is it interesting?

"Multi-touch" interfaces have three main benefits:

- because objects can be touched directly, a layer of indirection is removed - compare trying to touch one of the bouncing bubbles with your hand to trying to perform a similar task with a mouse. This increases the immediacy and intuitiveness of the interface.

- allowing for multiple touch points facilitates a range of new gestures. By using two fingers, pictures can be scaled and rotated instinctively, without the need for any typical GUI sliders and buttons.

- most importantly, allowing for multiple touch points allows for multiple simultaneous users, performing collaborative tasks within a shared space.

Put together these lead to a vision of social computing, where using a computer becomes natural and playful; attention is not diverted into individual, isolated tasks; information discovered is immediately shared with co-participants; building on the fact that several people are concurrently working in one space, shared spaces can be created between remote users.

6 FAQs

How big can it be? This is really limited by the projection hardware; it is hard to get a large image without a large projection distance. Versions of this idea have been made which are several meters wide, by using several projectors - its all a question of budget and space constraints.

Can it react to the shapes of my hands The information about the shapes of objects making contact with the surface is extracted, but it is not currently used - it's definitely possible!

Can it react to objects? At the moment, it reacts to *pressure*, but it is possible to expand this to work with markers which can be placed on objects and recognised.

Does it need to be in a dark room? Not particularly. Direct sunlight is not great, but other than that, it should work OK.

How many touches can it sense at once? There's no theoretical limit. Certainly in the order of hundreds. If you have an application which needs more, I'd love to hear about it!

Does it need super-fast hardware? It's currently all running on a Mac Mini, 2.0 GHz.

7 More on FTIR

When light crosses an interface between two material with different refractive indices, rays of light are bent - this is why the bottom of a swimming pool looks nearer than it actually is. When a ray of light exits the plastic slab, it is bent *towards* the slab. If the exit angle is low enough, it will bounce back inside the

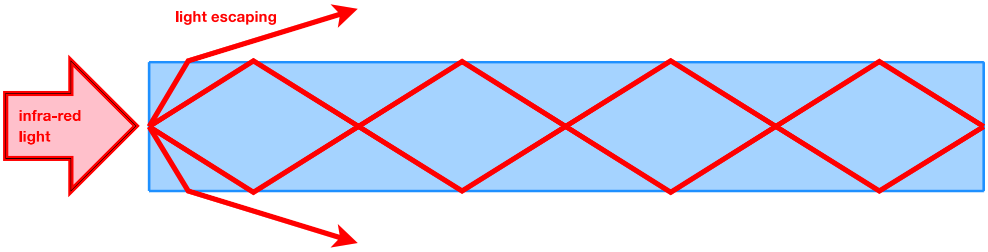

Figure 1: Total Internal Reflection

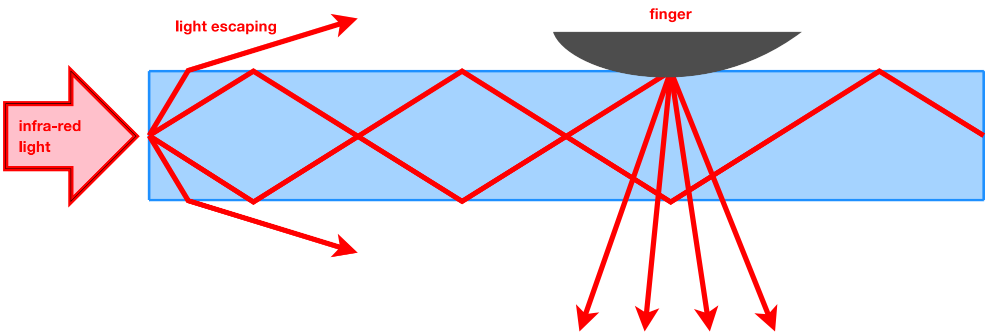

Figure 2: Frustrated Total Internal Reflection

slab. This is known as Total Internal Reflection, and means that a substantial portion of the light injected into the slab remains there (see Figure 1)

However, if an object makes a good optical contact with the slab, there is no longer a plastic/air interface, and the phenomenon is disrupted. Light hitting this point is scattered, and this is known as *Frustrated* Total Internal Reflection, or FTIR (see Figure 2).