GLOWBITS

Daniel Hirschmann
Interactive Telecommunications Program
New York University
441 East 20th Street, Apt 5E
New York, NY 10010 USA
+1 917 664 4493
daniel@glowbits.com

ABSTRACT

The Glowbit System is an attempt to explore the potentials offered by an actuated tactile display interface. It offers multiple levels of interaction to augment the user experience. The Glowbits change color like the pixels in any display system and simultaneously physically move to different locations along a linear track. Their position and color are related: as images shift, so too does the topology of the Glowbits surface.

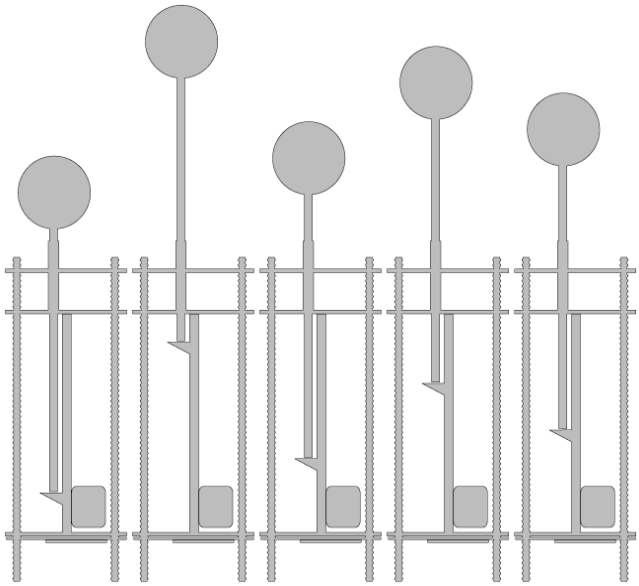

Fig 1: Glowbits system abstraction.

Keywords

LED, RGB, motors, display, 3D, pixels, physical interface, tactile display, interactive, sculpture, networked, modular, scalable. Information visualization.

INTRODUCTION

When viewing screen-based artwork, one experiences a distinct lack of physical texture. This is inherent in the flat nature of screens. If each pixel in the display had the potential to move forward and backward as their color changed, a new dimension of experience would be offered to viewers and users of this kind of tactile display. The Glowbit System is an attempt to address the possibilities of such a medium.

Glowbits are moveable large-scale pixels of an interactive display. Their movement can be autonomous or dependent on a viewer. Each one has a motor attached that allows them to move themselves through software. They can potentially shift according to the continuous nature of screen-based content, or physical interactions of a viewer.

As a general IO device, they can be configured in various ways - depending on the intended outcome. A few possible configurations are: A 'sculptable' display; a 3D display; a control interface for live performance; a networked tactile display to connect loved ones physically over distance.

CONTEXT

Viewers of video installations / art pieces have the potential to fall into a state or mode of the 'television watcher'. Video's are presented and contained within the slightly convex grey glass plane of the screen. The most obvious attribute that's missing from a video monitor is a physical texture. The moving images are trapped in the box. They have no way of entering or affecting the space of the viewer.

Video as a medium is less connected to the artist. Traditional mediums allow for a greater degree of association between the viewer and the artist. Simply connecting with the artist's brush strokes on the canvas; impressions of their fingers tips cast into the bronze of their sculpture, etc. These are examples of the layering that viewers have access to in the single moment of viewing the work.

The Glowbit System was initially devised to offer screen-based artists a further level of expression: a physical layer.

The following concepts were explored in the current system:

- **Tactile display** - Communicate touch over distance[1]. There is a one to one relationship between multiple Glowbit Systems in different locations across the globe. Thanks to the space folding properties of the internet, whatever is done on one side, will happen almost in real time on the other side. This would offer a more visceral connection between loved ones separated by distance.
- **3D display**[2,3] - exemplified by an alphabet that spills out into real space. (Similar to the large scale LED displays found in high traffic metropolitan areas)
- **Sculptable Pixels** - human interaction to *build* images and share with others

Live performance tool[4] - aimed specifically at the laptop performer. By using the Glowbits as a visual reference, performers can connect to their software-based synthesizers and give audiences visual cues to identify their virtuosic skills.

SOLUTIONS & INTENTIONS

The Glowbits System was devised to be a grid of enlarged actuated pixels in a display. They are capable of changing color relative to the amount of their actuated movement. The intention is for a large-scale higher resolution matrix to display images that would shift both in color and topology.

Their movement can be the result of user interaction, or data received from an external digital source. It could therefore act as both an input and output device. The prototype is configured as a 5X7 grid. This it lowest resolution that has the potential to display multiple recognizable shapes: Alphanumeric Text. (See Figure 2)

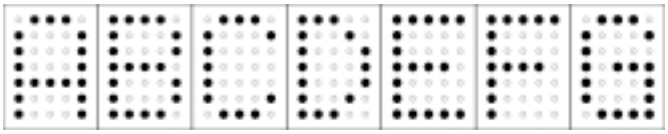

Fig 2: Upper case font that the Glowbits use for character display.

TECHNICAL OUTLINE

5X7 Grid System Abstraction

The grid is made up of 7 strips of 5 Glowbit Drones. Each grid has a Drone Leader connected to it, which communicates to each of the Drones in the grid. The Leader maintains a snapshot of the grid at any time, and has the ability to send control values to the Drone's.

Multiple Glowbit Grid System

The Glowbit system was designed with modularity and scale in mind. In larger configurations, a Glowbit Queen will maintain system wide control. The Queen is a more powerful and more capable version of the Drone Leader. In this situation, a Queen will send all relevant information to the Drone Leaders of each Grid, which act as distribution hubs for that control data. The Queen maintains a snapshot of the system as a whole while the Drone Leader maintains a snapshot of its grid only. In this particular configuration, only the Queen has the capacity to make system wide control decisions, while the Drone Leader is a conduit. The system can be customized for intended uses.

WHERE TO FROM HERE

- Develop a new language for artists and interactive display developers to communicate with their viewers.
- Explore the systems scalability. This will be useful in determining its potential as a display in public space.
- Connect people over the physical divide with various Glowbit systems – linking them through light, color and touch.

ACKNOWLEDGMENTS

Tom Igoe, Gary Schober, Mark Argo and NYU's Interactive Telecommunications Program.

REFERENCES

1. Brave, S., Ishii, H. and Dahley, A. Tangible Interfaces for Remote Collaboration and Communication, Proceedings of CSCW '98. ACM Press, November 1998, 169-178.
2. Raffle, H. and Joachim, W. M. and Tichenor, J. Super Cilia Skin: An Interactive Membrane, CHI 2003 paper.
3. Rosin, D. *Wooden Mirror*. Siggraph 2000, Interactive . Found at: http://www.siggraph.org/artdesign/gallery/S00/interactive/thumbnail16.html
4. Sharon, M. E. *Pierrophone* NIME '04 Proceedings found at: http://www.suac.net/NIME/NIME04/paper/NIME04_4A09.pdf

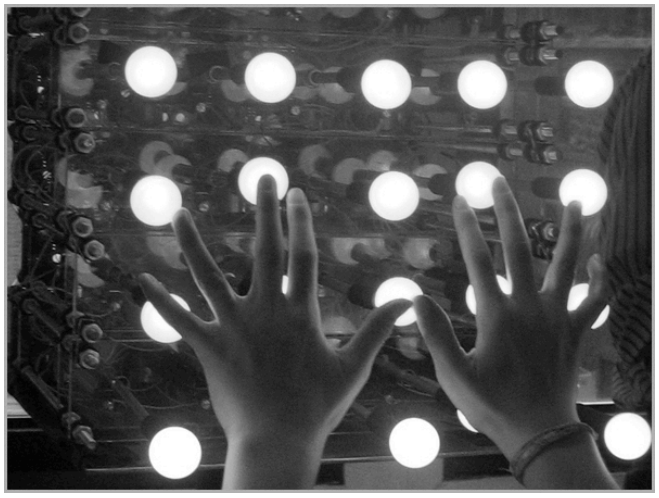

Fig 3: Interacting with the Glowbits.