
Timing Is Everything: From Dynamic Lighting to Meaningful Experience

Susanne Seitinger

Philips Color Kinetics
3 Burlington Woods Drive
Burlington, MA 01803 USA
susanne.seitinger@philips.com

John Warwick

Philips Color Kinetics
3 Burlington Woods Drive
Burlington, MA 01803 USA
john.warwick@philips.com

Abstract

The position paper argues that time is central to our experience of light in the city. Interactive lighting experiences will be shaped by the contextual cues time provides for citizens as they move through different types of spaces. Several real-world projects show an emergent language for the additional flexibility provided by contemporary technological capabilities.

Author Keywords

urban screens; media facades; architectural lighting; light-emitting diodes; controls; interaction design

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Time in the City

Lighting is inherently a time-based experience. In nature, all life is governed by regular cycles of light and dark. In the city, humans have shaped their own lit environment to suit the requirements of an active, 24-hour lifestyle. [6] Though no longer linked to particular times of day, levels of brightness are associated with types of activities. For example, theater marquis are dazzlingly lit on performance nights drawing visitors in from a distance. Kevin Lynch's question "What time is this place?" takes on a new meaning in connection with

artificial lighting. [3] The time-based experience of a place becomes malleable in new ways with the opportunity to manipulate the appearance of façades, structures, and open spaces.

With the widespread adoption of programmable LED (light-emitting diode) technology the degree of control has increased even further than in the early days of artificial light. Now lighting designers, interactive experience designers, and urban planners have more levers than ever before to tweak. For example, Islington Council in London transformed a dark and dreary underpass for bikers and pedestrians. Throughout the night different colors “paint” one side of the underpass. The other half cycles from cool to warm white light as soon as a person enters the passage.



Figure 1. Regents Canal, Wharf Road, Islington, UK, www.architainment.co.uk/press-releases/architainment-lighting-brings-sensory-led-lighting-to-canal-tunnel

Perception

New LED street lighting has kindled a raging debate – within the field of course – on the best color temperature for cities. While past light sources were

more yellowish LED lighting permits a much cooler white light that changes how people perceive colors and objects in a space. It is beyond the scope of this paper to discuss the pros and cons of different light sources. What matters for this discussion is Islington’s choice to change the color temperature in response to a person’s presence. Warm when someone is around. Cool when no one is there. It will be interesting to study over time how people perceive this change. Do they feel more welcome? Does the association of warm light with presence ring true?

Surveillance and Wonder

As in Islington, people have come to expect presence sensors to trigger lighting indoors especially as a result of energy-saving measures. Outdoors this connection is still in its early stages. There is a blurry boundary between feeling wonder and excitement about an interactive experience, i.e. one that recognizes a person’s location and possibly much more, and not wanting to be followed. Maria Sester’s installations with theater spotlights comments on the ambiguity of interpreting a pool of light as something akin to a stage light – the limelight – or a search light used to spot wrong-doers. [4] This ambiguity has always been part of the urban experience with light since the very first use of lanterns by night watchmen. [6] However, our contemporary technological capabilities open up many more opportunities and shades of interpretation not to mention the many links possible between other sensor technologies and digital lighting systems. A recent project for the Victoria & Albert Museum by Cinimod Studio is another example of how people’s movements and presence becomes transformed through certain responsive lighting technologies. [1]

Resolution

Through the widespread presence of sensors in spaces or on people's bodies (in the form of mobile devices), time can be put on hold. The experience can be unlocked by a specific user. A person's presence can also leave traces of activity in the space. LightBridge for the MIT 150th Anniversary Celebration used the movements of pedestrians back and forth across the Massachusetts Avenue Bridge between Boston and Cambridge to trigger different emergent light patterns. Though the sensor system did not always function reliably, the distributed passive-infrared sensors were designed to generate data that was linked to different light parameters such as size of light effect, color and brightness. These were then displays on a low-resolution pixel display visible both from a distance and on the bridge. The display became a reflection of activity over time on the bridge connecting current and past citizens to each other. [7]



Figure 2. LightBridge, MIT 150th Anniversary, Photo Credit: David Sun Kong.

Jason Bruges piece for Sunderland Station operates similarly. His low resolution display shows shadows of waiting passengers on an unused platform. [2]

Resolution becomes more important in these types of installations. Traditionally we might associate our ability to glean information from a display in pixels. However, context – including time – makes it easier or harder to interpret their meaning. Many cities have high-rise buildings with spires that change color based on weather predictions. Sports facilities display team color on their façades (most strikingly the Herzog and De Meuron Allianz Arena in Munich, Germany). The vaguer a particular association might be the harder it will be to interpret explicitly. In many cases, designers or artists are specifically interested in this ambiguity. They want to draw viewers into the experience through a striking visual-spatial effect rather than convey information.

Challenges

Unlike past lighting experiences all the contemporary examples listed above require an explicit data-driven control system. Without inputs sophisticated digital lighting systems cannot function. To enhance contemporary urbanism through interactive lighting it is important to face the challenge of simple and flexible controls that are enabling for meaningful experiences. Whether it is reliable sensors or individually addressable pixels interactive light goes well beyond past requirements for electrical connections. As designers and creators are inspired by technological capabilities it will be important to have a dialogue on what truly matters to people and their experience of space and time in the city.

Authors

Susanne Seitinger, City Innovations Manager for Philips Color Kinetics, is responsible for leading the research and strategy around the impact of programmable LED lighting elements to create safe, inviting and responsive urban environments. LightBridge, her most recent project in honor of MIT's 150th anniversary in Cambridge, Massachusetts, used new configurations of low-resolution displays and sensor-activated urban screens to showcase the potential of responsive infrastructures in future urban lighting plans. Seitinger received a BA from Princeton University as well as a PhD, MS and MCP from MIT. Her PhD dissertation—*Liberated Pixels: Alternative Narratives for Lighting Future Cities*—explored the aesthetic and interactive potentials for future lighting and display infrastructures.

John Warwick, Software System Architect at Philips Color Kinetics, is responsible for the design and architecture of LED lighting control systems. Most recently, he participated in the relighting of the Empire State Building using LED light fixtures. Warwick led the development of a new networked control system that enabled the display of dynamic content on the iconic building. Warwick received a BS from Carnegie Mellon University and a MS from the University of Massachusetts.

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