One Light, Two Light, Red Light, Blue Light: A Responsive Environment in an Urban Context

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Introduction *One Light, Two Light, Red Light, Blue Light (1L2LRLBL)* is an interactive LED installation situated in the main bus station in downtown Lexington, KY (figure 1). It was designed and fabricated by the University of Kentucky College of Design School of Architecture students[1] as part of an academic elective course focusing on the development of full-scale installations that present new ways to interact with built form.

Overview *1L2LRLBL* emerged from a prompt by the Lexington Downtown Development Authority (LDDA) to enhance a derelict urban condition within the waiting area of the main bus terminal. The proposal utilizes an existing glass block wall on the façade of an adjacent parking garage as a canvas for an interactive light installation to enhance the space and create a playful environment for children (and adults) waiting with their families for the buses. As the project developed, it became clear that we, the students, faculty, and client, were asking bigger questions: How can existing infrastructure adapt new technologies and use? Can architecture become socially engaged? Can it inspire movement or interaction that is beneficial to place and inhabitants?

Details *1L2LRLBL* is a gridded wall of 240 8" x 8" glass blocks that serve as a pixelated screen that mirrors and abstracts the figures and movements of passers-by. The glass blocks are lit from behind by a grid of LED's arrayed on milled plexiglass sheets and are activated by a series of Arduinos controlled by a Rhino/Grasshopper interface (figure 3) with two Xbox Kinects. These Kinects are mounted on the facade of the building and

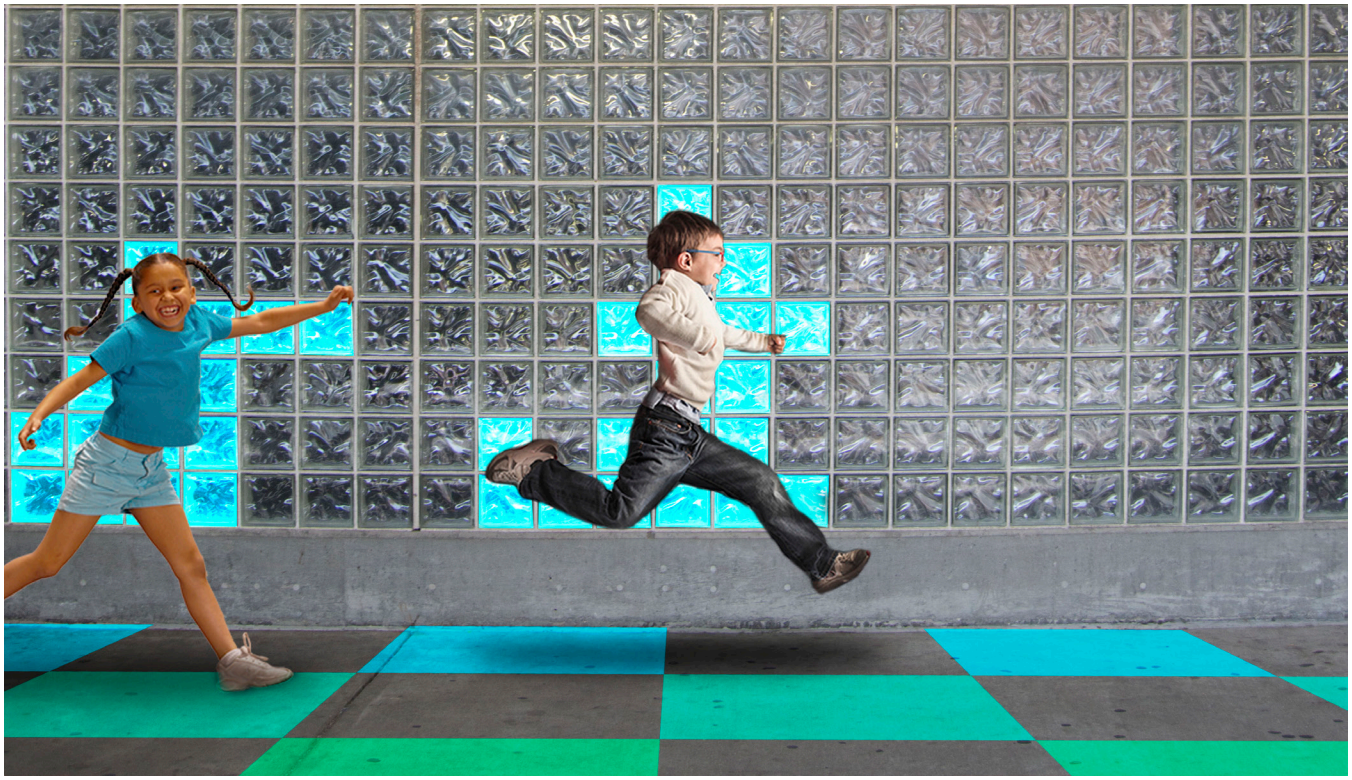

Figure 1. *1L2LRLBL*, conceptual montage. Courtesy of author.

Figure 2. Stills from a documentary video produced by the UK Research office. Courtesy of author.

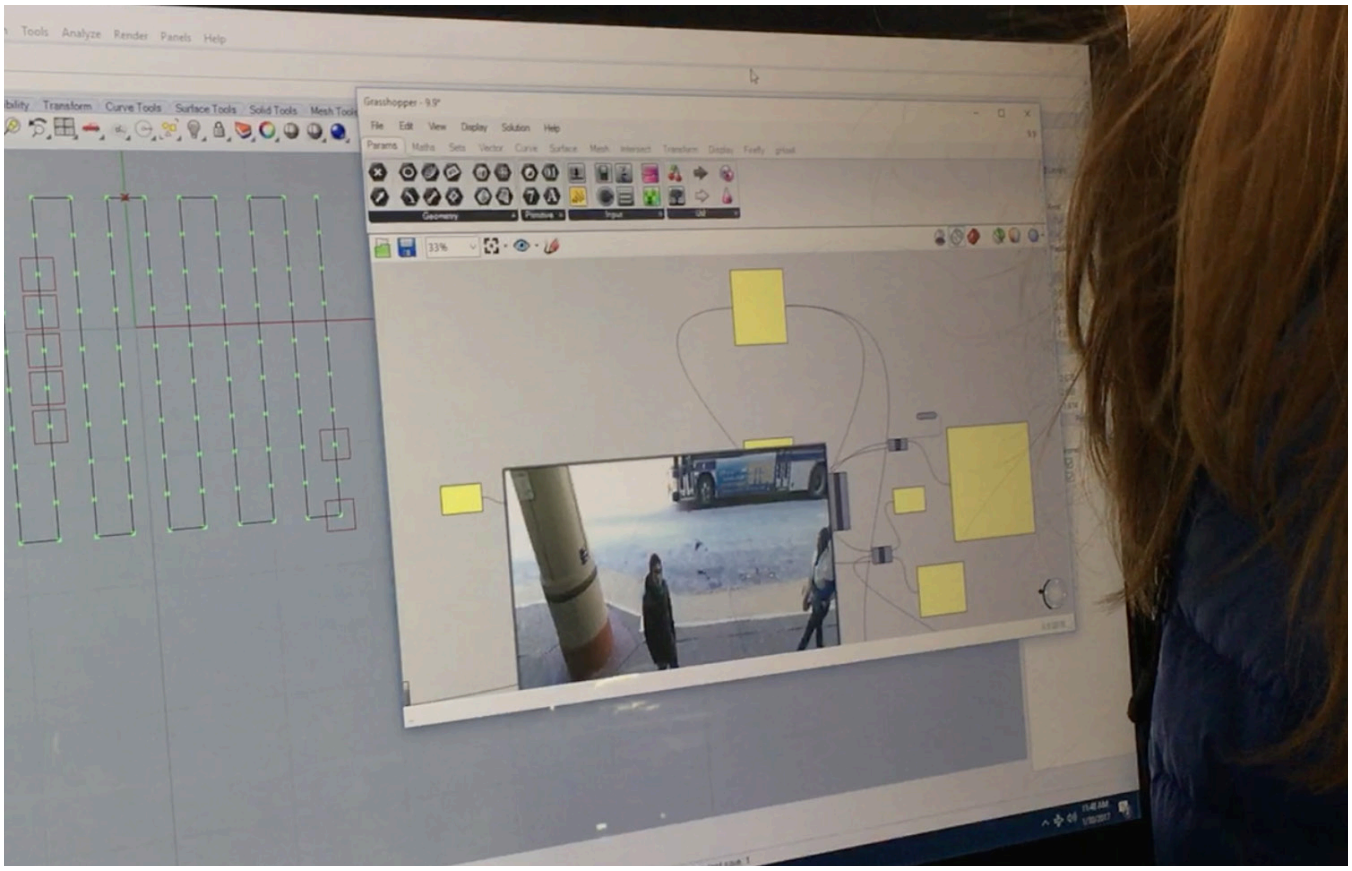

Figure 3. Tracking moving bodies. Courtesy of author.

receive video data of people who step into an area demarcated by textured painted tiles on the ground (figure 4). As moving bodies occupy the frame, the images transmitted are converted to simple pixelated shapes that turn the LED's on and off in real time and change their color based on proximity of the bodies (near and far) effectually mirroring the passers-by with a colorful "8-bit" version of themselves (figure 5).

Observations: Play and Interactivity *1L2LRLBL* projects simple scripted patterns or roughly mirrors movement for decorative effects. The interactive "play" begins when the response of the display is noted by the viewer who then becomes the user. Besides the pixelated mirroring, there is another level of abstraction that occurs when more than one body occupies the monitored space. The software, currently unable to discern individual bodies when they overlap within the frame, will then generate unexpected figures and visual glitches for interesting and unexpected (and sometimes humorous) effects.

Successes in Education While ultimately the goal of the course was to execute the design per the prompt organized by the LDDA in negotiation with the academic requirements of an architectural elective served by the students' proposals, there were underlying benefits of the course and its evolutionary process. The premise of the course is to encourage students to collaborate and take agency in a wide spectrum of processes of design, fabrication, and construction process (depicted by stills from a documentary video in figure 2). In order to complete the project, students had to source materials, learn new and necessary technologies, improvise, troubleshoot, seek advice from consultants, and manage a budget. There were also regular meetings and presentations with The Downtown Development Authority, The Parking Authority and The Transit Authority for feedback giving the students valuable real-world experience (figure 6).

The project began with a variety of proposals (figure 7) which were narrowed down through these meetings in response to zoning restrictions, primarily safety concerns about objects impeding the narrow corridor, upkeep, and cost. While the interest in collaboration between the city departments with the college was based on the previous interactive installations developed by the course, those iterations were more volumetric (figure 8). In this particular scenario the interactive element had to take place within a very thin sliver of space. Besides the physical interaction proposals, the students also presented schemes that were "play" in spirit, such painting the columns with a gradient of neon colors or putting a field of disco balls along the ceiling, but in both cases it was defined as something that while playful in spirit, it did not encourage physical action from the inhabitants which was an important requirement of the awarded grant.

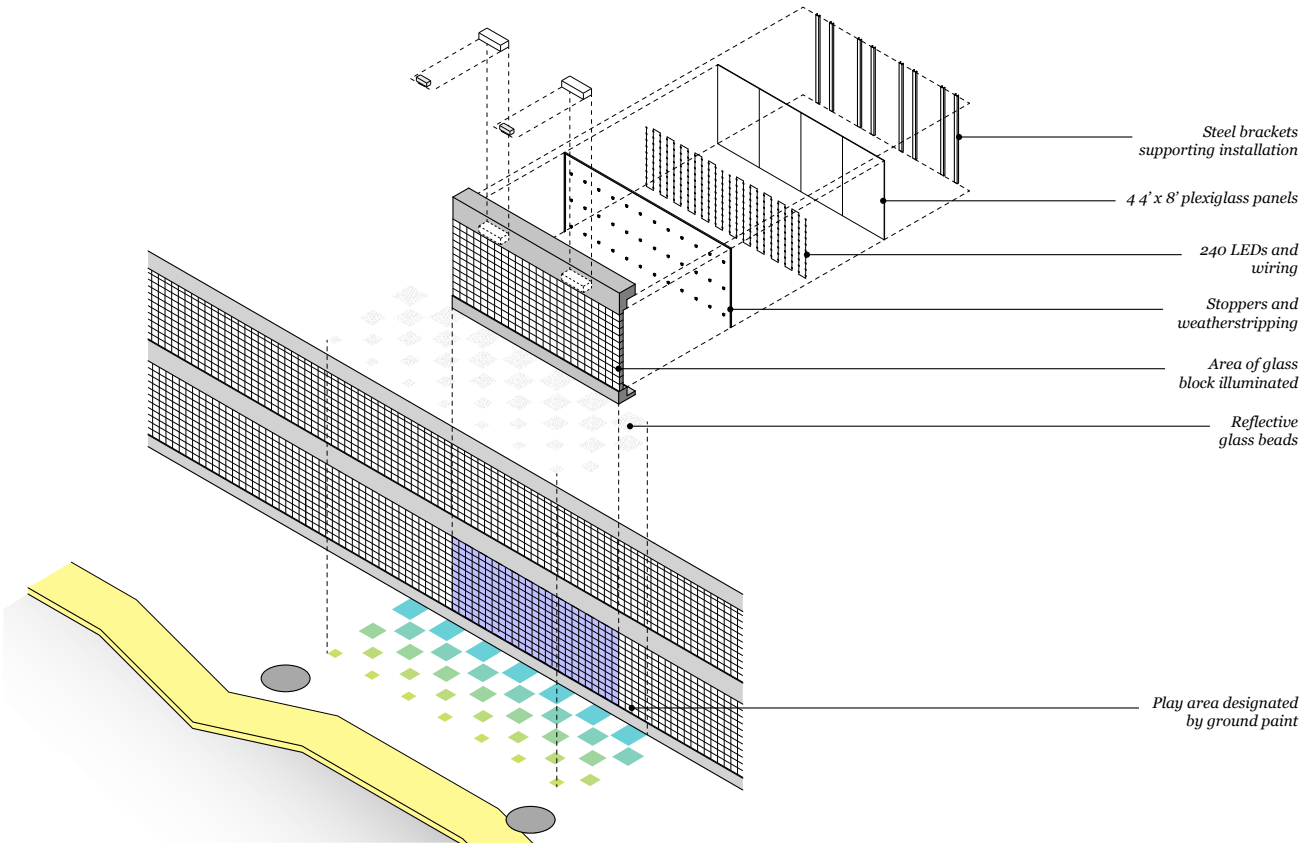

Figure 4. Axonometric of component assembly. Courtesy of author.

Figure 5. *1L2LRLBL*, interaction on site. Courtesy of KaBOOM!, Inc.

Figure 6. Students presenting to the LDDA, The Parking Authority, and The Transit Authority. Courtesy of author.

Future The project is a full-scale prototype seen as proof of concept that could lead to future funding to expand on this site and future sites. The script running the software in its current state is also limited to a simple array of colors and commands to activate the lights and this can be modified to generate an infinite array of colors and scripted patterns to further enhance the public space through color, light, and information.

If the project were to continue on this particular site, there could conceivably be at least three more phases in development:

1. Develop more patterns and responses in the software to be tested on the existing panels. This could also include programmed text.

2. Expand *1L2LRLBL* to run the length of the terminal. It could be limited to preprogrammed displays at first as the cost of drilling holes in the existing walls for video connection may be cost prohibitive (unless Wi-Fi is installed on site).

3. Once the LEDs have been installed and programmed, the video receptors could be installed to add another layer of information to the projections.

Credits *1L2LRLBL* was funded through the Play Everywhere Challenge Grant organized by KaBOOM!, Inc., a District of Columbia nonprofit corporation in partnership with the Lexington Downtown Development Authority, Lextran, and Lexpark to install a permanent interactive installation in the downtown Lexington Transit Center.

ENDNOTES

1. Course Participants: Alex Arrowood, Mike Foster, Pooya Mohaghegh, Brandon Nelson, Josh Powell, Luke Ramler, Tricia Rowedder, and Josh Schultz with special thanks to UK Engineering Student Michael Pina for assistance with Arduino coding.

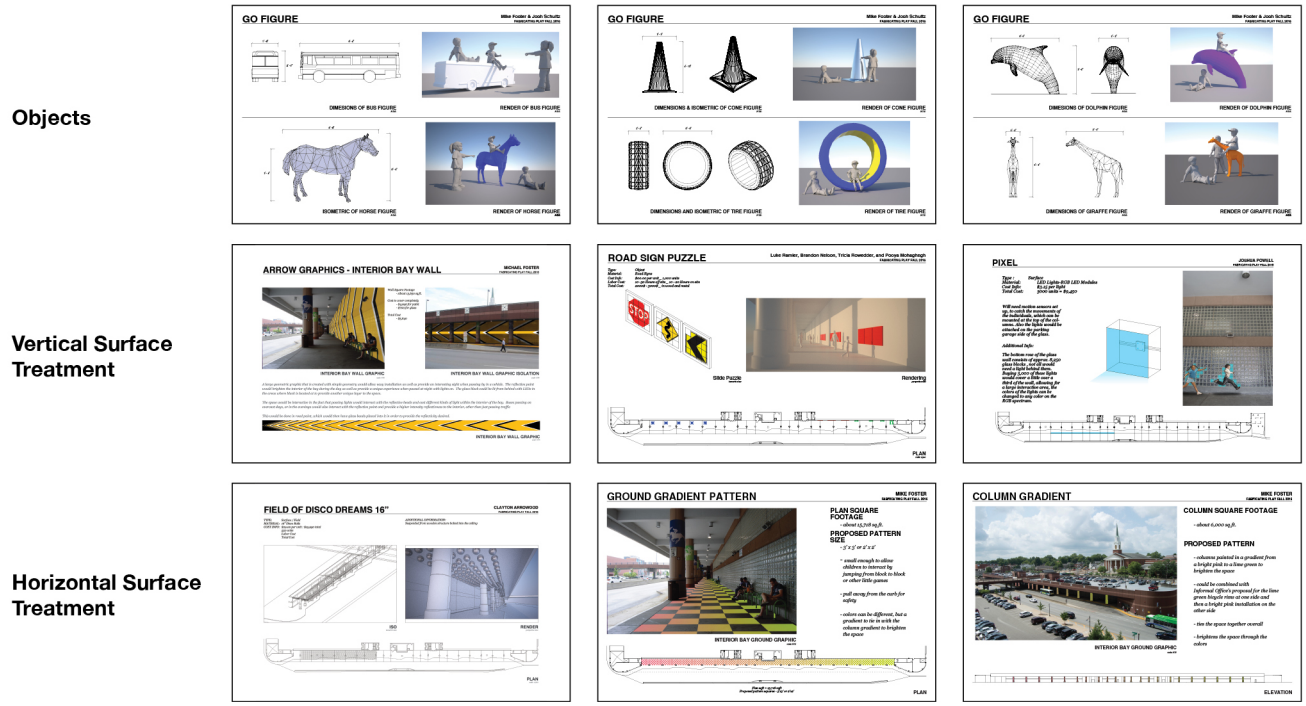

Figure 7. Initial proposals. Courtesy of author.

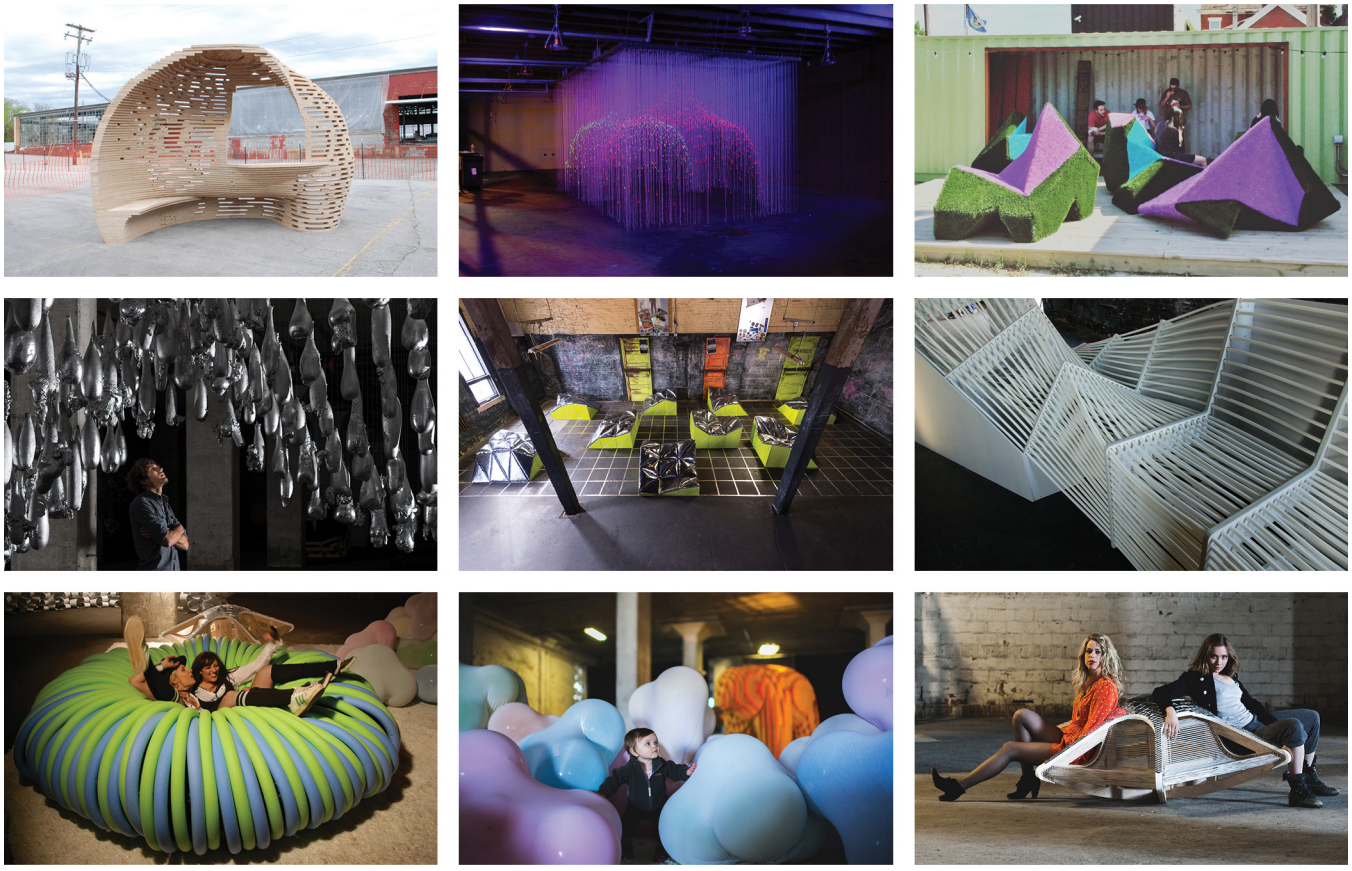

Figure 8. Previous deliverables of elective course. Courtesy of author.