ONOH
SPRING 2021

Ambient Backdoors

Using Natural Light and Synthetic Sound to Activate Domestic Spaces

Project Origins

This project sought to activate my suburban backyard in Tempe, AZ through a simple but interactive system, whereby detected changes in light activated an audio soundscape composed using musical synthesis. Having spent the last ten years in Lawrence, KS (Fig. 1), I have grown affectionately accustomed to a rich ecological soundscape informed by over 54 parks distributed over three park districts. This is particularly true in the summer months when various species of cicadas reach adulthood and emerge from their underground nymph stage. Male cicadas “sing” in a beating chorus of sound produced by rapidly flexing their tymbals, drum-like organs that drone sonorously in their hollow abdomens. It is an incredible sonic experience that is not bound by Western time signatures, and its absence is clearly missed in the developed suburb of Tempe, AZ. As a current resident of the Superstition neighborhood at the intersection of Rural and Southern, my nightly soundscape is dominated by the sounds of cars heading for U.S. 60, packs of motorcycles zooming down Rural Avenue, the hissing of city busses stopping for boarders, the occasional shrill of an ambulance or police siren wailing or the chopping of a helicopter overhead.

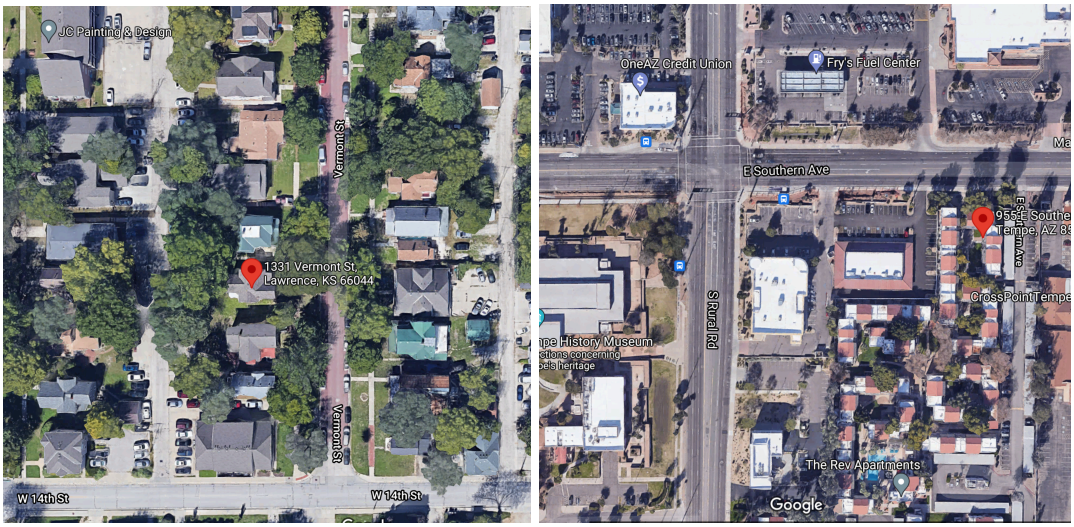

Fig. 1 Comparison shots of my former (left) and current (right) neighborhoods in Lawrence, KS and Tempe, AZ

Observing these sounds from the garden in my Tempe backyard, I appreciate the textural qualities of these sounds and their distinction from the Kansas soundscape I am accustomed to. Drawing my attention to my garden (Fig. 2), my ears sense the muted quality of this homemade vista: no wind blows through the trees nearby at night, and there is no discernible symphony of insect sounds that can be heard above the hum of the air conditioning units located throughout my apartment complex. This sensorial awareness, directed by my ears and enriched by nostalgic association, prompts me to conceive of my backyard as a site primed for sonic

intervention. Thus, “Ambient Backdoors” activates my backyard through biomimetic sound, using PureData and a Bela microcontroller to produce the audio and natural light as a control variable.

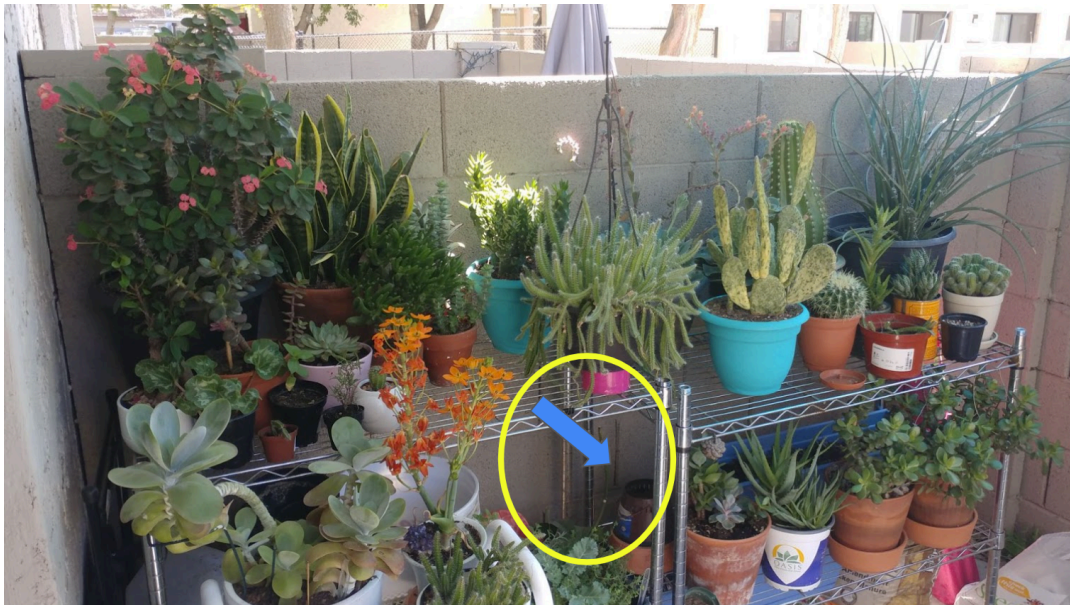

Fig. 2 Photograph of my backyard in Tempe. Arrow points to installation site

Project Materials

Project hardware consisted of one Bela microcontroller and one light-dependent resistor (LDR) sensor, connected to a portable speaker and powered via a USB battery pack (Fig. 3-4). Additionally, a candle was used as a portable but natural, ambient light source that the LDR used as a data input (Fig. 5). Project code was written in PureData, a visual programming language, using Andy Farnell’s “Designing Sound” insect patches as a starting point. I paid heavy attention to “beating” techniques in PureData to synthetically reproduce the droning sounds created by swarms of male cicadas and other insect mimicry. The LDR was programmed with a numeric threshold so that the system was triggered to play at a specific degree of darkness, then reset after a delay of 10 seconds when too much illumination was detected. In this way, the system could mimic the sensitivity of insects.

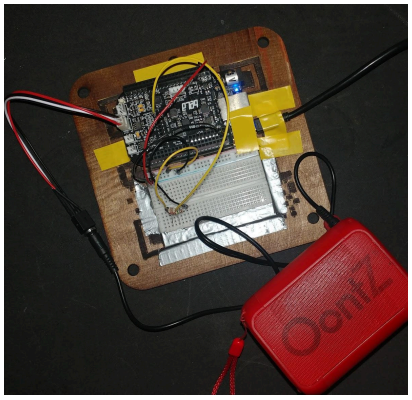

Fig. 3 Bela setup

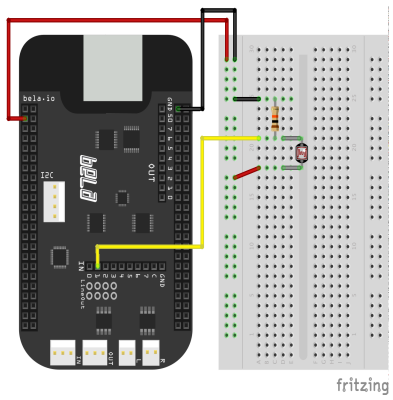

Fig. 4 Bela setup

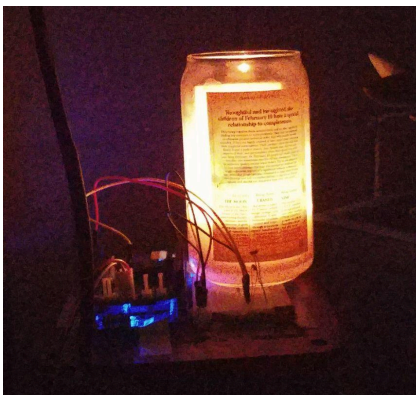

Fig. 5 System installed on site

Project Execution

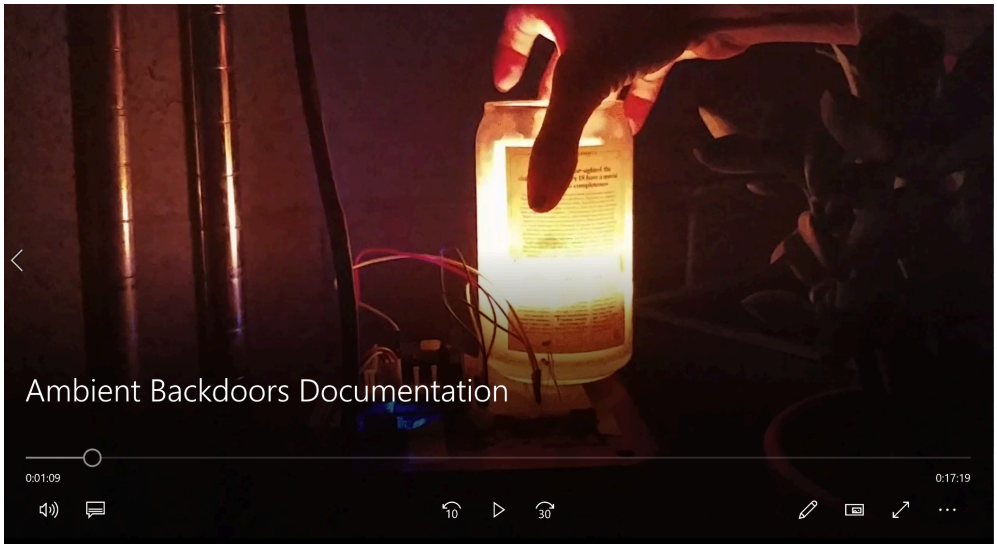

Fig. 6 Project Documentation (click to view)



Fig. 7 Audio recording (click to listen)

“Ambient Backdoors” was installed amongst my various outdoor plants on the evening of April 20, 2021. The piece was installed well after nightfall, so a candle was used as a substitute but natural light source. The candle was manually maneuvered to trigger the system, as demonstrated in the video documentation included in Figure 6. Once triggered, the system yielded a roughly 16 minute soundscape (Fig. 7) consisting of timed and layered Farnell insect sounds and a chorus of beating oscillators and phasors that I composed. The system was reset as desired by moving the candle near the LDR, then away again to allow the system to “come alive”.

Conclusion

“Ambient Backdoors” was successful in activating my muted backyard through a layered biomimetic soundscape. Future iterations of this work would expand the audio experience from a 20 minute piece to a more durational work of art that lasts from true sunset to sunrise.
The use of light to trigger this particular system speaks to the desire to balance the synthetic qualities of this work with organic, natural data inputs. In this way, this piece asserts itself as an ecosystemic work of art that is responding directly to the “gaps” in sound experienced in my backyard.