

KSAT Spoken Word Project

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INTRODUCTION

The Karl Stirner Arts Trail (KSAT) is a public sculpture park and walking trail located in Easton, Pennsylvania. The path follows the curves of Bushkill Creek, a local waterway and valuable community asset. Built in 2011, the 1.75-mile trail now provides a connection between Lafayette College's Arts Campus, downtown Easton, the Simon Silk Mill residential and commercial complex, and Easton's West Ward neighborhood. The KSAT is named after Karl Stirner, who was a prominent sculptor and longtime advocate for the arts within Easton. In alignment with Stirner's values, the purpose of the KSAT is to connect art with nature, history, health, and wellness (Karl Stirner Arts Trail 2024).

KSAT stakeholders and contributors strive to cultivate a recreational experience that is also educational and engaging for all users via the incorporation of physical components. These include a labyrinth, a student art wall, and a series of thought-provoking sculptures. The KSAT Advisory Board, which oversees trail management, recently received funding to support a new project highlighting the art of poetry. Our team of senior Engineering Studies students was able to contribute to the final product via an initiative known as "The KSAT Spoken Word Project." Its objective is to showcase the work of writers from the Lehigh Valley via a series of installations, with each one dedicated to a different local poet, that will allow KSAT users to listen to poems as they experience the trail.

Though still in its beginning stages, this project is multifaceted. Our team explored the social context and political history of Easton as it impacts trail use, the technical and artistic aspects of potential designs, and additional project constraints pertaining to economics and the environment. The Spoken Word will be a valuable addition to the KSAT, as it celebrates local talent and aligns with the trail's mission of connecting art with experiences of the natural world.

Figure 1 depicts a current map of the trail. The orange pinpoints containing a red archway, which is the KSAT logo and the trail’s most recognizable landmark, represent art installations currently placed along the route. The green pinpoints denote places of interest, including the Simon Silk Mill complex, the dog park, and the Historic Easton Cemetery. The purple pinpoints containing a “P” indicate parking areas and are closer to where many users enter or exit the trail. Learning about the existing setup of the KSAT allowed our team to begin visualizing how new installations would best be incorporated into the trail.



Figure 1: KSAT Landmark Map

Our initial research, composed of site visits, a user survey, and interviews with both engineering experts and community members, allowed us to formulate our problem statement: **How might we create meaningful poetry installations that are engaging and accessible for all users?**

We initially proposed two potential solutions, sketched out in Figure 2, to address this question. Both options would use solar energy to power a speaker with the capability to play a pre-programmed recording of a poem in an outdoor environment. Their main difference stems

from how the recording would be activated. In Option 1, the audio is triggered by a motion sensor, so when someone steps underneath the laser sensor, the speaker will activate and begin playing. In Option 2, the audio is turned on by a manual button. Considering the higher power demands that accompany the motion sensor, our team determined that the structure of Option 1 would need to be connected to a local electricity grid to support all of its energy needs. We drew from these energy considerations, as well as material concerns, to devise Option 2, which includes a waterproof box to protect the speaker in the absence of the cone from Option 1.

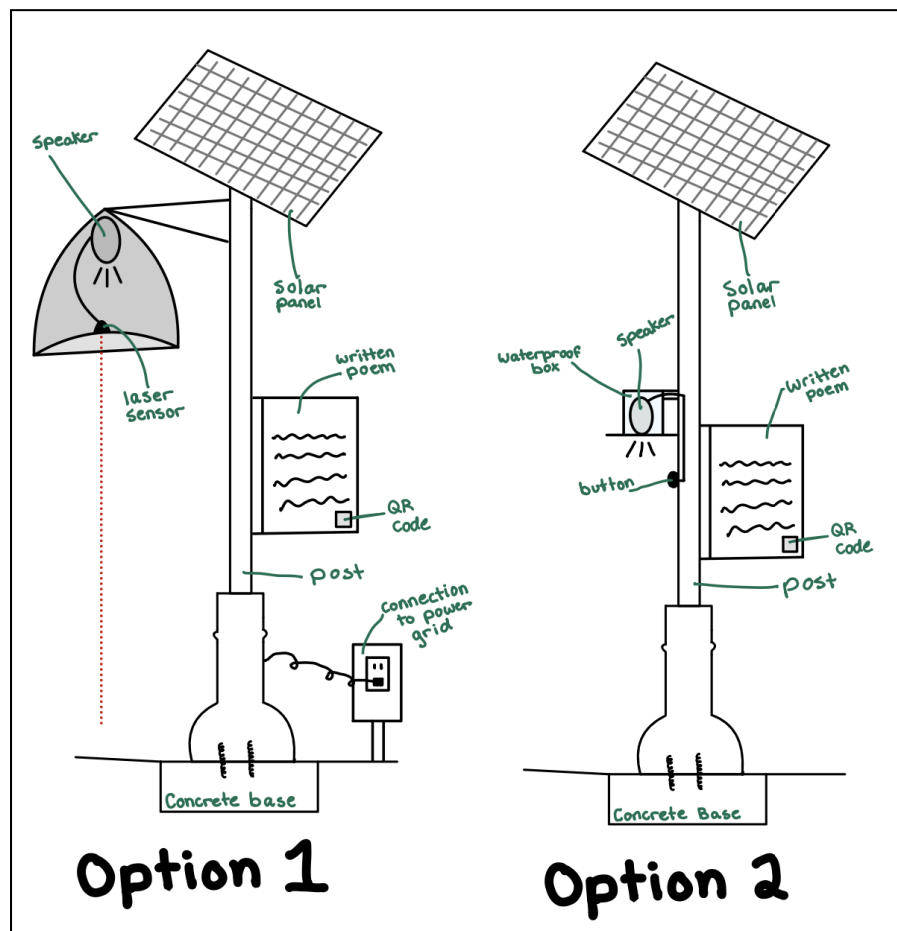


Figure 2: Initial Proposed Solutions

Further design iteration prompted us to consider the integrity of the structure's internal components and intended equipment. Not only would weatherproofing be a requirement for the

speaker box, but it would be necessary to clearly let sound waves pass through and allow for easy maintenance access while withstanding any unwanted tampering with the box. To better protect the audio components, our final design iteration incorporates three aluminum panels to enclose all inner workings of the structure. As shown in the prototype and cross-section included in Figure 3, the front panel will provide space for the push button, the speaker output, and written versions of a featured poem, while the back panels will have room for visual art related to the poem's content. We believe that this version, referred to as Option 2B, best combines energy, material, and accessibility concerns. Thus, we recommend Option 2B as the solution most suited to accomplishing the goals of the KSAT Spoken Word Project.

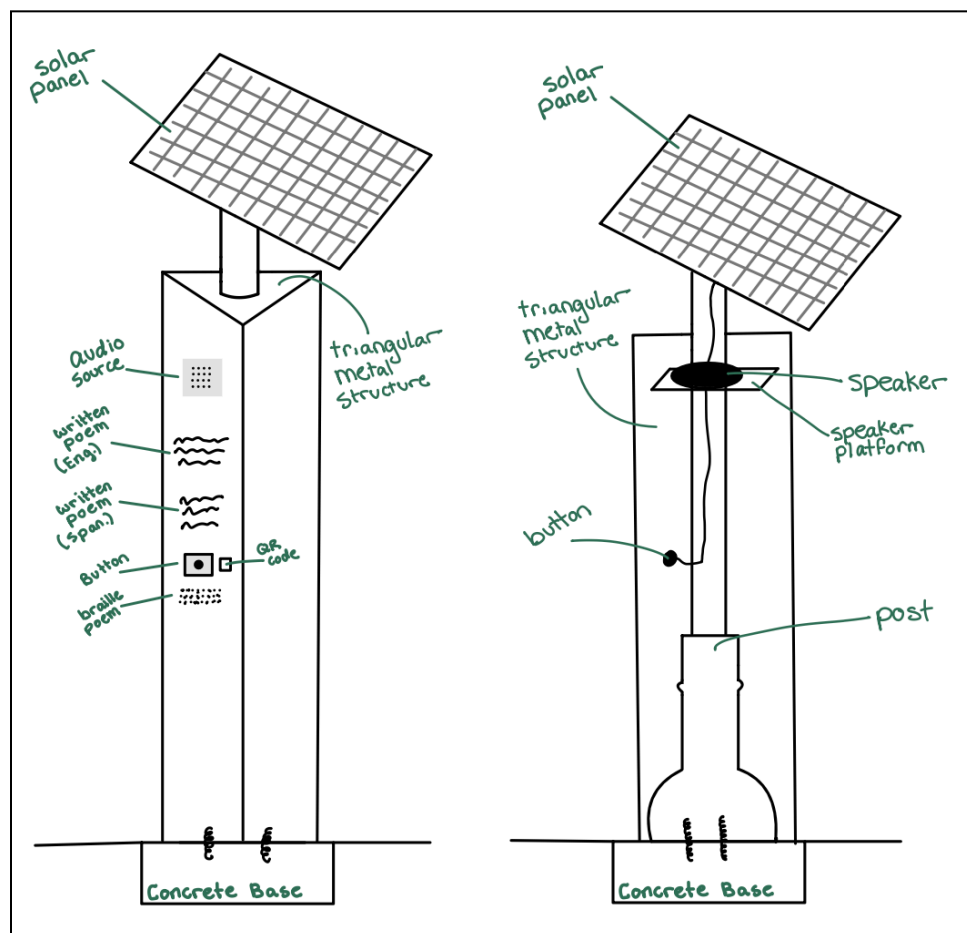


Figure 3: Final Proposed Solution

SOCIAL CONTEXT

To entertain and educate trail users, the KSAT Spoken Word Project will feature sound art, a form of art that employs an audio component as its primary medium. Sound is not only a physical experience, but a mental one as well, so sound art has the capability to stimulate users in unexpected ways (Cobussen 2016). Historically, sound art has transformed public spaces by adding interactivity to visual art and engaging the auditory sense. Through interacting with sound art, users can further understand, relate to, and reflect on the meaning of a displayed piece (Cobussen 2016).

An example of successfully-employed sound art includes Philadelphia's 2010 “Museum Without Walls” audio project. Launched by the Fairmont Park Art Association, Museum Without Walls is an artistic exhibit that publicly showcases sound art, allowing users to engage with sculptures through “narrative-driven soundscapes” (Norristown Times Herald 2016). The audio recordings were selected to offer insight into the intentions of the artists who designed the exhibit’s sculptures. Through the sound feature, artists such as Mark di Suvero were also able to explain their personal connection to the pieces. This perspective is accessible to viewers via cell phones, downloads, and streaming services. For mobile phone use, the project employs an app called *BloombergConnects* (Norristown Times Herald 2016). Locals and tourists alike are able to interact with the exhibit via its innovative use of sound art.

Our team was inspired by the Museum Without Walls project, and we hope to employ audio in a similar manner in the KSAT Spoken Word Project to connect trail users to the area's poets. The KSAT currently features many visual art exhibits, so the audio component of the Spoken Word will add variety to the viewer experience. For those less familiar with art

interpretation, the audio removes some of that subjectivity, while still allowing users to have an individual reflection on a piece.

Our team understands the importance of thoughtfully designing for a specific group of users, and we intended for our project's output to reflect that. In order to design a sound art technology that will positively impact the KSAT and the Easton area in which it resides, we first researched the city's demographics to learn more about the community and its makeup. In Easton, 20.3% of residents speak a language other than English at home (U.S. Census Bureau 2020, 2022). This statistic led us to prioritize the incorporation of a second language into our design. Thus, we plan to offer two audio options, one in English and one in Spanish, the second-most-common language spoken in Easton. The user will be able to activate the English audio or the Spanish audio when engaging with the poetry installation.

Another important demographic consideration is that 14.1% of the Easton population is aged 65 years or older (U.S. Census Bureau 2020, 2022). Oftentimes, older individuals struggle with operating more modern technologies. At the same time, older adults tend to enjoy low-impact outdoor activities like trail walking, so we expect this population to fall into our intended users. To address this need, we intend for our design to be user-friendly and to offer instructions when applicable. We plan for the audio component to be activated by a simple button, an interface that is ideally accessible to all ages.

Additionally, 2.9% of Easton residents have a hearing disability (U.S. Census Bureau 2020, 2022). With any auditory project, it is important to account for people who may struggle with hearing recordings coming from speakers, especially in an outdoor environment with many competing sounds. To address this concern, there will be a written version of the featured poem in both English and Spanish incorporated into each installation. The written poems will also be

useful during any extended periods of maintenance on the audio system. To accommodate users with visual impairments, we plan to include a Braille version of the poem alongside the written transcriptions.

These design choices align with the KSAT's prioritization of functioning as an inclusive and educational space for all members of the community, regardless of background or physical ability. When considering accessibility, our team strove to address questions regarding how design choices can maximize inclusivity for different groups, such as speakers of languages other than English and individuals with disabilities. We wanted to learn which additional features could enhance the KSAT's role as a welcoming community space through its newest artistic innovation. Following principles of universal design helped us better ensure that our project would reflect Easton's diversity and invite equitable engagement.

Along with the makeup of the broader Easton area, we got a sense of the demographics of KSAT users via an online survey. While this survey was anonymous, we did ask participants to indicate their age range, how they typically access the trail, and their connection to the Easton community, among other questions regarding engagement with the KSAT. The survey was made on Google Forms and accessible via a QR code on fliers created by our team. We posted fliers in the announcement boxes at both ends of the trail, in the Simon Silk Mill complex, and around Lafayette's main campus and Arts Campus. A copy of the flier put up near the Don Juan's entrance to the KSAT is shown in Figure 4. The fliers were dispersed in early October and remained up through November. Within a month, our survey had garnered 19 responses, which we assessed collectively by utilizing the Google Forms analytics features. Some respondents indicated willingness to provide additional feedback and included their phone number. However, our team did not have any success in contacting these respondents for further participation.



Figure 4: KSAT Use Survey Flier

From our survey results, we concluded that most trail users would be willing to listen to a poem during their time on the KSAT. One of our questions read, “How likely are you to interact with an art exhibit on the trail? (1 = least likely, 10 = most likely).” Over 75% of respondents provided a score greater than 5, indicating an inclination towards engaging with public art. Additionally, 78.9% percent of participants indicated that they enjoy listening to nature on the trail, so they may not be using headphones on the KSAT. Headphone users are less likely to stop and listen to a poem, as it interrupts their music, podcast, or phone call. If the majority of trail visitors are not wearing headphones, this supports our conclusion that they would be partial to listening to a new poem. For the question, “What do you do on the trail?,” we found out that 100% of respondents use the trail for walking. People who are walking are more likely to stop

and interact with an exhibit than people who are running, biking, or fishing, again showing support for and interest in a new art installation. The data is visualized below, in Figures 5 and 6.

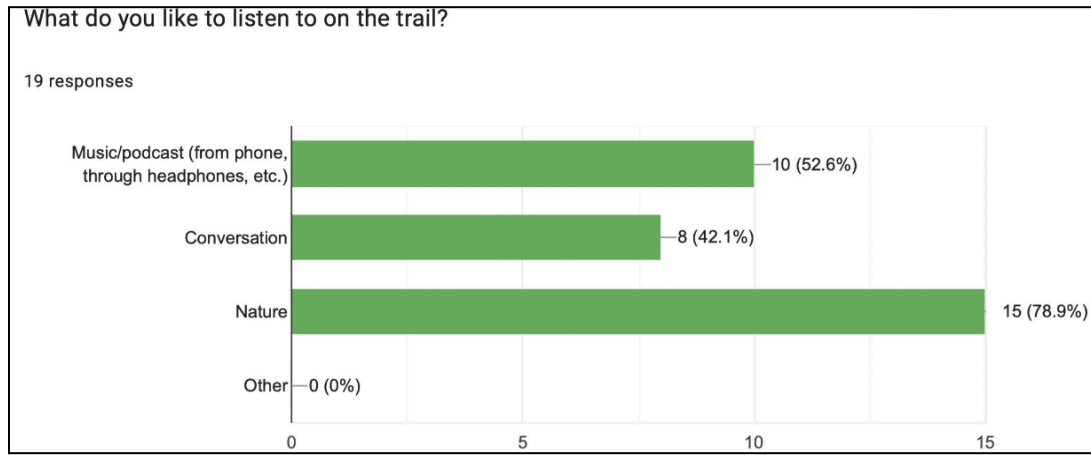


Figure 5: Listening on the Trail - Response

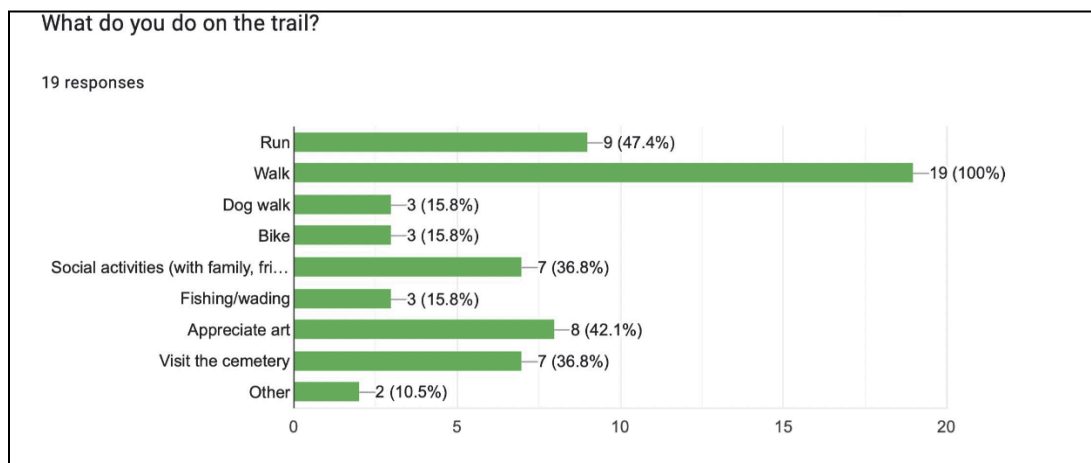


Figure 6: Trail Use - Response

The survey also helped us gather information influencing placement of the installations. We learned that 36.8% of users begin walking on the trail at the Silk Mill entrance, and that 60% of people walk the entire trail whenever they use it. The full data is shown in Figures 7 and 8.

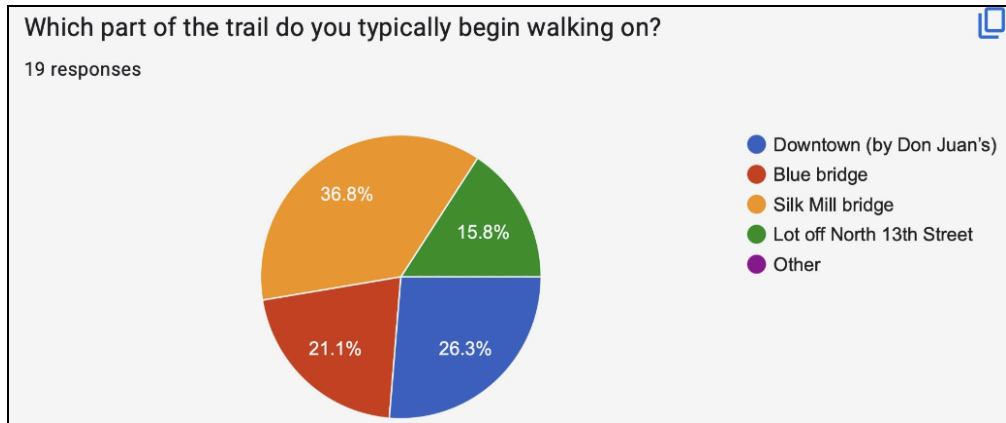


Figure 7: Trail Start Locations - Response

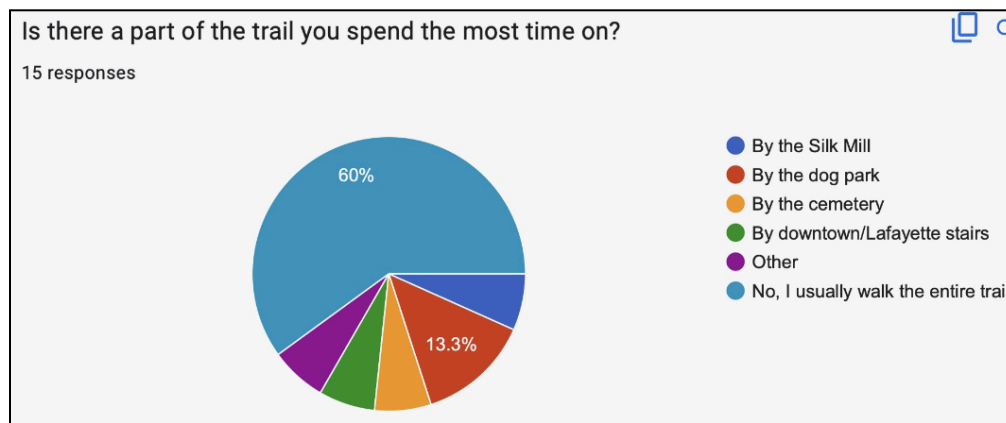


Figure 8: Trail Segments - Response

Along with additional factors discussed in the Political Context section, the survey results guided our team in selecting optimal locations for our poetry installations.

POLITICAL CONTEXT

The Karl Stirner Arts Trail is an important component of the City of Easton's ongoing efforts to revitalize public spaces and engage the local community. Stakeholders from the city as well as Lafayette College have played key roles in advocating for the KSAT, with each group prioritizing a slightly different vision. In 1999, the City of Easton and Lafayette College were jointly given a \$9 million grant for the general improvement of the North 3rd Street and Bushkill Creek corridor (Finlay 2022). Both parties agreed on the construction of a trail, though their motivations varied. The city sought to create accessible green space for residents and upgrade a former silk mill into a residential and commercial entity, while the College intended to develop the area around its newly-purchased visual arts building. Ultimately, Easton Mayor Sal Panto enlisted stakeholder Richard McAteer to help steer the revitalization project. With the intention of turning the budding trail into a public art exhibit, McAteer involved Lafayette art professors Jim Toia and Ed Kerns, bridging the city-college divide and setting up the KSAT to become the interactive space it is today (Finlay 2022). This history highlights local politics and presents the KSAT as both a collaborative and somewhat contested effort.

Our team's work on the KSAT Spoken Word Project is inherently shaped by this partnership. Professor Jim Toia, our main community contact and source of information regarding the public-private relations surrounding the KSAT, also serves as the trail's Executive Director and Curator. Upon connecting with Professor Toia, he shared that a new grant of \$10,000, from the Northampton Tourist Fund, has been allotted to the City of Easton for an innovative art installation on the KSAT (Toia 2024). He intends for the new exhibit to combine audio and visual media through poetry. Professor Toia envisions a series of simple structures, with room for artistic design and a user-activated sound component, as something that would be

most successful on the trail (Toia 2024). He provided constraints pertaining to cost, size, and materials that ultimately influenced our design process. For example, the installation must be energy-efficient and solar-powered.

Professor Toia is part of the KSAT Advisory Board, which is subdivided to best guide decision-making and use of resources for the trail. These groups are the KSAT Inc. Board of Directors, the KSAT Arts Advisory Council, and the KSAT Lafayette College Advisory Council (Karl Stirner Arts Trail 2024). As a whole, the Board is composed of city officials, local artists, and representatives from the College. The Board will ultimately steer the direction of the Spoken Word Project, providing final approval of poem selections, installation locations, and strategies for engaging the public. Guidance from such a variety of stakeholders will ensure that our team's work is beginning a project that reflects the values of the Easton community and upholds the KSAT as a valuable local asset.

With the values of Easton's diverse community in mind, our team found it important to research and differentiate between "the aesthetics of politics" and "the politics of aesthetics," concepts that often influence public displays. The aesthetics of politics explains how politics, on any level, can shape personal opinions and experiences (Park 2019). For example, art that serves to comment on society can help viewers make sense of current events. On the other hand, the politics of aesthetics describes how art can have its own influence on opinions and experiences (Park 2019). For example, modern art that challenges traditional art can show that there is no "right" or "wrong" in art, but instead there is room for subjectivity, something that can be transferred to other facets of life. With these two concepts in mind, our team sought to keep from creating or enforcing biases and instead offer room for creative thinking via our final proposal.

Since the KSAT is directed at all ages, our team sought to make the Spoken Word

installations interactive and entertaining for everyone, including children and their caretakers. This involves the politics of aesthetics, as any component dedicated for children must be creative and subjective enough to engage them, without reinforcing harmful beliefs, even unintentionally. Additionally, our design should allow users to think critically about a poem and develop their own perceptions, aligning with the intentions of sound art and showing the aesthetics of politics. To fulfill these goals, poem selection must be intentional, and the KSAT Board must carefully consider the aesthetics of the installations. Once the poems are selected, simple activities like guided movement or listening can be devised to align with the poem's themes and provide a more engaging component for younger listeners.

Additionally, our team will be the first to act as “Promotores” (the Spanish translation for “Promoters”) of the KSAT Spoken Word Project, as inspired by a public health outreach model centered around community engagement and equitable access in Los Angeles. The Promotores approach was implemented during the Los Angeles State Historic Park (LASHP) renovation project in 2018 (Loukaitou-Sideris and Mukhija 2020). Promotores are community members who help incorporate the interests of underserved and underrepresented groups. These representatives are responsible for facilitating communication between these communities and local decision-makers, for example through holding sessions to hear community concerns and share them with policy leaders. After the Promotores model was piloted, the Los Angeles area experienced an increase in the diversity of LASHP visitors because the park began to better meet a wider variety of needs (Loukaitou-Sideris and Mukhija 2020). Within the context of the KSAT Spoken Word Project, our team serves as a bridge between stakeholders, Lafayette College, and the Easton community, ensuring that multiple perspectives are represented.

Meeting the needs of Easton's diverse community involves considering residents from

multiple neighborhoods and of varied backgrounds. Easton is divided into four quadrants: College Hill, where Lafayette College is situated and many faculty members reside; Downtown, which has undergone continuous revitalization involving new restaurants and apartment buildings; the South Side, an older and culturally-rich neighborhood across the Lehigh River; and the West Ward, a dense neighborhood filled with vibrant businesses. Geographically, the KSAT is closest to Downtown, with connections to College Hill and the West Ward.

In conversation with Professor Benjamin Cohen, an Engineering Studies professor and member of the KSAT Lafayette College Advisory Council, we saw the importance of engaging residents from the West Ward. This neighborhood is the most historically-disadvantaged, with the least access to green space. Professor Cohen suggested placing some of the poetry installations near the trail's 13th Street entrance, the most convenient entry point for West Ward residents (Cohen 2024). This location can help make the exhibit more accessible, as we have learned that not all KSAT users traverse the entire trail, so anyone walking from the West Ward would not be required to travel farther distances to reach a poetry installation. Considering these community dynamics in our project's potential sites allowed us to address socioeconomic disparities and ensure that the Spoken Word reaches a wide range of Easton residents. Combined with our survey results, this insight from Professor Cohen guided us in identifying ideal locations for our installations, depicted on an annotated map in Figure 9.

The map in Figure 9 map provides an update to Figure 1. The site closest to the 13th Street entrance can serve as a direct connection to the West Ward neighborhood. The location near the dog park would benefit users who spend their time on the opposite end of the trail, a trend revealed in our survey results. Finalized locations will be outlined in the Technical Context section, as site decisions are also influenced by whether an area receives adequate sunlight for

solar panel operation.

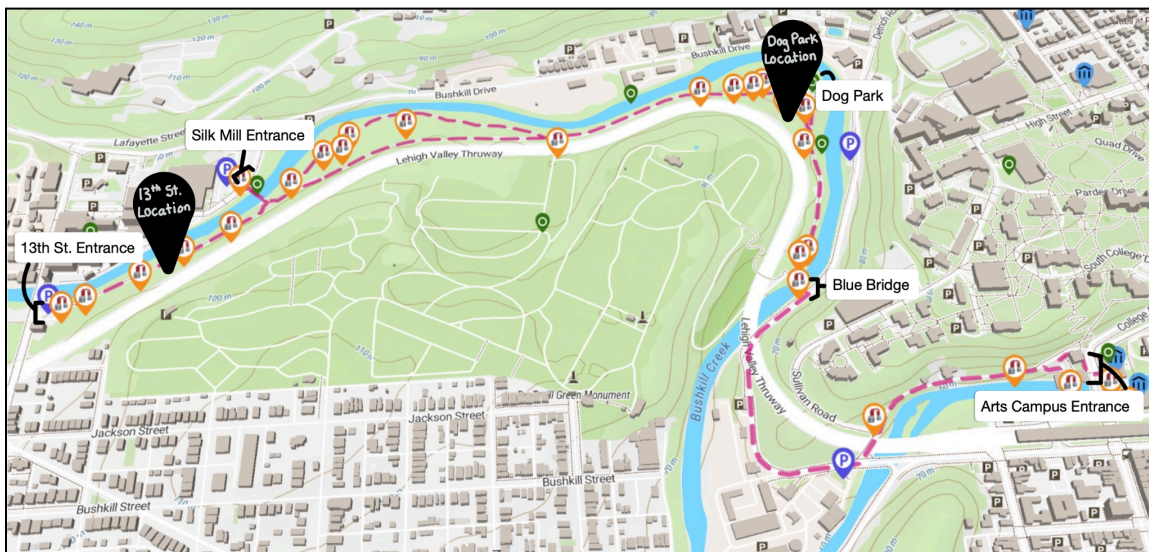


Figure 9: Installation Locations

Broader political factors that may influence the project include permitting, as well as prevailing attitudes surrounding funding for the arts. Permission for breaking ground will likely need to be obtained, holding installation teams accountable for changes to land use and the immediate environment (Wilford-Hunt 2024). Easton Public Works maintains the KSAT and is expected to be involved with its newest addition. Additionally, local and national views on the importance of art can play a role in determining continued support for the Spoken Word. The project's initial reception has the potential to impact financial contributions and publicized assistance from local officials, especially as the City of Easton continues its revitalization efforts (Toia 2024). Thus, our team has prioritized promoting the project in a positive and flexible manner to strengthen visibility.

TECHNICAL CONTEXT

Based on the results of our interviews, survey, and thorough research, our team devised two solution options, shown in Figure 10.

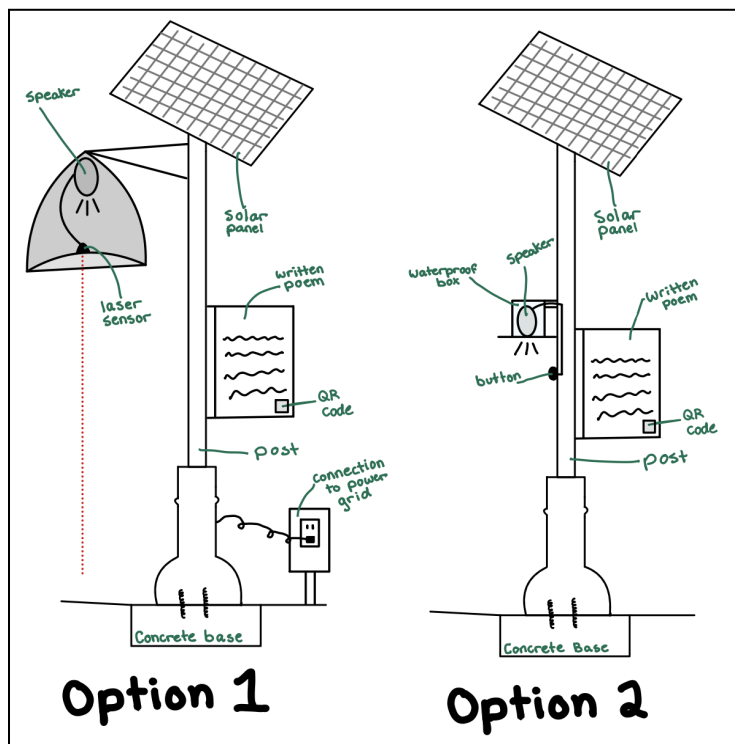


Figure 10: Solution 1 & Solution 2

These solutions are modeled on the specific type of lamp post featured across Lafayette College's campus. Modifying these available lamp posts is an ideal option for the final design, as they capitalize on an existing structure. Since the lamp posts have functioned reliably on campus, a location less than one mile from the KSAT, they would prove a reasonable and sturdy installation in a similar environment like the trail. The lamp posts will be free for the project's use, a benefit further highlighted within the Economic Context section (Wilford-Hunt 2024). Thus, using these already-available base structures will allow our project to prioritize sustainability in design and implementation. Specifications for the lamp posts are shown in Figure 11 (Roll Barresi & Associates 2016).

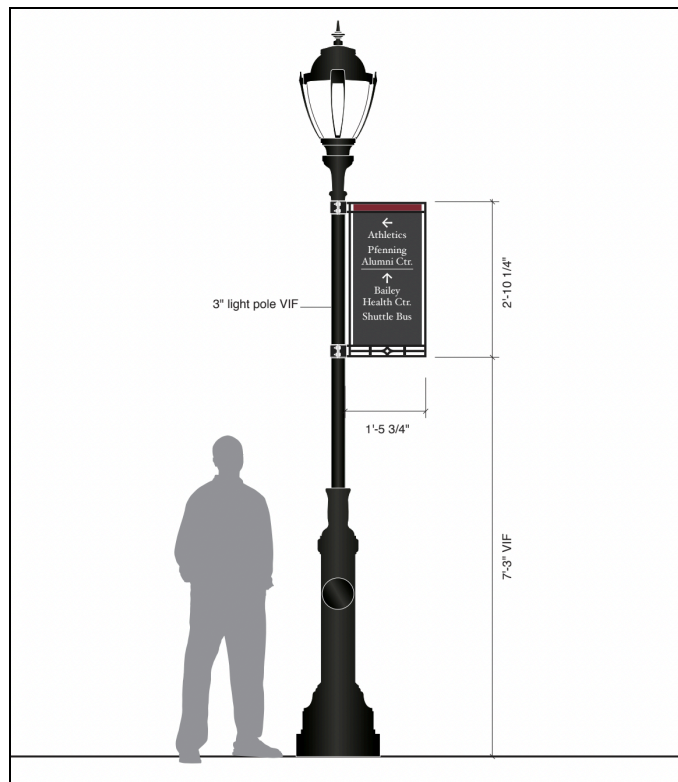


Figure 11: Lamp Post Specifications

Following a discussion with Professor Toia, we decided that the ideal height for the Spoken Word structures is roughly seven feet. The installations must be tall enough so users cannot reach the solar panel on top, and short enough to keep from distracting from the natural scenery. Thus, the lamp posts should be cut right underneath the base of the signage on the specifications, leaving 7'3" of height to work with for the art installation. Between the 3-foot and 5-foot marks, the front of the post will include written versions of the poem in English, Spanish, and Braille, as well as a QR code for users to scan and access the poem on a personal device.

In addition to sharing the lamp post base structure, both proposed solutions utilize a solar panel to generate energy for the speaker. However, the overall energy need differs between the two solutions based on their working components. The laser sensor in Option 1 increases the design's energy demand, necessitating a connection to a power grid. However, in a discussion

with Professor Toia, we learned that a power grid is not easily accessed from the KSAT (Toia 2024). Since Option 2, with its simpler components and accompanying lower energy demand, is expected to be completely operable under the provided solar energy, the second solution would be a less energy-intensive and more sustainable choice.

Another feature of both options is that the solar panel is connected to the speaker through wiring. All electrical components must be shielded from the outdoors to best ensure the functionality and longevity of the installation. In Option 1, this is accomplished by positioning the speaker at the apex of a cone, with connective wiring running through the center of the lamp post and into the cone. The cone serves the dual function of providing protection from the elements and funneling sound down toward the user once they step underneath and trigger the motion sensor. Since a large portion of the KSAT is adjacent to U.S. Route 22, a major highway through the Lehigh Valley, there is significant traffic noise that may distract from the poetry experience. The conical shape would help block outside noise, as they are often utilized in interactive museum exhibits for this purpose (Lopez 2024).

During our interview with computer science professor Christian Lopez, however, we learned that a laser sensor may not be the most reliable technology for our project. Lighting conditions, influenced by sunlight and the color of clothing that users are wearing, can interfere with motion sensors (Lopez 2024). We anticipate that most participants will use the installations during the day, so sunlight interference would be a challenge when using a motion sensor. Depending on the dimensions of the cone, only one or two people would be able to fit underneath it at a time. If users are on the KSAT with others, they may not be able to listen to the poem together. The physical limitations and lack of interpersonal connection posed by the motion sensor and cone combination steered our team away from choosing this technology.

Professor Lopez confirmed that using a push-button, as sketched out in Option 2, is a simpler and more reliable avenue for our project. Since Option 2 does not employ a cone to house the speaker, some other waterproof structure must be included to shelter the speaker from the outdoors. Finding one proved to be more difficult than expected, as a speaker-enclosing box must be unopenable by users and impenetrable by the elements, while not blocking soundwaves and remaining accessible for maintenance.

After presenting these first two options to Professor Toia, we concluded that Option 2 is more applicable to the project context. He provided ideas on how to improve Option 2 in order to address our concerns about the protective box, as well as his own concerns regarding the security of the electric components and accessibility to the poem itself. This discussion resulted in the creation of Option 2B, detailed in Figure 12.

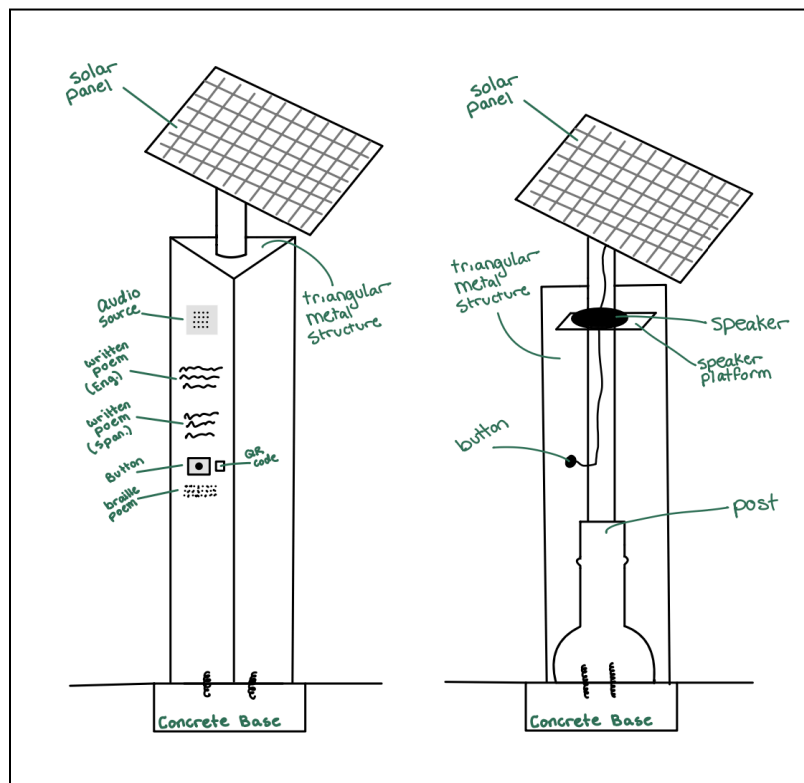


Figure 12: Solution 2B

Option 2B has a similar internal structure to Option 2, with some minor changes. In Figure 12, the diagram on the left shows how the installation looks from the outside, and the diagram on the right reveals its inner workings. Feedback from Professor Toia led us to pursue this final proposed design. For example, there have been past instances of vandalism on signage and art pieces along the KSAT (Toia 2024). Enclosing the entire mechanical structure ensures that users are unable to access expensive equipment. Additionally, having the poems written directly on the main vertical structure rather than on an appendage should help deter undesired behaviors (Toia 2024). For these surrounding panels, Professor Toia suggested using brushed or glossy aluminum due to its ability to be painted and withstand outdoor conditions. The lamp post itself is already constructed from aluminum, so we know the material is resistant to weather and sustainable over long periods of time. Finally, from his artistic viewpoint, Professor Toia believes that Option 2B will better assimilate with the rest of the artwork than Option 2 would, as it will portray its clear message without incorporating many unnecessary parts.

Option 2B also solves the problem of finding a waterproof box for the speaker. Since the speaker will be fully enclosed within the structure, including at the top and bottom, there is no need to find an additional, smaller way of protecting the speaker. Another interesting feature of using panels in Option 2B is the streamlined ability to change the poem. The front panel, which will feature the poem in English, Spanish, and Braille, will be screwed on. Therefore, it can easily be replaced by a new panel with a different poem. The ability to remove the front panel will also come into play when maintenance is required. The other two panels will have room to incorporate visual art related to the poem's content and themes, with the ability to be swapped or painted over when a new poem is introduced.

For the final proposal, our team sought to present a suitable speaker and solar panel combination. Following recommendations from Professor Lopez, we researched several speakers that can store and play a short poem. A comparison of our final options is detailed in Figure 13.

Speaker Type	Power Output (Watts)	Play Time (Hours)	Battery Capacity (mAh)	Charging Time (Hours)	Unit Cost (\$)	Dimensions	Features
BOGASING S8 Pro	100	15	1500	2	170	Depth: 2.56" Width: 11.06" Height: 4.33"	Type-C, USB, AUX, TF
DOSS	12	20	2200	4	35	Depth: 2.9" Width: 6.6" Height: 2.7"	Type-C, AUX, TF, LAD light

Figure 13: Speaker Comparison

Due to its shorter charging time, higher power output, and USB capabilities, our team decided to use the BOGASING S8 Pro speaker. We believe these benefits are worth the higher unit price. The speaker's USB feature is especially important for inputting and changing the recorded poem audio.

Then, to select an appropriate solar panel, our team determined the amount of energy the BOGASING S8 Pro speaker needs. These calculations were based on predictions of average poem lengths and the daily number of users. In the most ideal conditions, when the exhibit is newest and weather conditions are pleasant, we estimate that the speaker will play a maximum of 300 times per day. In the winter months, we estimate that the speaker will play a maximum of 60 times per day. Since each poem will likely be between 30 seconds to 2 minutes long, the maximum time the speaker might play per day is about 10 hours in the summer and 2 hours in the winter. Our calculations are shown below.

$$\frac{300 \text{ plays}}{1 \text{ day}} * \frac{2 \text{ min}}{1 \text{ play}} * \frac{1 \text{ hr}}{60 \text{ min}} = 10 \text{ hours per day}$$

$$\frac{60 \text{ plays}}{1 \text{ day}} * \frac{2 \text{ min}}{1 \text{ play}} * \frac{1 \text{ hr}}{60 \text{ min}} = 2 \text{ hours per day}$$

Our next set of calculations involved estimating daylight hours to determine where the structure must be situated to direct adequate sunlight to the solar panel. We considered two locations on the KSAT, near the 13th Street entrance and next to the dog park, as influenced by our research into the project’s social and political context. Utilizing the U.S. Naval Observatory’s data services, we inputted each location’s latitude and longitude coordinates to find the projected daylight hours based on records from 2023 (Astronomical Applications Department 2024). The results are copied in Figure 14.

Duration of Daylight for the Year 2023 13th Street N 40° 42', W 75° 14' Zone: 5.0 hours West of Greenwich												
Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
1	09:19	10:07	11:17	12:41	13:57	14:54	15:02	14:19	13:06	11:46	10:26	09:29
2	09:20	10:10	11:19	12:43	13:59	14:55	15:02	14:17	13:03	11:43	10:24	09:28
3	09:21	10:12	11:22	12:46	14:02	14:56	15:01	14:15	13:00	11:41	10:22	09:27
4	09:22	10:14	11:25	12:49	14:04	14:57	15:00	14:13	12:58	11:38	10:19	09:25
5	09:23	10:16	11:28	12:51	14:06	14:58	15:00	14:11	12:55	11:35	10:17	09:24
6	09:24	10:19	11:30	12:54	14:08	14:59	14:08	12:53	11:33	10:15	09:23	
7	09:25	10:21	11:33	12:57	14:10	15:00	14:58	14:06	12:50	11:30	10:13	09:22
8	09:26	10:23	11:36	12:59	14:13	15:00	14:57	14:04	12:47	11:27	10:10	09:21
9	09:27	10:26	11:38	13:02	14:15	15:01	14:56	14:02	12:45	11:25	10:08	09:21
10	09:28	10:28	11:41	13:05	14:17	15:02	14:55	14:00	12:42	11:22	10:06	09:20
11	09:30	10:31	11:44	13:07	14:19	15:03	14:53	13:57	12:39	11:20	10:04	09:19
12	09:31	10:33	11:46	13:10	14:21	15:03	14:52	13:55	12:37	11:17	10:02	09:18
13	09:32	10:36	11:49	13:12	14:23	15:04	14:51	13:53	12:34	11:14	10:00	09:18
14	09:34	10:38	11:52	13:15	14:25	15:04	14:50	13:50	12:31	11:12	09:58	09:17
15	09:35	10:40	11:55	13:18	14:27	15:05	14:48	13:48	12:29	11:09	09:56	09:17
16	09:37	10:43	11:57	13:20	14:29	15:05	14:47	13:46	12:26	11:06	09:54	09:16
17	09:38	10:46	12:00	13:23	14:31	15:05	14:45	13:43	12:23	11:04	09:52	09:16
18	09:40	10:48	12:03	13:25	14:32	15:05	14:44	13:41	12:21	11:01	09:50	09:16
19	09:42	10:51	12:05	13:28	14:34	15:05	14:42	13:38	12:18	10:59	09:48	09:16
20	09:43	10:53	12:08	13:30	14:36	15:06	14:41	13:36	12:15	10:56	09:46	09:15
21	09:45	10:56	12:11	13:33	14:38	15:06	14:39	13:33	12:13	10:54	09:44	09:15
22	09:47	10:58	12:14	13:35	14:39	15:06	14:38	13:31	12:10	10:51	09:43	09:15
23	09:49	11:01	12:16	13:38	14:41	15:05	14:36	13:29	12:07	10:49	09:41	09:15
24	09:51	11:04	12:19	13:40	14:43	15:05	14:34	13:26	12:05	10:46	09:39	09:16
25	09:53	11:06	12:22	13:43	14:44	15:05	14:32	13:24	12:02	10:44	09:38	09:16
26	09:55	11:09	12:24	13:45	14:46	15:05	14:31	13:21	11:59	10:41	09:36	09:16
27	09:57	11:12	12:27	13:48	14:47	15:04	14:29	13:18	11:57	10:39	09:35	09:16
28	09:59	11:14	12:30	13:50	14:48	15:04	14:27	13:16	11:54	10:36	09:33	09:17
29	10:01	12:33	13:52	14:50	15:04	14:25	13:13	11:51	10:34	09:32	09:17	
30	10:03	12:35	13:55	14:51	15:03	14:23	13:11	11:49	10:31	09:30	09:18	
31	10:05	12:38	14:52	14:21	13:08	10:29	09:18					

Duration of Daylight for the Year 2023 Dog Park N 40° 42', W 75° 13' Zone: 5.0 hours West of Greenwich												
Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
1	09:19	10:07	11:17	12:41	13:57	14:54	15:02	14:19	13:06	11:46	10:26	09:29
2	09:20	10:10	11:19	12:43	13:59	14:55	15:02	14:17	13:03	11:43	10:24	09:28
3	09:21	10:12	11:22	12:46	14:02	14:56	15:01	14:15	13:00	11:41	10:22	09:27
4	09:22	10:14	11:25	12:49	14:04	14:57	15:00	14:13	12:58	11:38	10:19	09:25
5	09:23	10:16	11:28	12:51	14:06	14:58	15:00	14:11	12:55	11:35	10:17	09:24
6	09:24	10:19	11:30	12:54	14:08	14:59	14:08	12:53	11:33	10:15	09:23	
7	09:25	10:21	11:33	12:57	14:10	15:00	14:58	14:06	12:50	11:30	10:13	09:22
8	09:26	10:23	11:36	12:59	14:13	15:00	14:57	14:04	12:47	11:27	10:10	09:21
9	09:27	10:26	11:38	13:02	14:15	15:01	14:56	14:02	12:45	11:25	10:08	09:21
10	09:28	10:28	11:41	13:05	14:17	15:02	14:55	14:00	12:42	11:22	10:06	09:20
11	09:30	10:31	11:44	13:07	14:19	15:03	14:53	13:57	12:39	11:20	10:04	09:19
12	09:31	10:33	11:46	13:10	14:21	15:03	14:52	13:55	12:37	11:17	10:02	09:18
13	09:32	10:36	11:49	13:12	14:23	15:04	14:51	13:53	12:34	11:14	10:00	09:18
14	09:34	10:38	11:52	13:15	14:25	15:04	14:50	13:50	12:31	11:12	09:58	09:17
15	09:35	10:40	11:55	13:18	14:27	15:05	14:48	13:48	12:29	11:09	09:56	09:17
16	09:37	10:43	11:57	13:20	14:29	15:05	14:47	13:46	12:26	11:06	09:54	09:16
17	09:38	10:46	12:00	13:23	14:31	15:05	14:45	13:43	12:23	11:04	09:52	09:16
18	09:40	10:48	12:03	13:25	14:32	15:05	14:44	13:41	12:21	11:01	09:50	09:16
19	09:42	10:51	12:05	13:28	14:34	15:05	14:42	13:38	12:18	10:59	09:48	09:16
20	09:43	10:53	12:08	13:30	14:36	15:06	14:41	13:36	12:15	10:56	09:46	09:15
21	09:45	10:56	12:11	13:33	14:38	15:06	14:39	13:33	12:13	10:54	09:44	09:15
22	09:47	10:58	12:14	13:35	14:39	15:06	14:38	13:31	12:10	10:51	09:43	09:15
23	09:49	11:01	12:16	13:38	14:41	15:05	14:36	13:29	12:07	10:49	09:41	09:15
24	09:51	11:04	12:19	13:40	14:43	15:05	14:34	13:26	12:05	10:46	09:39	09:16
25	09:53	11:06	12:22	13:43	14:44	15:05	14:32	13:24	12:02	10:44	09:38	09:16
26	09:55	11:09	12:24	13:45	14:46	15:05	14:31	13:21	11:59	10:41	09:36	09:16
27	09:57	11:12	12:27	13:48	14:47	15:04	14:29	13:18	11:57	10:39	09:35	09:16
28	09:59	11:14	12:30	13:50	14:48	15:04	14:27	13:16	11:54	10:36	09:33	09:17
29	10:01	12:33	13:52	14:50	15:04	14:25	13:13	11:51	10:34	09:32	09:17	
30	10:03	12:35	13:55	14:51	15:03	14:23	13:11	11:49	10:31	09:30	09:18	
31	10:05	12:38	14:52	14:21	13:08	10:29	09:18					

Figure 14: Daylight Hours at 13th Street (Left) and Dog Park (Right) Sites

The charts yielded almost the exact same data since their latitude and longitude inputs are very close together. Another limitation of these results is that they do not incorporate shade from trees or other structures, accounting only for patterns of the sun. Despite these setbacks, we are able to use the charts to gain a rough estimate of the average daily sunlight on the KSAT each month. We also calculated this average for the winter (October - March) versus the summer (April - September), as shown in Figure 15 and Figure 16.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Sunlight per Day (Hrs:Min)	9:38	10:39	11:57	13:18	14:27	15:02	14:45	13:44	12:27	11:06	9:56	9:18

Figure 15: Average Daily Sunlight, By Month

Winter (Oct.-Mar.) Average Daylight Time (Hrs:Min)	10:26
Summer (Apr.-Sept.) Average Daylight Time (Hrs:Min)	13:57

Figure 16: Average Daily Sunlight, By Season

Since the daylight tables do not account for shade, we needed to estimate the average amount of sunlight lost due to shadows and cloud coverage. Thorough completion of this process would be complex and require in-person observations over an extended period of time. To simplify the procedure to fit within the scope of our project, we utilized Google Earth images and personal experiences with the KSAT to reasonably determine shade coverage. Since the 13th Street location is surrounded by more trees and buildings than the dog park location, we are estimating that the 13th Street site loses about 4 hours of potential sunlight, and the dog park site loses about 2 hours, daily. We compiled the table shown in Figure 17 based on these estimates.

Location	Winter Average (Oct.-Mar.) (Hrs:Min)	Summer Average (Apr.-Sept.) (Hrs:Min)
Dog Park	8:26 ≈8.5	11:57≈12
13th Street	6:26≈6.5	9:57≈10

Figure 17: Average Daily Sunlight, By Season, With Shade Factored In

During the winter, we expect required speaker play time to reach a maximum of 2 hours per day. During the summer, this estimate extends as high as 10 hours per day. Thus, demands on the speaker will differ between seasons. We selected the BOGASING S8 Pro speaker, which has a total capacity of 15 hours of play time between charges. This speaker must be charged to at least 67% of its battery capacity during the summer, and at least 14% of that capacity during the winter. Calculations of the respective energy requirements are detailed below.

$$\text{Summer: } \frac{10 \text{ hours}}{1 \text{ day}} * \frac{100\% \text{ capacity}}{15 \text{ hours}} = 66.66\% \text{ capacity (100W)} = 66W$$

$$\text{Winter: } \frac{2 \text{ hours}}{1 \text{ day}} * \frac{100\% \text{ capacity}}{15 \text{ hours}} = 13.33\% \text{ capacity (100W)} = 13.33W$$

To calculate the required size of the accompanying solar panel, we utilized a formula based on daily energy consumption, daily average amount of sunlight, and a safety factor. The safety factor can fall between 1.25 and 1.5, and it accounts for variations in sunlight (VTOMAN 2024). Since our value for energy to the speaker is a rough estimate, we are using a safety factor of 1.5. The formula is:

$$\text{Watts (solar panel)} = [\text{Daily Energy Consumption}/\text{Avg. Sunlight Hours}] * \text{Safety Factor}$$

Since the 13th Street site receives the least amount of sunlight, we used that location to find how much solar energy must be generated to power the speaker at the capacities determined above. As long as the 13th Street site receives this adequate amount of sunlight, the dog park site should as well, as it features significantly less tree coverage. Our calculations with the formula are included below.

$$\text{Summer: } \frac{66 W}{8.5 hr} * 1.5 = 11.65W$$

$$\text{Winter: } \frac{13.3 W}{6.5 hr} * 1.5 = 3.07W$$

Our motivation for performing these calculations was influenced by our conversation with Professor Nicodemus, an Engineering Studies professor and expert in solar energy. Professor Nicodemus pointed us to the relations between energy received and energy required, in both ideal and actual scenarios (Nicodemus 2024). Rounding up from our summer calculation, our team concluded that the solar panel must produce at least 12 Watts of energy.

To account for the margin of error, we looked into 15-W solar panels and ultimately selected the ACOPOWER 15-W panel. We believe this option fits our project goals, as the panels are waterproof and have the ability to withstand high winds and heavy snow loads. These panels have the basic components for an off-grid system, making them a suitable option for the KSAT. The panels are made out of aluminum, matching the rest of our structure. The ACOPOWER device also contains a 12-V backup battery to store excess energy, which we believe will be essential for the final installations. On particularly sunny days, the solar panel will produce excess energy that can be kept in the battery and accessed during cloudy periods or at night, helping to minimize the effects of unreliable weather patterns.

Thus, our final recommendation incorporates a speaker and solar panel combination that takes environmental, geographic, and energy-related factors into account. Prior to developing prototypes of Option 2B, our calculations must be validated to ensure energy efficiency.

ECONOMIC CONTEXT

Visual arts professor Jim Toia, our team's main community contact, serves on the KSAT Advisory Board as their Executive Director and Curator. His responsibilities include selecting, sharing, and implementing a variety of artistic exhibits for the trail. Recently, Professor Toia was able to secure funding for a new type of exhibit – one with an audio feature, currently referred to as “The KSAT Spoken Word Project.” This novel initiative has the goal of incorporating the diverse voices of poets from throughout the Lehigh Valley. Therefore, with its emphasis on prioritizing local sources for both physical and recorded components, investing in this project equates to investing in building community. Easton residents will benefit from the addition of an engaging educational component to their valued trail, and the featured poets will expand the reach of their work to a receptive and supportive audience.

According to Professor Toia, the initial project grant from the Northampton Tourist Fund will be worth \$10,000 and is intended to be spent over a two-year period. He anticipates that the project will gain positive attention and traction, with the potential to receive up to \$35,000 total for its eventual implementation (Toia 2024). The KSAT Advisory Board will be a key player in obtaining and allocating this additional funding. The Board already facilitates an annual fund campaign, encouraging friends of the KSAT to contribute to fostering its mission of connecting art with nature, history, health, and wellness (Karl Stirner Arts Trail 2024). For our team's contribution to the overall project, we elected to work only within the constraints of the \$10,000 budget, as we wanted to ensure our proposal would be feasible using guaranteed resources.

The choice of the base structure depicted in each design iteration allows our proposal to conserve a portion of this budget from the beginning. During our interview with Professor Wilford-Hunt, an Engineering Studies professor and architecture professional, we learned that

the lamp posts used on campus have been provided by Alan Brink, a Lafayette alum and economics major from the class of 1970 (Wilford-Hunt 2024). Brink is currently the president of Spring City Electrical Manufacturing Co., a company dedicated to the production of American-made light posts (Spring City 2024). A set of twenty-five cast-iron lamp posts was first gifted by Brink in 2003, and his company continues to develop and donate the fixtures as needed (Lafayette College 2003). Since such materials are clearly available for the benefit of the Lafayette community, our team decided to capitalize on the connection and model our designs around a standard lamp post, thus devoting more funding towards additional materials and installation costs.

Each of our three design iterations requires a solar panel, a speaker, and wiring to connect the solar panel to the speaker. Costs will also accrue from installation, accounting for labor and for a concrete foundation, and for the artistic components, such as weather-resistant paints and compensation for contributing poets. As discussed within the Technical Context section, our team researched the structure itself, with emphasis on speaker and solar panel requirements. Thus, the scope of our current cost estimates applies to the physical structure and not to its collaborative development or implementation.

Options 1, 2, and 2B differ in how they store and play audio recordings. Option 1 requires a laser-activated motion sensor to play a poem recording and employs a cone to effectively funnel sounds from the speaker. Options 2 and 2B opt for a simpler mode of operation via a push button. Option 2B features the additional component of aluminum panels to maximize protection for the inner equipment as well as surface area for artistic expression. While they share the same base structure, each iteration's unique design results in a different final price. Figure 18 depicts a breakdown of the estimated costs that are associated with each option.

Material	Unit Cost (\$)	Option 1	Option 2	Option 2B
Solar Panel	\$30	X	X	X
Speaker	\$170	X	X	X
Wiring	\$15	X	X	X
Motion Sensor	\$30	X		
Cone	\$100	X		
Button	\$10		X	X
Aluminum Panels (21 sq. ft.)	\$100			X
	Total Cost →	\$345	\$225	\$325

Figure 18: Cost Breakdown of Options

The components required for Option 1 yield the highest overall cost, as the motion sensor and cone are more technically involved and must be weatherproof. Option 2 has the lowest total cost, but its internal structure is not well-protected. Option 2B falls in the middle of the pricing scale, as it incorporates the push button of Option 2 and a method of protecting the speaker like in Option 1.

Based on this rough cost breakdown, we believe that an initial investment of \$325 is reasonable for an audio poetry installation. The final product must be durable and functional while maintaining aesthetic value. This price point would allow the baseline requirements of one installation to be met. As mentioned, this estimate does not incorporate the costs of labor that accompany building, setting up, decorating, or recording the audio component for the structure. Yet, this estimate should leave room for the majority of these necessary costs while splitting the \$10,000 budget between our two identified locations to test their suitability for the project.

Scaling must be prioritized when purchasing the materials listed in Figure 18. Once a design is chosen and able to be funded, and its prototypes have been successful enough to warrant multiple implementations, each material should be bought in bulk. For example,

Professor Toia mentioned aiming to feature ten poetry posts along the KSAT (Toia 2024). Thus, ten of each item should be bought at the same time. Not only can this save on shipping costs, but each part will be the same age and have experienced the same wear at the time of installation. Scaling is particularly applicable to the aluminum sheets, as a quote is required, and all 30 sheets may be cut at the same time.

As with other art installations along the KSAT, the Spoken Word is meant to be enjoyed by the Easton community for many years. Long-term considerations for this project include routine maintenance, repairs, and obtaining backup or replacement parts. Professor Cohen told our team that Easton Public Works will likely be servicing the poetry posts along with the rest of the trail (Cohen 2024). Responsibilities for maintaining the structures will include cleaning the solar panels, checking the functionality of the speakers, and swapping out the poems when necessary. Our team used estimations of hourly wages and required maintenance time to determine reasonable upkeep costs. Predicting that a post would require about one hour of maintenance per month, and using an average salary of \$20 per hour for a city employee, we concluded that sustaining one post would cost at least \$250 per year. This projection does not include unanticipated repairs and should be factored into the number of planned installations for the exhibit.

While we are unable to predict when unexpected material failures or vandalism might occur, we do have information regarding routine part replacements. The ACOPOWER solar panel has a 5-year workshop warranty, so if any part of the panel breaks within 5 years of its purchase, a replacement should be covered by the manufacturing company. It also has a 20-year output warranty, which means the equipment's capacity for electricity generation will have dropped to 80% of its initial power output and should be swapped out after 20 years to ensure

energy efficiency. The BOGASING speaker has the lifespan of a typical household speaker, though this will likely be impacted by its constant use in an outdoor environment. Its lithium-ion batteries must be replaced approximately every two years, a factor influenced by specific speaker volume, usage, and average outdoor temperatures.

It is important to select companies and products that will likely be accessible for an extended period of time. Sourcing expertise for maintenance and repairs from the City of Easton will ensure local investment in the Spoken Word installations. In addition to the speakers and solar panels, replacement parts should be purchased from reliable vendors with warranty plans for the life of the product. Ensuring project longevity from the start can help alleviate financial concerns during and beyond its functional life.

Our team devised a timeline for the project based on conversations with our community contacts. During our initial meeting, Professor Toia shared his interest in constructing the installations in the spring of 2025, with a ceremony celebrating their launch to occur in April or May. His intention was for Lafayette students to decorate the posts as part of their spring semester art classes (Toia 2024). However, Professor Cohen expressed his concerns with this project's completion date, considering it is currently under the guidance of students who will transition the project to another course at the conclusion of the fall semester (Cohen 2024). Professor Wilford-Hunt provided advice on how to develop a more appropriate timeline, informed by her industry experience in architecture. Instead of debuting multiple installations at once, prototypes should be created, followed by the first permanent iteration (Wilford-Hunt 2024). This procedure would provide adequate time to test the suitability of different materials for meeting user needs and withstanding outdoor conditions during all seasons. Users should also be encouraged to provide feedback on the design as it improves. This timeline will require the

initial grant budget to be spent on the building and testing of prototypes prior to the eventual implementation of the final product using the full projected budget.

Our team believes that this project will be a valuable use of the KSAT Advisory Board's \$10,000 grant. We have conserved the budget by selecting base posts that are already available, and we have included reasonable material sources to create cost estimates. We have also outlined the anticipated costs whose numerical values we cannot yet estimate and projected the lifespan and maintenance requirements of the structures. Financial benefits of the Spoken Word Project may include more donations to the KSAT annual fund, increased demand for published works from the featured poets, and higher rates of trail users visiting neighboring businesses.

As with any community project, not all benefits are measurable in a monetary manner but come to fruition through social change. These would include increased engagement with the Karl Stirner Arts Trail as a whole, ideally by all age groups and demographics due to the accessibility of the installations. Other benefits could take the form of increased interest in poetry and awareness of local poets, prompting creativity among trail users. Finally, the installation creates an educational opportunity for visitors to learn about topics such as poetry, solar energy, and the connection between art and nature. This project has significant potential to benefit Easton and even the greater Lehigh Valley area.

CONCLUSION

The KSAT Spoken Word Project is a collaborative effort between the City of Easton and Lafayette College that seeks to create an innovative and interactive exhibit featuring sound art for the Karl Stirner Arts Trail in Easton, Pennsylvania. With the support of a \$10,000 grant, the KSAT Advisory Board intends to involve Lehigh Valley writers in a celebration of poetry that enhances the trail's mission of connecting art with nature, history, health, and wellness. Our team of senior Engineering Studies students contributed to the Spoken Word Project by completing initial research and design iteration, addressing the problem statement, "How might we create meaningful poetry installations that are engaging and accessible for all users?"

We ultimately devised a solution in the form of a solar-powered, repurposed lamp post with a button-operated speaker that can play a 2-minute poem in both English and Spanish, with room on the sides of the structure for the text in English, Spanish, and Braille, and original artwork related to the poem's themes. This solution is referred to as "Option 2B" throughout this report. Our research supports the use of two sites, the 13th Street trail entrance and the lawn surrounding the Easton Dog Park, for the initial installation of the poetry posts. The final product will be solar-powered, emphasizing a commitment to environmental sustainability. Early versions will begin to incorporate local materials and labor, and it will cost approximately \$325 to construct the first prototype.

Several social, political, technical, and economic factors support this design proposal. Our team relied on census data, as well as responses from our survey of KSAT users, to explore Easton's demographics and learn how we can best meet community needs. The social context led to our inclusion of English, Spanish, and Braille versions of featured poems, and influenced our site selections. Understanding local politics and city-college relations was also crucial for

preventing the perpetuation of systems or biases, as our team was able to consider multiple stakeholders and elected to prioritize access to the West Ward neighborhood when choosing installation locations. Significant research went into the design process, especially for selecting the recommended materials. Based on energy assumptions and calculations, our team opted for the BOGASING S8 Pro speaker, the ACOPOWER 15-W solar panel with a 12-V backup battery, and aluminum paneling. These technical considerations allowed us to make economic predictions regarding prototype costs, maintenance needs, and replacement timelines. Our team believes that this proposal is an important first step in accomplishing the goals of the KSAT Spoken Word Project.

During the Spring 2025 semester, Lafayette College's Sustainable Solutions course (EGRS 480) will continue progressing with the KSAT Spoken Word Project. This course guides a group of multidisciplinary, upper-level students in carrying out a real-world project. Partnerships with community contacts and Lafayette professors have already been established, so the next group will be able to strengthen these connections and begin involving the broader Easton community with the development of the Spoken Word. Our EGRS team looks forward to passing on our work with the following clear and crucial next steps.

First, the Sustainable Solutions team must conduct additional solar energy research to ensure the selected ACOPOWER 15-W panel will provide enough energy to consistently power the BOGASING S8 Pro speaker. Our team's research was based on reasonable estimates, but with additional time and foresight, the next group will be able to dedicate resources to gathering precise data on daylight hours at the 13th Street and dog park sites.

Additionally, the Sustainable Solutions class should experiment with different materials for the protective panels that accompany Option 2B. While our team believes that aluminum is

the best choice, there are several types of aluminum to consider. Weatherproof aluminum would be especially apt to pursue, as we have learned that aluminum can be susceptible to warping under extreme temperatures. With the vital inclusion of poems in Braille, it would be worthwhile to look into different coverings for the tactile component, as we are concerned that the aluminum may become too hot to comfortably touch during the summer months.

Drawing on this research, the main goal of the next team should be to create and test a prototype. Prototyping is essential for gathering information about how the installation will function in the community and guiding any necessary changes. The prototype will help with determining the appropriate speaker volume, optimal placement of wiring, and dimensions of the visual components, among other variables. A trial period should take place at both the 13th Street and dog park locations, with the Sustainable Solutions team investigating and finalizing additional locations to support the series of ten poetry posts that Professor Toia envisioned.

Ultimately, The KSAT Advisory Board will thoughtfully choose which local poets and works are to be featured in TheKSAT Spoken Word Project. After these selections have been made, promotion for the exhibit and community involvement will likely increase. Professor Toia has expressed interest in partnering with Lafayette College's art department to contribute to the visual art component of the installations (Toia 2024). With the three aluminum panels surrounding the lamp post, we have intentionally created a blank canvas for visual elements to be painted, collaged, or drawn. As Professor Toia planned, the official launch of the exhibit can be accompanied by a celebration of city and college stakeholders alike. Following successful implementation, future teams may be interested in researching how to expand the project to other parts of Easton, both green spaces and urban settings. There is room for continued growth and interdisciplinary collaboration surrounding the Spoken Word.

References

- Astronomical Applications Department. 2024. "Duration of Daylight/Darkness Table for One Year." Data generated November 13, at 14:00 (EST). <https://aa.usno.navy.mil/data/DurOneYear>.
- Cobussen, Marcel. 2016. "The Role and Position of Sounds and Sounding Arts in Public Urban Environments." *Journal of Sonic Studies*. Leiden University, Netherlands.
- Cohen, Benjamin. October 18, 2024. Personal Communication.
- Finlay, Oliver. 2022. "Karl Stirner Arts Trail Celebrates a Decade of Nature and Artistry." *The Lafayette*, February 4. <https://lafayettestudentnews.com/128248/culture/karl-stirner-arts-trail-celebrates-a-decade-of-nature-and-artistry/>.
- Karl Stirner Arts Trail. 2024. "The Board and Advisors." <https://www.karlstirnerartstrail.org/the-board-and-advisors/>.
- Lafayette College. September 8, 2003. "Marquis Mailer – Sept. 8, 2003." <https://news.lafayette.edu/2003/09/12/marquis-mailer-sept-8-2003/>.
- Lopez, Christian. October 16, 2024. Personal Communication.

Loukaitou-Sideris, Anastasia, and Vinit Mukhija. 2020. "Promoters for Parks? The Potential of a Public Health Model to Improve Outreach and Community Engagement in Park Planning." *Leisure Sciences* 45(12): 1-23.

<http://dx.doi.org/10.1080/01490400.2020.1817202>.

Nicodemus, Julia. October 22, 2024. Personal Communication.

Norristown Times Herald. 2016. "Interactive Audio Experience for Outdoor Sculpture."

Association for Public Art. <https://www.associationforpublicart.org/apa-now/news/interactive-audio-experience-for-outdoor-sculpture/>.

Park, Hayon. 2019. "Painting 'Out of the Lines': The Aesthetics of Politics and Politics of

Aesthetics in Children's Art." *Visual Arts Research* 45 (2): 66–79. <https://www.jstor.org/stable/10.5406/visuartsrese.45.2.0066>.

Roll Barresi & Associates. 2016. *Exterior Campus Sign Standards Manual*. Lafayette College.

Spring City Electrical Manufacturing Co., Inc. 2024. "American Made: Built for American Communities." <https://www.springcity.com/About/History>.

Toia, James. November 13, 2024. Personal Communication.

U.S. Census Bureau. 2020, 2022. "Easton City, Pennsylvania: Populations and People, Health." *2020 American Community Survey 5-year Estimates, 2020 Decennial Census*. https://data.census.gov/profile/Easton_city,_Pennsylvania?g=160XX00US4221648#populations-and-people.

VTOMAN. 2024. "How to Charge a Battery with Solar Panels." <https://vtoman.com/blogs/news/charging-batteries-with-solar-panels>.

Wilford-Hunt, Mary. October 11, 2024. Personal Communication.