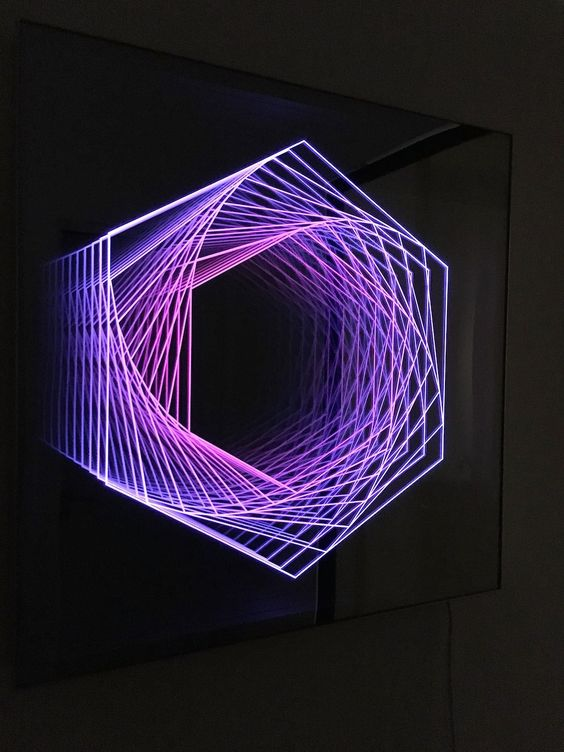
# Inspirations

<https://www.instagram.com/reel/Cf3F_dEJN-5/?igshid=YmMyMTA2M2Y%3D>

[Sonic Runway - Burning Man 2016](https://www.youtube.com/watch?v=hsgZN2_kUnI)

https://www.pinterest.com/pin/669629038355172022/



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# Bill of Materials

| **Component** | **Quantity** | **Unit Cost** | **Total Cost** | **Hyperlink** |
| --- | --- | --- | --- | --- |
| LED strip power supply | 1 | $27.99 | $30.86 | <https://smile.amazon.com/gp/product/B06XK3X3PW/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&psc=1> |
| LED Strips | 4 | $19.99 | $88.16 | <https://smile.amazon.com/gp/product/B01CDTEDZI/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&th=1> |
| 3 pin to strip connectors (10 pack) | 1 | $12.49 | $13.77 | <https://smile.amazon.com/dp/B094NJLKFH/ref=sspa_dk_detail_0?psc=1&pd_rd_i=B094NJLKFH&pd_rd_w=odg2o&content-id=amzn1.sym.3481f441-61ac-4028-9c1a-7f9ce8ec50c5&pf_rd_p=3481f441-61ac-4028-9c1a-7f9ce8ec50c5&pf_rd_r=K4VSS7YBHA1XJE3SFT2E&pd_rd_wg=kc0x6&pd_rd_r=c987e9a4-2882-4c0c-bb7b-a0c289dcd031&s=lawn-garden&spLa=ZW5jcnlwdGVkUXVhbGlmaWVyPUExQ1YxMTUwT05OQkZUJmVuY3J5cHRlZElkPUEwNTIyMTU0MzdPTEIxQVRUMFpMVSZlbmNyeXB0ZWRBZElkPUEwNTQ4NzQ2M0cxME03S0JYTFFSWiZ3aWRnZXROYW1lPXNwX2RldGFpbF90aGVtYXRpYyZhY3Rpb249Y2xpY2tSZWRpcmVjdCZkb05vdExvZ0NsaWNrPXRydWU=> |
| Strip to strip connectors (10 pack) | 1 | $10.49 | $11.57 | <https://smile.amazon.com/gp/product/B06XSGD516/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&psc=1> |
| Waterproof Enclosure | 1 | $9.65 | $10.64 | <https://smile.amazon.com/dp/B099NZTK3F?psc=1&ref=ppx_yo2ov_dt_b_product_details> |
| T-type Wire Splitter | 1 | $7.61 | $8.39 | <https://smile.amazon.com/dp/B08GK64LK1?psc=1&ref=ppx_yo2ov_dt_b_product_details> |
| 22 AWG 2 conductor cable | 1 | $10.59 | $11.68 | <https://smile.amazon.com/gp/product/B00QTCBZ4I/ref=ppx_od_dt_b_asin_title_s00?ie=UTF8&psc=1> |
| Arduino MKR 1010 | 1 | $47.04 | $51.86 | <https://smile.amazon.com/Arduino-MKR-WiFi-1010-ABX00023/dp/B07FYFF5YZ/ref=sr_1_1?crid=2PMFO7ZEYZMRV&keywords=arduino+mkr+wifi+1010&qid=1662762125&sprefix=arduino+mkr%2Caps%2C186&sr=8-1> |
| Base Board | 1 | $4.24 | $4.67 |  |
| Bolts, zipties, etc. | 50 | $0.05 | $2.76 |  |

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# Infrastructure Mockup

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# Determining the Number of LEDs

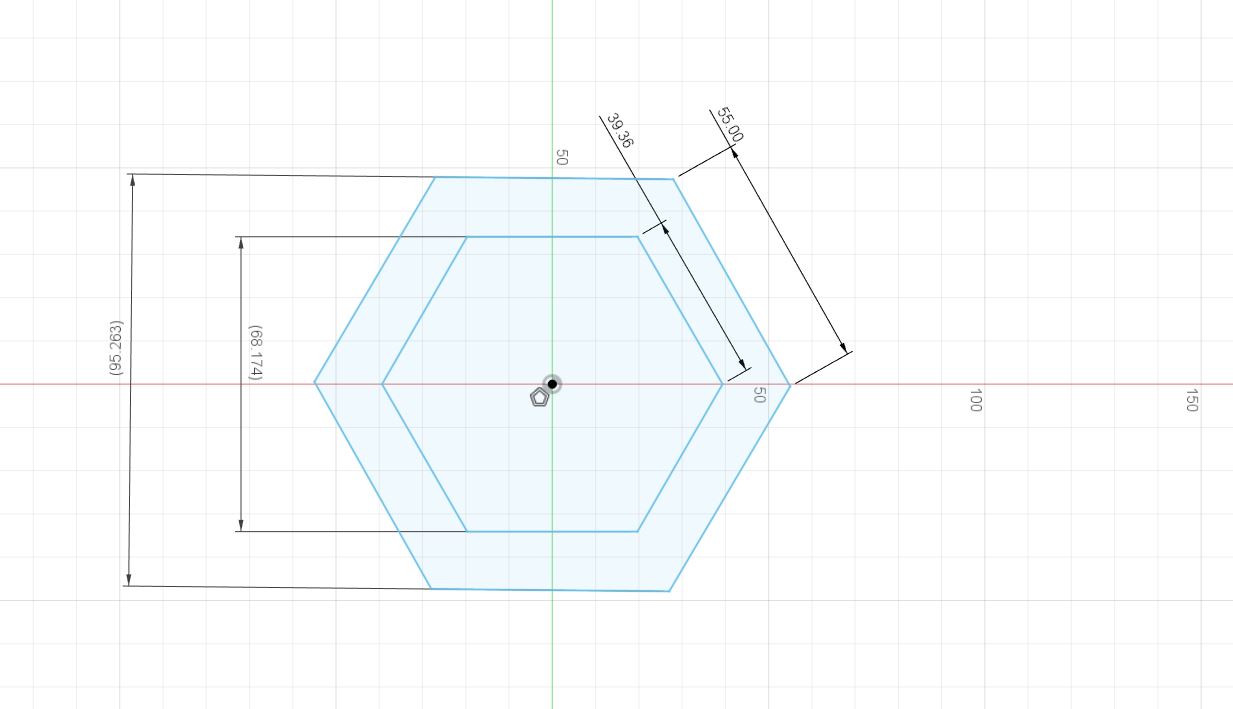
To figure out how many LED strips are needed to make our vision a reality, I made some simple CAD mockups of the arches. For anyone with Fusion 360, you can access the file directly [here](https://a360.co/3PaUMPn).

Assumptions:

* The panels of the archway are to be made of 2 x 4 pine or similar
* Dimensions in the infrastructure mockup were the outside unit lengths
* The bottom of the arch (i.e. the playa) is not to be lit
* The strips are to be placed on the inside of the arch
* Neglect bending radii - the led strips are quite flexible

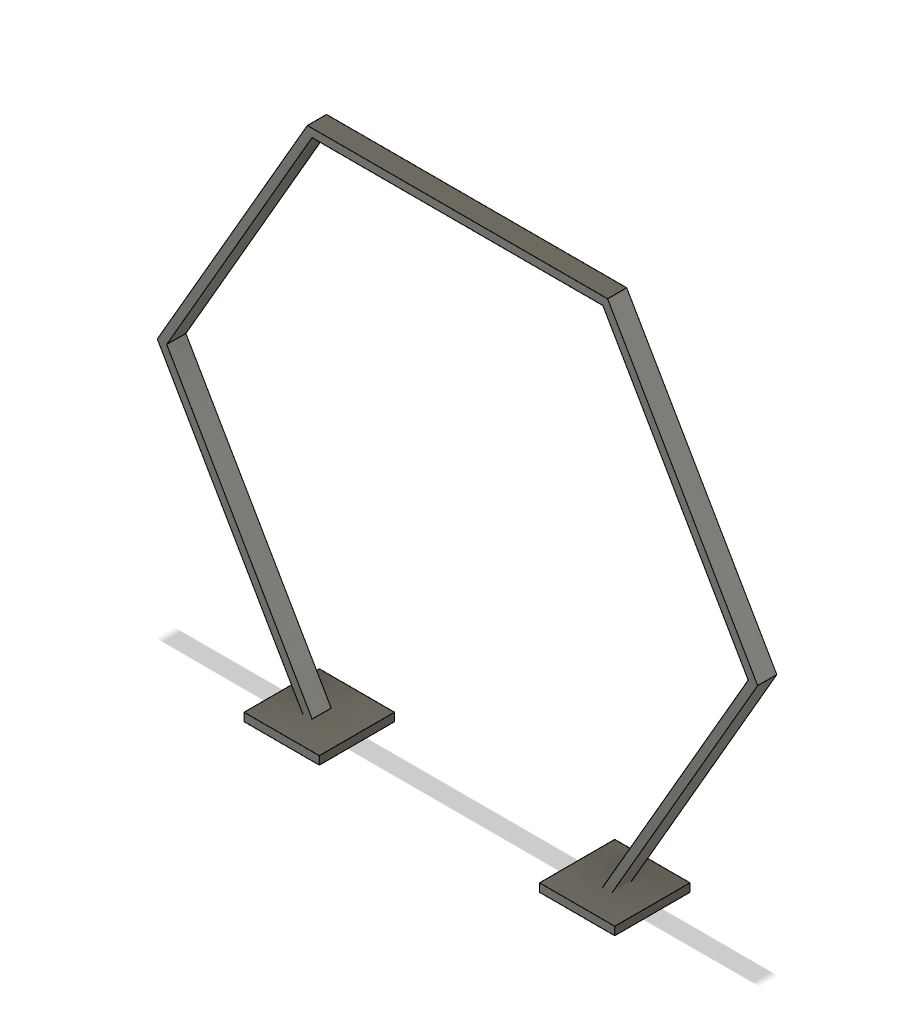
The LED strips come in 5-meter lengths, or 16.4 ft. for us Yankees. This is pretty universally standard for these types of strips. We could maybe find something custom, but it would be pricey (probably). If we were to divide a single one of the standard stips equally along five inner edges, then there would be enough length for the edges to be just under 40” long, which would correspond to a structure just over five and a half feet tall. No bueno.

The mockup designated 55-inch outside edges, making the total structure 94.5” tall (7’ 10.5”). Muy bueno.

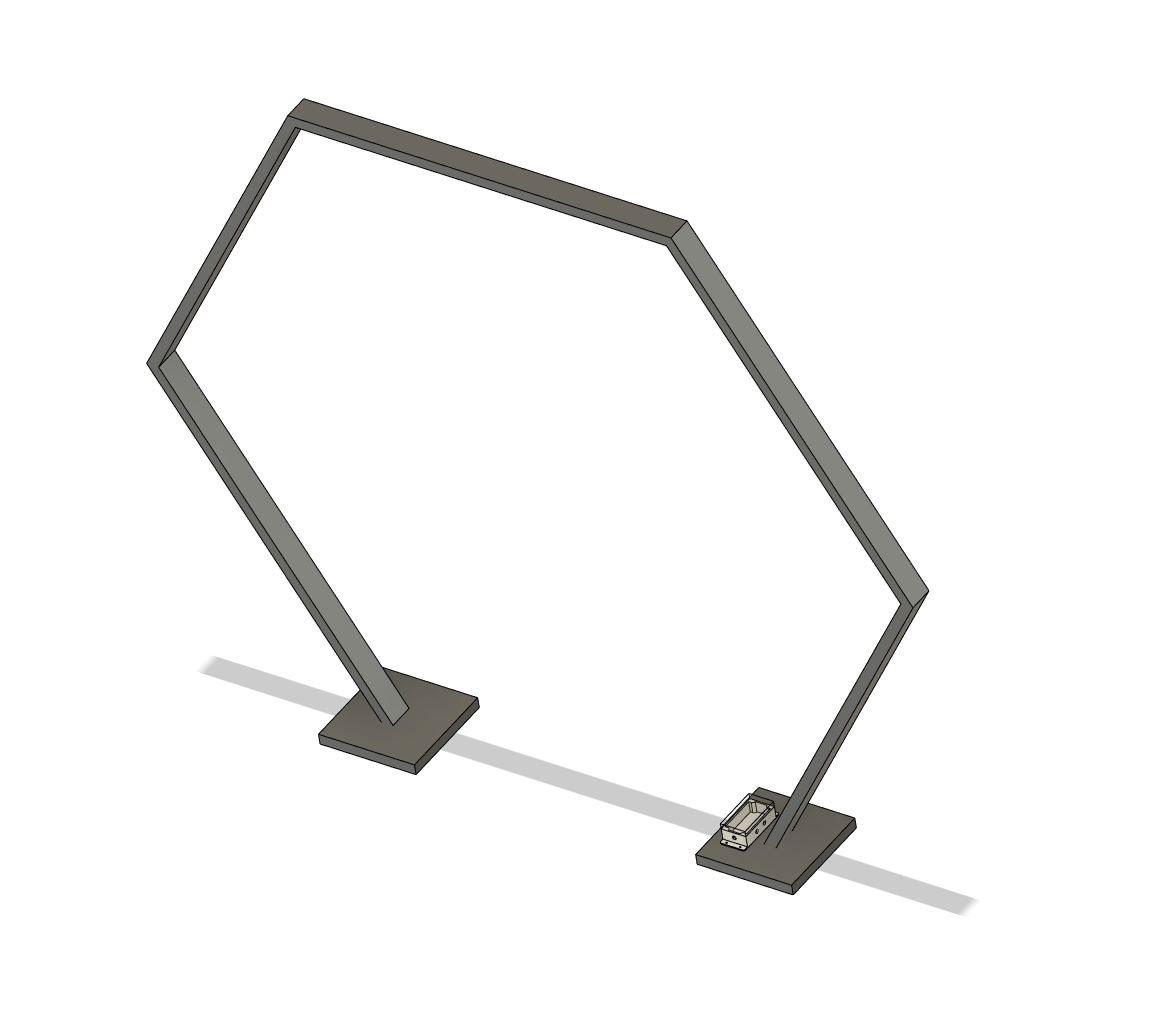


Above: Comparison of the size of the infrastructure mockup vs. the size needed if only one strip were used per arch.

What does this mean? We will need to do more than one strip per arch, and that means doing some modding of the LED strips. Fortunately I have access to the tools needed to do that, the downside is it’s kind of annoying and is going to be a lot more work than if we could just do one out-of-the-box strip per archway. Ah well.



Above: Isometric view of the arch (approximate). The square feet are just over a foot long in each direction, and the panels of the arch were sized to two-by-four boards.



Above: Possible placement and approximate scale of the electronics housing box. If we want the lights of the three arches to be synced/choreographed, we would use only one electronics box with a single microcontroller + power, and run the cabling along the ground from one foot of the arches to the other. In this configuration, it would make sense to have the electronics box mounted to the center arch.

I would propose using four strips across the three arches. What I would do is cut the fourth strip into three equal parts, then solder each of them to the ends of the other three strips. If this was done we wouldn’t be able to light the entire length of the arch, but pretty much all of it. In the image below, I added red lines marking the start and end point for the elongated strips. In my mind, this is better than getting a fifth to fill in about 6” on either end, which is not what she said.

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Above: Start and end point for the lighting if using the elongated LED strips payton is proposing.

**August 21st, 2022:**

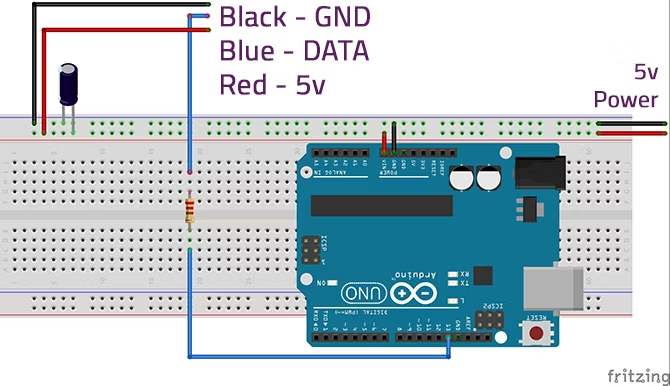
After building and testing the prototype on a real arch at Alisha’s, we found that we can fit 175 LEDs per archway. This was made the default for the design moving forward.

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# Lighting FX Circuit

After researching different microcontrollers and looking at what ones I have available for free from work, I determined that any type of arduino would be sufficient. I used the Arduino Uno for prototyping because it is easy to work with, but we may switch to MKRs for the final build because I have more. MKRs are usually used for applications that need to work with WiFi, but we will not be doing that - the only reason they are the probable choice is that we have them for free.

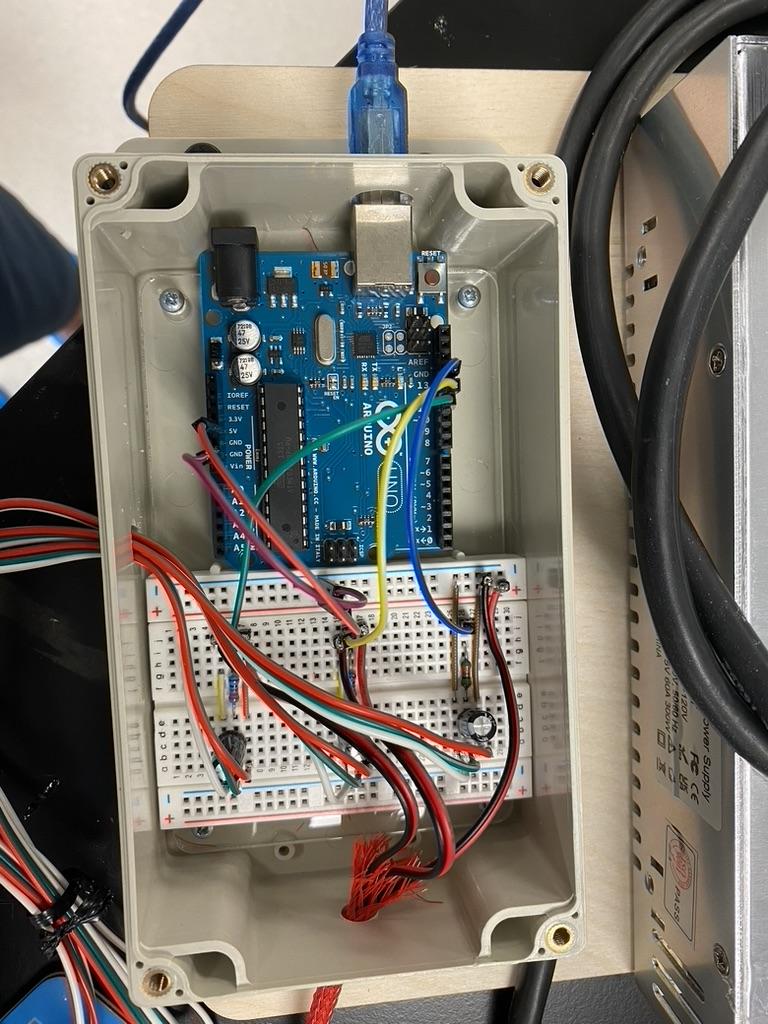
The basic circuit for a single coil is shown below, with the notable edit that the 5V power connected to the Arduino Uno should connect to the 5V input, not the Vin.



Resistor = 330Ω

Capacitor = 100 - 1000 µF (doesn’t really matter)

This circuit was repeated then three times, with each data line going to a different IO port on the board. A photo of what this looks like in the enclosure is shown below.



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# Lighting FX Program

For the programming, I used the default Arduino IDE and utilized the [FastLED](https://youtu.be/4Ut4UK7612M) library.

A github repository link is [here](https://github.com/paytongoodrich/hexagon-LED-arches).