

OSHA Case Study: Interactive 3D Map at Los Luceros Historic Site, Los Luceros, NM

Abstract

This interactive 3D map is a CNC engraved 60" x 42" table made from Jemez Pine burned in the New Mexico fires in Spring of 2022. This map has 11 buttons on the border of the map that illuminate different buildings relating to the site. The cut outs feature a square with 3D objects that relate to the building and a button with a braille description. There are 11 locations that are pointed out in the map, and more can be added at a later date if the client wishes. Each location is important to the site and is also a tool for the staff to share about the Historic Site.

(video link to come)

The Los Luceros Historic Site is the newest site in New Mexico and opened in 2019, right before the world shut down during the Pandemic in 2020. This map will be a great tool for the site to use and will be mobile and follows ADA specifications. The map was designed by Becca Sharp and the buildings/objects on the map and buttons were designed and created by Lydia Gonzales and Becca Sharp. The electronics were fabricated by the team as well as with Rianne Trujillo and Miriam Langer. This project is using the Museduino V4 to connect multiple buttons and responsive neopixels using one Arduino Uno.

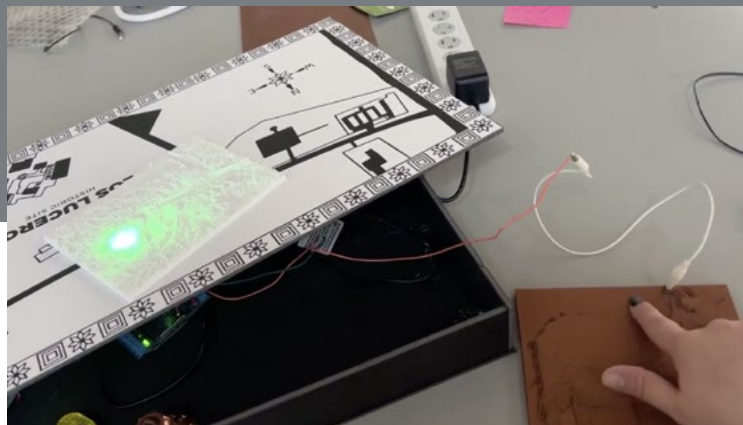
Project Development

Initial Proposal

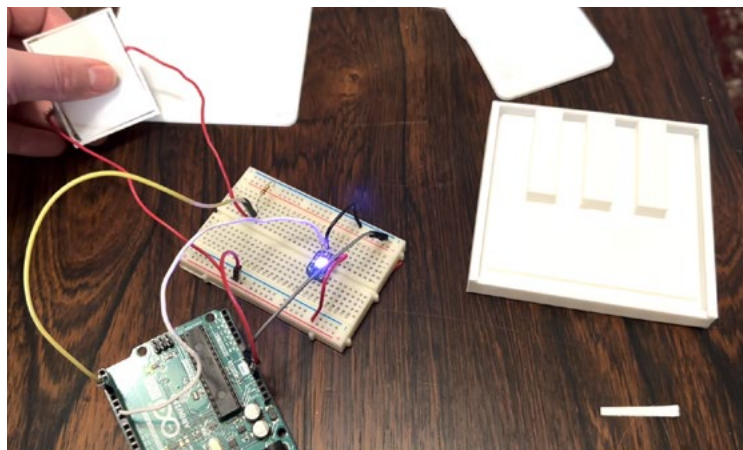
The Los Luceros Historic Site hired the PICT (Program Interactive Cultural Technology) class from Media Arts & Technology to create new exciting installations for the site. The class consisted of different teams including the Multimedia Team with Becca Sharp, Lydia Gonzales, Rianne Trujillo and Miriam Langer. The team proposed a large CNC map engraved and resin casted to help as a wayfinding tool for the site. The map will have multiple 3D printed buildings placed in relation to their location around the site. The visitors will be encouraged to press a button that will illuminate the corresponding building/location in the historic site.

Early Prototyping

The team started by creating a single building from the site and 3D printed the building using different materials such as ABS and PLA. The building is connected to an LED that leads to an Arduino Uno with a copper tape button that illuminates the



LED illuminating from a switch circuit using copper tape, Arduino Uno, Alligator Clips and a single LED.



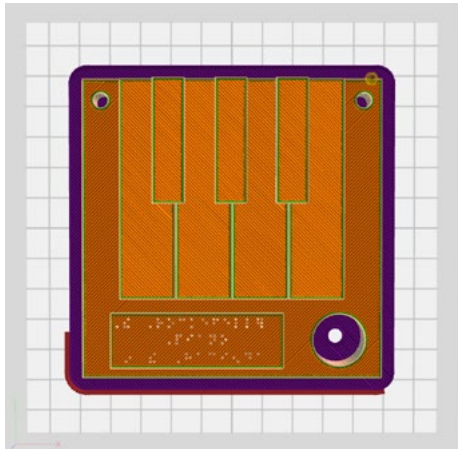
Button prototype Version 1 - A button made from copper tape, foam and springs

LED when touched. The prototype was very successful and did exactly as intended. This then pointed us in the direction to use capacitive touch for the interaction with neopixel LEDs so that we could use different colors for the different locations.

The map design was completed and approved by the site. The team would be working with Old Wood of Las Vegas NM to create the newly designed map with dimensions of 57" x 39". This would allow space between each button and for a large base map to place the buildings on top of.

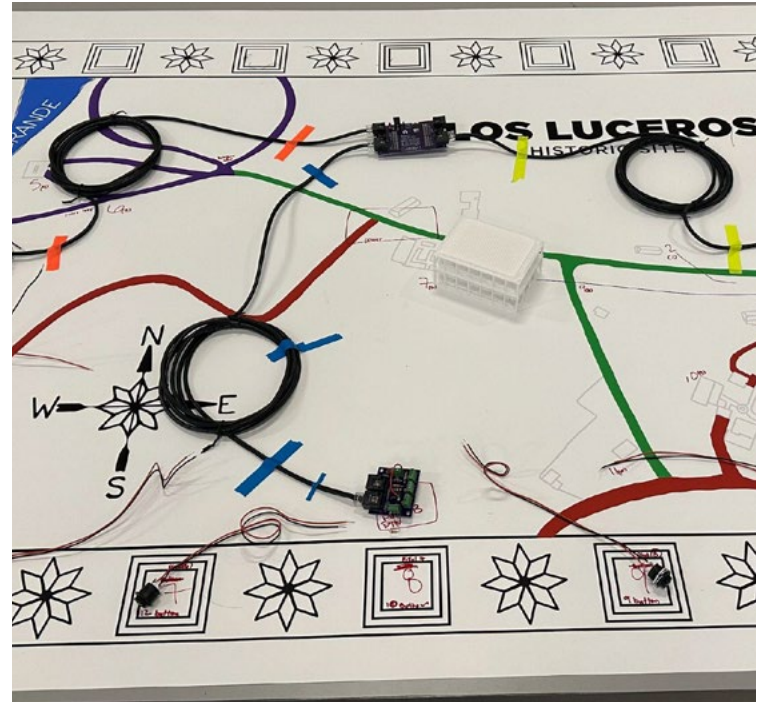


The buttons will be printed in PLA and went through many different versions, in the final version the button will have a push button, braille for accessibility and an object in the middle of the print.



the external power board that will have the 11 neopixels and 3 buttons attached. The main shield will also connect to the 2 Smorgasboards that will house the remaining buttons.

This will allow the buttons when pressed to illuminate the neopixel that is connected to the corresponding button.



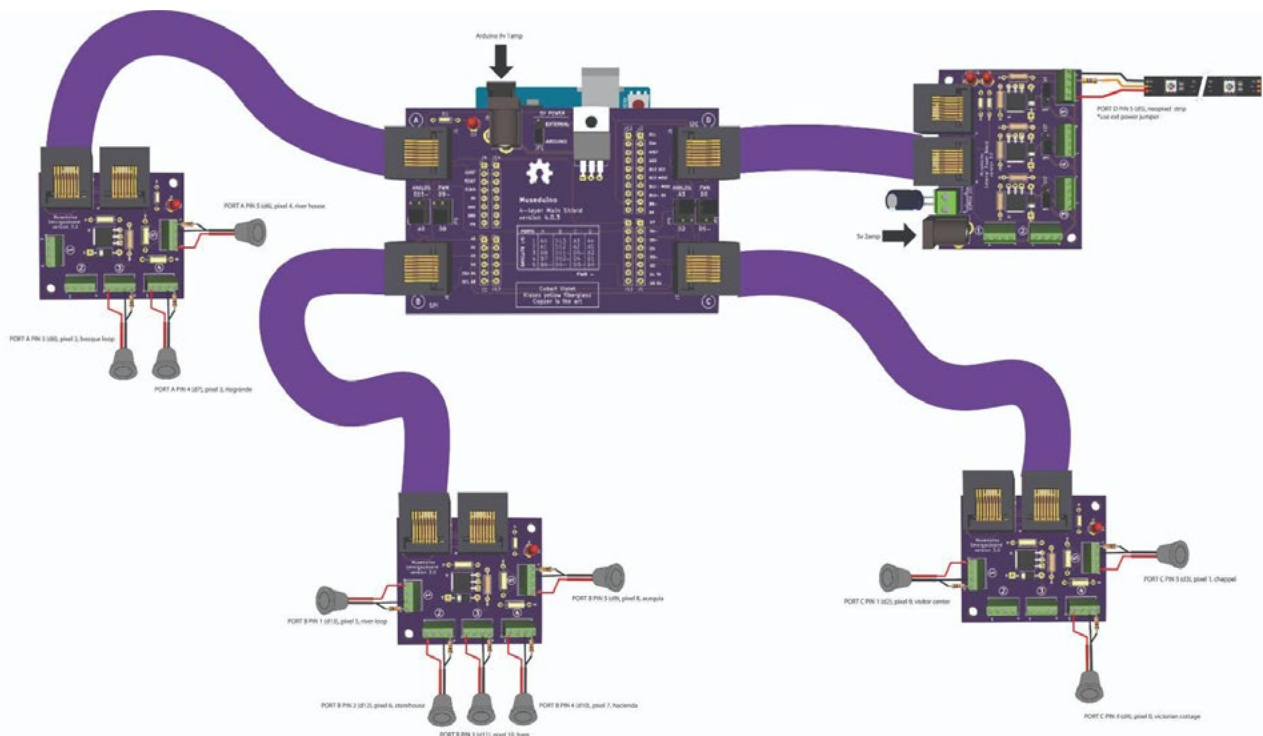
Technology Used

- The technology used for the interaction of the map includes:
- 1 Arduino Uno R3
- Museduino V4 (One Main Shield, 2 Smorgasboards, 1 External Power Board) 11 Push Buttons
- 11 Neopixels

The technology used is all open source hardware and easily accessible for replacement parts if needed. The Arduino Uno will have the main shield on top with the cat5 cables connecting to

Fritzing Schematic

This schematic shows the Main Shield on the Arduino Uno with the Smorgasboards and External Power Board.



Installation / 3D Model of Install

A 3D model is used in place of the table until installation is complete by July 2023. The table will be created on a 60"x42" wood engraved table. The table will be stained in a dark oak stain and engraved to reveal the natural wood below. The objects created on top of the table are made in PLA with a resin cast. The electronics are housed underneath the table with no wires exposed on the surface of the table. The table will have one power supply that will plug into the floor of the Visitor Center at the Historic Site.



Troubleshooting and Lessons Learned

Troubleshooting for this table is still in process but so far it was discovered that the sizing of the table was an issue for a few reasons. It did not give enough room for the buttons to have pressure without breaking the wood edges around the table. The button design took some time to pick the most robust and accessible buttons for the table. The electronics have gone well with the Museduino allowing us to extend the reach much further for the pins needed for the map.

Conclusion

This project is so far very successful and has gone as expected. Through testing the electronics chosen have proven to be robust and the PLA with a light resin cast improves the shine and stability for the prints. The electronics are open hardware and responding just as we wanted. The electronics are straightforward and affordable which allows us to make duplicates for the Historic Site, this will allow some ease in case anything needs replacing (though we rarely need to replace electronics after installation).