

OSHWA Case Study: “Behind the Fence” at Bradbury Science Museum, Los Alamos

Abstract

“Behind the Fence” is a multisensory experience with nine interactive drawers and a 360o video at the Bradbury Science Museum in Los Alamos, NM. This is an open source hardware permanent install that was custom designed and fabricated inside the museum. Behind the Fence uses RFID readers, three custom crafted scents, LEDs and responsive custom audio. This install also includes artifacts from the Manhattan Project to share stories using 360o video of buildings that are no longer accessible to the public including the Slotin Building, Pond Cabin, and Battleship Bunker.

<https://vimeo.com/800723340>
<https://vimeo.com/800723825>

The museum had Omar (find last name and title) to help with the construction of the installation, this would include building a new wall for three large monitors and a set of drawers to fit inside the wall so that the electronics may be accessed from the backside. The electronics, scents, and drawer inserts were designed and fabricated by Becca Sharp, Dré Gallegos, Miriam Langer, and Rock Ulibarri. The drawers used three Arduino Unos,

Project Development

Initial Proposal

The Bradbury Science Museum hired the PICT (Program of Interactive Technology) class to design and install various exhibits for the museum. In doing this, Becca Sharp, Dré Gallegos and Miriam Langer proposed an installation using drawers from the Manhattan Project archives to create an interactive exhibit that would feature various open source hardware and artifacts from the Manhattan Project. This project would have a 360o video that would take visitors “behind the fence” where the public was not able to go. The video would instruct visitors to open drawers labeled either “Slotin, Bunker, and Pond Cabin”; three very important buildings to the Manhattan Project. These drawers would have different artifacts and a RFID reader to activate either audio, LEDs, or both simultaneously. These drawers will also contain scents that will be fabricated in house with the help of Art & Olfaction’s Saskia Willson Brown. Visitors will use a “Secret Pass” designed by the PICT class and fabricated by Becca Sharp and Dré Gallegos. This pass will contain a RFID tag for users to activate the different drawers and to use to discover more exhibits around the exhibit.



Drawers were made of foam core (left) using the original Battleship Bunker image (below) for prototypes

Early Prototyping

Becca started by working with Kerry Loewen (Professor/Chair in Media Arts at the time) to create a script for the videos that would help direct the drawers and what they would contain. Nine drawers would need to be created, three with scent, three with audio and LEDs, and three with artifacts for visitors to touch and see up close and personal.

The first prototype was created with a single LED and a PN532 NFC/RFID Controller Shield on top of an Arduino Uno. This was fabricated inside of a foam core box and once tested with the RFID Shield and multiple RFID scanners we were able to determine this would be the correct direction to go.

The next steps were to determine the story for each set of drawers and what they would contain, what interaction and how to make this a nice multisensory experience. Becca Sharp also began designing the space for the installation using open source software, Unity 3D.

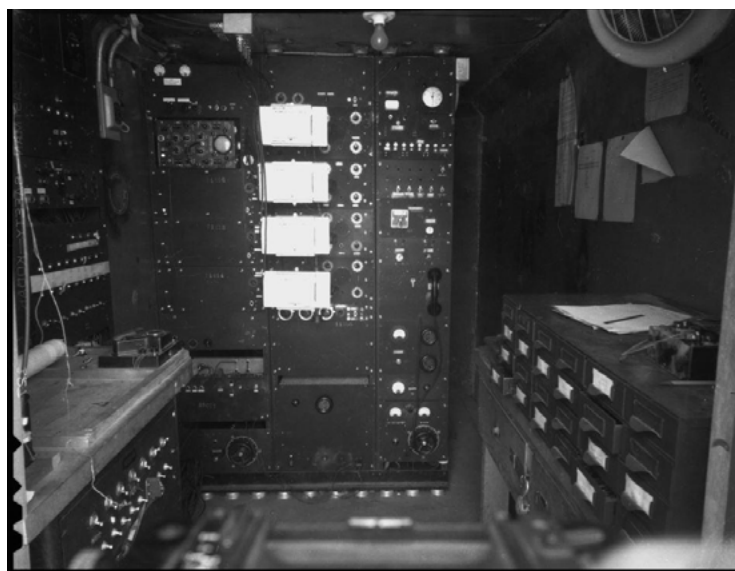


Photo from inside the original Battleship Bunker, the drawers were inspired by the drawers to the right

Buildings:	Slotin Building	Pond Cabin	Battleship Bunker
1st Drawer/ Scents:	Scents: Burning Electronics	Scents: Coffee, Campfire	Photocell Phone & Audio
2nd Drawer/Object:	Metal	Camera	Shot Counter
3rd Drawer/RFID:	Screw Driver & LED	Ruler & LED	RFID & Scent: Gun Powder

The drawers were then located in the Manhattan Project warehouse that stores archives and important information from the Manhattan Project. The drawers were then taken and fabrication began. The drawers were divided into three buildings: The Slotin, The Pond Cabin and The Battleship Bunker” all three were very important buildings that people would not be able to see in their original state ever again. The electronics and drawers were mapped out in a table pictured above.



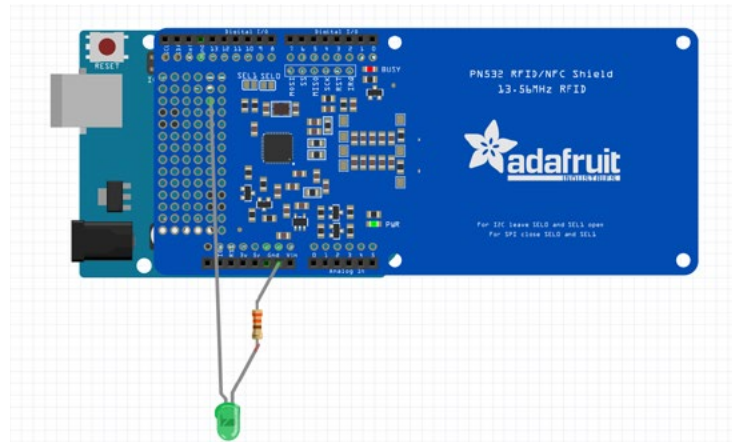
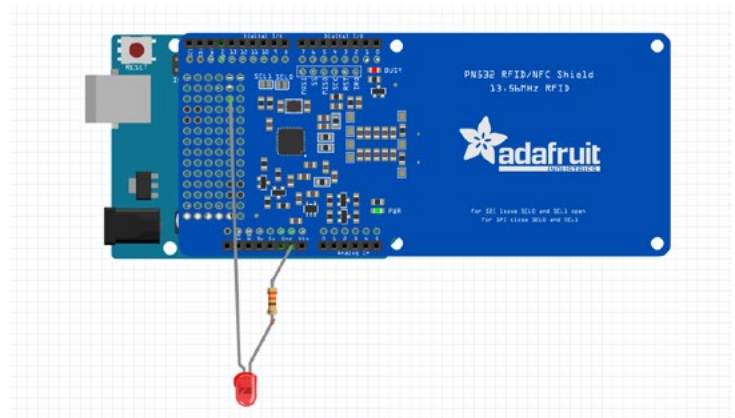
The secret pass was created using a red window for visitors to decode secret messages. The RFID Scanner is located in the bottom right corner. The RFID is adhered using double sided tape and the cards were printed at Media Arts & Technology. These were quickly replaced with larger versions because of the passes going missing so often. (By missing we mean people loved them and took them home)



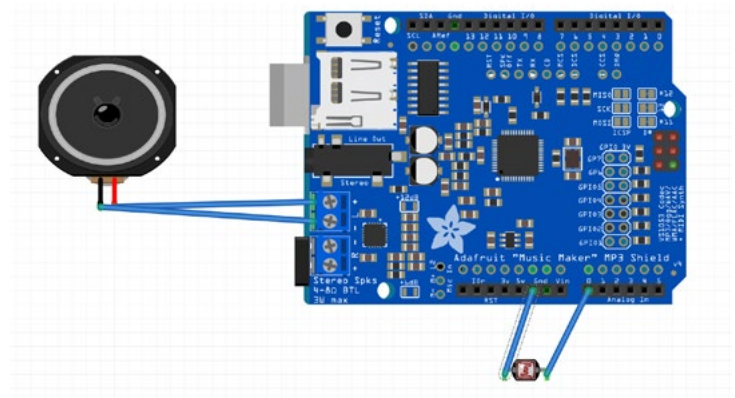
The second version of the pass is larger and uses the same technology but with a larger thicker pass to hopefully keep them in the museum.

Fritzing Schematic

Prototype Schematic using LED and RFID Controller:

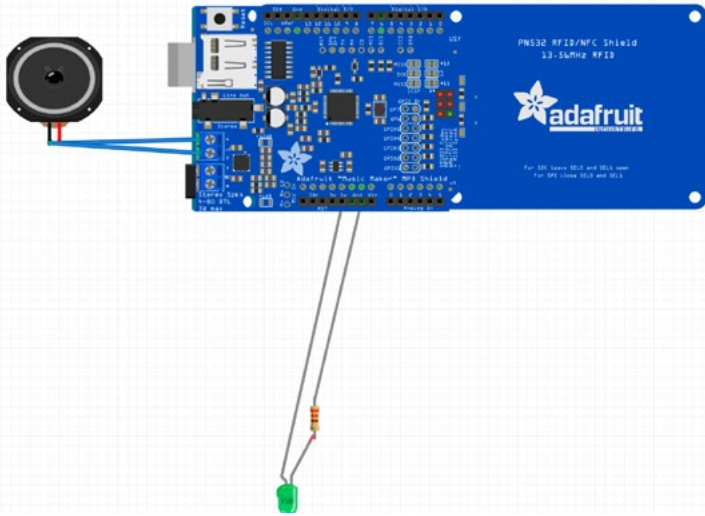
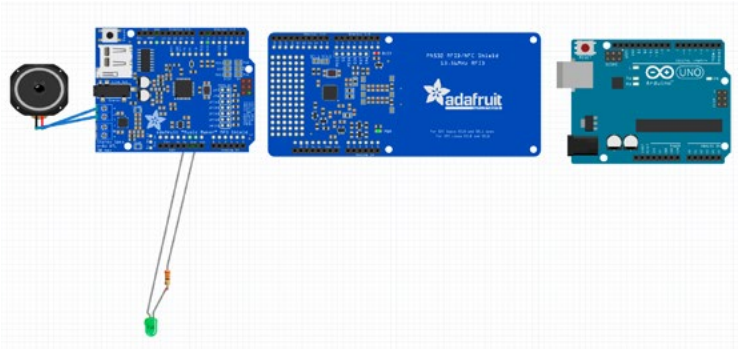


Photocell to Audio Shield and Speaker



RFID Controller w/ Audio Shield (and Speaker) & LED: (Separated)

RFID Controller w/ Audio Shield (and Speaker) & LED:



Installation

On Site at the Bradbury Science Museum

In May of 2017 the PICT class went to the museum to install. Becca Sharp, Dré Gallegos and Miriam Langer worked with Omar Juveland who fabricated a new spot in the museum for the installation. The drawers were added with all working components and installed with power coming from the backside of the drawers.

Hardware Used

- The hardware used for each drawer includes the following:
 - Slotin: RFID to LED and MP3 Shield w/ Speakers
 - Pond Cabin: RFID to LED and MP3 Shield w/ Speakers
 - Battleship Bunker: RFID to MP3 Shield w/ Speakers
- Adafruit PN532 NFC/RFID Controller Shield for Arduino x 3
- Adafruit "Music Maker" MP3 Shield for Arduino w/3W Stereo Amp x 3 Speakers x 3 (found on adafruit)
- 1 Photocell
- 2 LEDs - 5mm Green and Red w/ soldered 220 Ohm resistor to ground leg
- Troubleshooting and Lessons Learned





Troubleshooting and Lessons Learned

When troubleshooting when installing the drawers were a cm larger than the space provided for them, this required us waiting to install for a few hours on the day of install. The install went well and was relatively seamless. One thing learned was how important documentation is. For this project most of the documentation left with the client or was not archived properly.

Conclusion

Overall, this was a very successful install from concept to installation. The electronics were reliable and as of March 2023 the electronics are still working successfully and have not malfunctioned. The scents created are also still strong and potent. The audio is still very clear and the LEDs are bright.