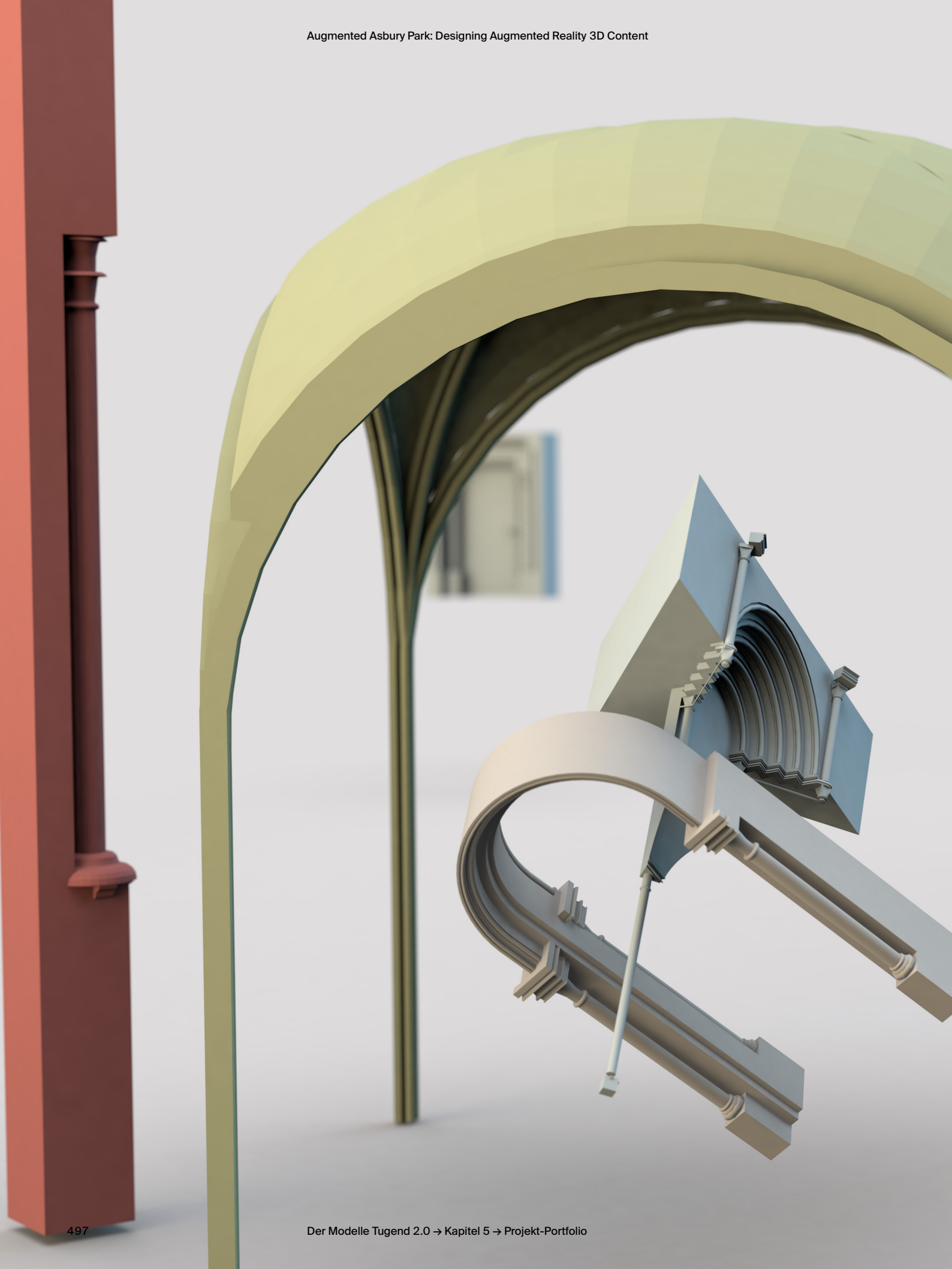

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IV. Augmented Asbury Park: Designing Augmented Reality 3D Content

→ augmented reality, boardwalk history, community mapping, digital design, experience design, history, interactive design, local history, locative media, memory, mobile technologies, new media, three-dimensional modelling, virtual architecture

Using digital 3D design and augmented reality (AR), our collaborative team was able to rebuild experiences of past buildings and structures that are no longer on the boardwalk in Asbury Park, New Jersey, USA. Our project, Augmented Asbury Park, is a free mobile experience involving 3D visualizations of key historic landmarks in augmented reality from the Asbury Park boardwalk in New Jersey. This paper will share our rationale, process and current challenges with creating AR 3D content related to this project.

IV.1 Introduction

Using digital 3D design and augmented reality (AR), our collaborative team was able to rebuild experiences of past buildings and structures that are no longer on the boardwalk in Asbury Park, New Jersey, USA. Our project, **Augmented Asbury Park**, is a free mobile experience involving 3D visualizations of key historic landmarks in augmented reality from the Asbury Park boardwalk in New Jersey. This paper will share our rationale, process and current challenges with creating AR 3D content related to this project.

IV.2 Project Inspiration and Rationale

Some of the most powerful intellectual examination of the interaction between culture, technology and communication was offered by James Carey in the 1980s. His seminal work **Communication as Culture: Essays on Media and Society** (1989), among other debates, poses questions about the role of technology on the ways we communicate and co-create culture. His works remind us of the importance of history and memory in building and maintaining a sense of community. Technology has often been seen as a culprit when it comes to what many have identified as the pervasive loss of a sense of community. But as scholars and creative practitioners, we see the potential of harnessing technology to design experiences that re-create and maintain a sense of community and build culture. Technology, in our view, has the tremendous ability to record and preserve memory. It is our conviction, that communication technology in both transmission view (sending information) and ritual view (construction and maintenance of shared beliefs in a specific time and place) in Carey's sense, has the ability to maintain that sense of community as much as the ability to have an adverse effect on it. In our practice, we tend to subscribe to the view of technology as a culture-building tool. In particular, we believe that AR technology can extend Carey's (1989) ritualistic view of communication, because it has the capacity to capture and re-create what was deemed lost, across time and space.

Our project was guided by those ideas and what we experienced in practice, communicating directly with people in the Asbury Park community in New Jersey. Asbury Park is a coastal town one-hour south of New York City with rich history. Founded in the late 19th Century, this town was built as a resort with hotels, a boardwalk filled with entertainment for the lower and upper crust of the American east coast. Its heyday spanned from early 20th Century to 1960s when several social, economic and political influences contributed to its fall in prosperity. We found that the memories of those **glory days** have been logged in people's minds. In 2011, local artist John Viggiano, Richison and Vujnovic used the abandoned historic Asbury Park Carousel House to re-construct, through art and oral history, experiences of rides that once occurred in that space. People could see actual images of carousel horses projected on an inflated parachute, and at two different

■ 01
Mike Richison, Documentation of The Living Carousel, Asbury Park, NJ, https://vimeo.com/44201645.

stations they could use motion to spin the horses, which would also trigger music that once played in the carousel house. They could also listen to pre-recorded testimonials of people from the community who narrated their experiences of riding on the carousel. 01 01

□ 01
The Living Carousel in the Asbury Park Carousel House (Richison 2011/ CC-BY-SA 2.0)

Positive public reception of this project and stories that we heard from the participants inspired us to begin the **Augmented Asbury Park** project. We wanted to counter that sense of loss of history and engage people's memories. What drew us to using AR is that we wanted people to be able to spatially interact with the project's 3D content on their own devices in real time. AR allows users of a smartphone, tablet, or headset to move their devices around and see digital 3D content overlaid on top of their real experience through optical viewing systems within their devices. AR technology for us was and is a tool through which the present can be disrupted, and people can become connected through sharing meaningful information. In that process, a new sense of community, perhaps even new shared meanings can be created.

To begin this project, the authors first traveled to Hatfield, Pennsylvania to visit the Philadelphia Toboggan Company (PTC) to learn about Carousel #87, the carousel that was housed in the Asbury Park Carousel House. Using AR, our initial idea was to re-create the carousel that once occupied that space. However, that journey took us to a much larger project, recreating

several different historical landmarks of the Asbury Park Boardwalk, which are no longer there. We combined historical research, interviewing of community members, collaborating with community organizations, and AR technology to deliver our project back to the community.

IV.3 AR 3D Content Creation

This project has involved multiple iterations of 3D content creation and revision. To begin the project, we started by doing research and collecting reference photographs both on and off site. Next, we connected with the Asbury Park Public Library and scanned imagery from hundreds of postcards. We also visited online resources. After collecting reference imagery, our team began creating 3D models based on guidelines provided by Metaio. 02

In regard to technique, the focus in creating 3D models for mobile AR platforms is minimizing the number of polygons in your model and maximizing the amount of detail that can be displayed in images applied as textures. Otherwise, it will take longer for the models to load on a mobile device. Generally, we aimed to keep our models under 5,000 polygons. We used several programs including Autodesk Maya, Autodesk 3DS Max, and Maxon Cinema 4D to create our 3D content. Also, we used image-editing software to optimize the texture images for web-based platforms using JPEG compression methods. Liam Rodriguez Elias, David Corniola, and Joseph Seminerio have been essential contributors for the creation and evolution of the project's 3D content.

□ 02
Augmented Carousel — on left: reference image, on right: 3D model (Johnston, Richison 2014–2017/CC-BY-SA 2.0)

The 3D models were exported as OBJ files with their accompanying texture files. Then, we uploaded these models to the appropriate server and tested for load times both on and off site. We found that higher resolution textures rendered faster for the off-site poster experience of the project content, because wireless internet connections and cellular reception were easier to access away from the boardwalk.

The complete list of our project assets is as follows:

- → Palace Amusements, originally built in 1888, demolished in 2004
- → Boardwalk Carousel, built in 1932 and dismantled and sold in 1992
- → Sky ride and Boardwalk Amusements
- → Wreckage of S. S. Morro Castle, beached in 1934
- → New Boardwalk Casino, built in early 1930's and partially demolished in 2006
- → Original Boardwalk Casino, built 1903, destroyed by fire in 1928
- → Monterey Hotel, built in 1912, demolished 1963
- → Natatorium, first built in 1912
- → 7th Avenue Pavilion, built in 1905

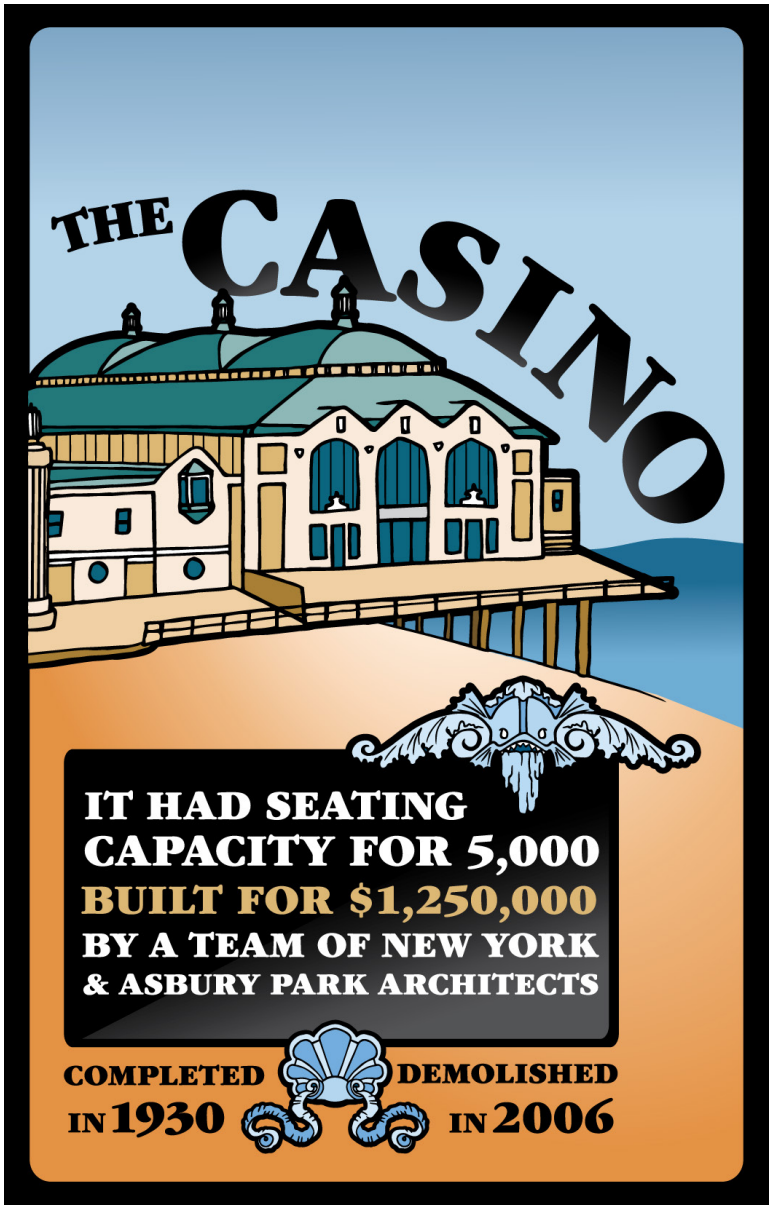
Please find marker-based AR experiences of each of these assets on the homepage of our project website at **www.augmentedasburypark.com**. Multiple rounds of testing became very important for (1) positioning the AR 3D content in front of the marker image for optimal viewing and (2) determining a workable file size of texture images for real-time optimal rendering. Quite often, the orientation of a 3D model in 3D modeling software differs from the orientation within an AR platform. After uploading the 3D model and seeing its orientation there, we would then go back into the 3D modeling software and adjust the orientation.

Recently, we updated three of our models of the Boardwalk Carousel, Palace Amusements, and the Sky ride with animation. This process involved reconstructing the topology of some of the original 3D models, exporting the 3D scenes into COLLADA files, uploading the models to the Augment AR platform, and testing how well the Augment platform reads the models and renders them in real time.

We paid special attention to the pattern of the horses' movements on a carousel. We used keyframe animation to recreate that movement, because the Augment application did not have the capability of reading expressions. Animating models such as the Ferris wheel and the carousel had to be done in a loop. Every time a node completes its 360-degree progression, the animation will repeat indefinitely. This allows for a smoother render in augmented reality. The Sky ride did not use the loop technique, because it is a linear sequence. However, each time a chair completes its path, it disappears and returns to its original position.

IV.4 Implementation of 3D Content within AR Platforms

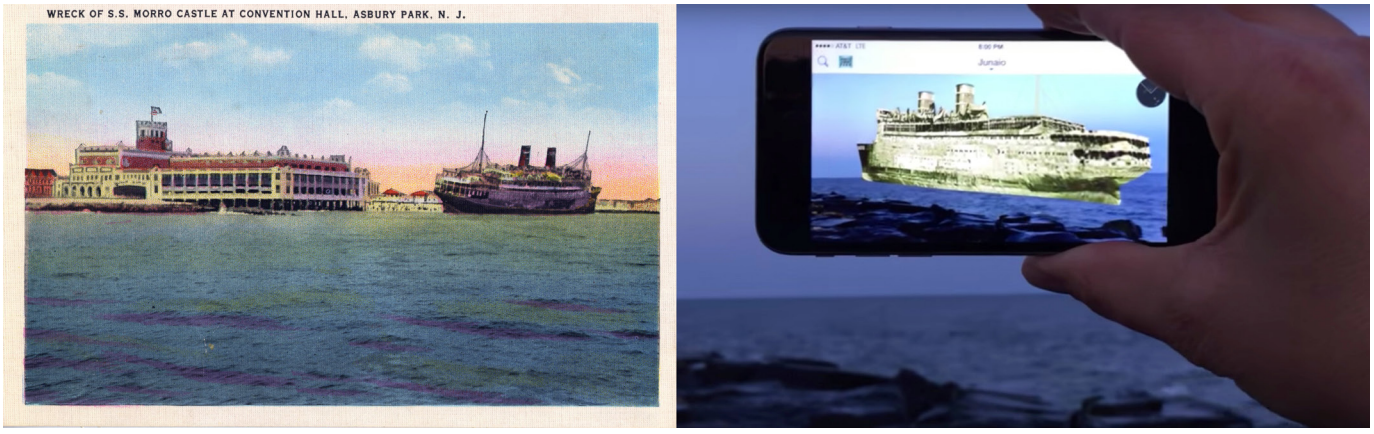
Augmented Asbury Park makes use of two different methods of registering AR content — through a marker (called marker-based) or via a specific geographic location (referred to as geo-locational). The ideal way to view the project is to stand on the actual Asbury Park Boardwalk with a mobile device. A viewer is then able to view the various assets onsite, from various angles — all allowing for a sense of scale and place. The assets are spread out over several hundred meters and grow or shrink according to where the viewer stands. **Augmented Asbury Park** can also be viewed anywhere using markers. With marker-based augmented reality, a 3D asset is snapped to a flat image. In this case, a set of ten posters became an integral part of the project. 03 Both methods of presenting assets had their set of opportunities and challenges.



☐ 03
Updated Poster of the Augmented Casino
(Richison 2017/CC-BY-SA 2.0)

Because **Augmented Asbury Park** is primarily about a place (speaking geographically and historically), special emphasis was placed on the on-site experience. The project originally ran on Junaio, a mobile augmented reality browser created by Metaio, a software development company. In order to see the project, viewers had to download the free Junaio app onto their mobile devices, then scan a barcode specific to the project. The barcode prompted Junaio to download a set of 3D assets called a channel — in the case of **Augmented Asbury Park**, the geo-locational channel contained eight historical models. Each model was accompanied by a set of PHP instructions that dictated its placement, orientation, and scale. These attributes would change with regard to where the viewers stood and in which direction they pointed their phones. Junaio would tap into the locational data (global coordinates) and accelerometer data (tilt of the phone) and adjust the model accordingly. The resulting effect gave a true feeling of the presence of a building or other structure. Video documentation of this experience was collected and is available online. 02 An example of this content can be seen below. 04

■ **02**
Ed Johnston, Augmented Asbury Park — AR Geo Channel, https://youtu.be/xJP48is1AWA.

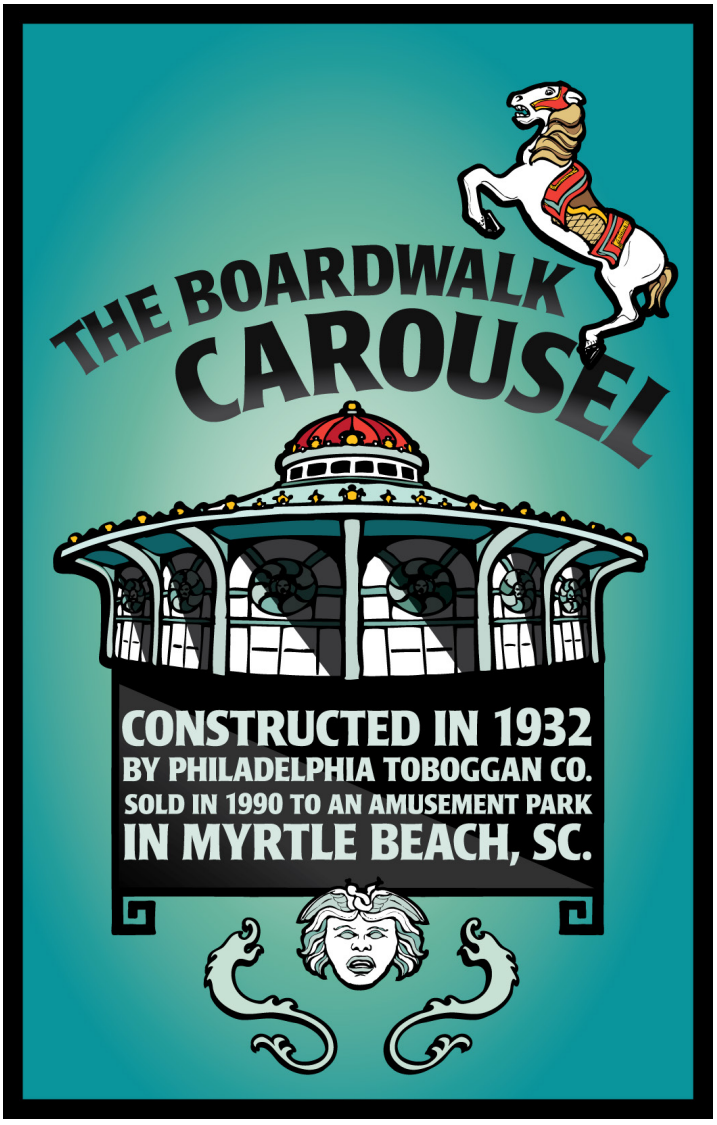


□ 04
Postcard of S. S. Morro Castle (Courtesy of the Asbury Park Public Library), Right: Geo-locational S. S. Morro Castle 3D Model (Johnston 2016/CC-BY-SA 2.0

In order to encourage content creation for adopters of these techniques, Metaio created detailed instructions as to how to access its API and enter parameters to ensure a somewhat believable experience. 3D assets were first compressed and uploaded. We opted to store our geo-locational assets on our own server rather than Metaio's upload service. Alongside the 3D content was a PHP script that housed information such as the longitude and latitude of each model as well as its scale and orientation. After dropping our models into the experience, we **camped out** on the boardwalk using a laptop and the wireless hotspot on our cell phones to adjust the coordinates, angle, and size of each model. The majority of models presented little difficulty, but the process involved checking the models from multiple viewpoints and adjusting the code as needed. Often, the models needed to overlap or complement

existing structures — as was the case with the Carousel — which had to live inside the existing Carousel House, the Casino — a model that had to cover the still-standing Casino, and the Morro Castle — a shipwreck that was the subject of many iconic postcard images.

In an effort not to exclude anyone — in particular those who may have been unable to travel to the Asbury Park boardwalk, the project can be viewed offsite on a set of markers. Augmented reality markers can be any image — anything that would allow the camera in a mobile device to register a stable platform. In order to get the marker-based experience to work, viewers would again scan a barcode within the Junaio app. Instead of walking around to specific locations, viewers would point their phones at one of the markers to see a model associated with that particular marker. We took this opportunity to create a suite of carefully crafted markers that could double as informative posters, allowing the experience to happen anywhere. As of mid-2018, these marker-based experiences are live and accessible through the free Augment mobile app. Please find directions for accessing this content at **www.augmentedasburypark.com**.



☐ 05
Updated Poster of the Augmented Carousel (Richison 2017/CC-BY-SA 2.0)

With the exception of the carousel drawings (which were drawn in 2011 for an earlier iteration of the carousel project), all illustrations were executed specifically for this project. Illustrator Sarah Buzzard was instrumental in helping us with many of the custom illustrations. Graphic designer Amanda Stojanov provided layout assistance on five of the ten posters, and Richison served in the role of art director and lead graphic designer. The posters were printed in limited editions using archival inkjet paper and ink. While working on design elements of the project, the goal was to build a brand and a look that referenced the history of Asbury Park's boardwalk — in particular the opulence of the demolished structures, the mystery surrounding particular events, and the boardwalk's fun and whimsical environment. The art direction of the project called for a determined color scheme, a closely related set of typefaces, a precise style of illustration, and a group of functional and informative infographics. The posters were featured in two local exhibits and several informal poster sessions throughout the community. The augmented reality aspect of the posters allowed them to function in a variety of scales from small badges to page-sized graphics to full-scale art pieces. [05]

IV.5 Community Engagement

The technology and the 3D content of this project were strengthened by the community-based efforts of the team. In order to build the content used in this project, the team conducted research into the overall history of the Asbury Park Boardwalk and into the individual sites. Beginning with the Carousel, library research, fieldwork, and interviews were conducted. We are indebted to two local historians: Asbury Park Library librarian Robert Stewart and Asbury Park Historical Society President Don Stine.

The postcard archive at the Asbury Park Public Library was extensive. We were able to sort through their collection of thousands of postcards in order to build a visual catalog of our chosen sites. Many of the postcards we scanned were rare and precious. These images were vital to the textures used in our models and served also as references for placement of the 3D assets. [04] Mr. Robert Stewart was kind and generous and helped us a great deal.

Mr. Don Stine provided overall information about the boardwalk and each of the sites. His knowledge of the importance of each site also helped in the editing process. Some sites were well documented and therefore not difficult to research. The structure that provided the most difficulty was the boardwalk sky ride. Stine had actually worked at the amusement park as a teenager and was able to provide anecdotal information about the short-lived sky ride.

Once the project was live, the team found novel ways to build interest and to demonstrate how to download and interact with the assets. A challenge for interactive creative work is encouraging individuals to actually participate. The Asbury Park boardwalk is a very fun, yet extremely distracting environment

for an interactive augmented reality experience, and we had to grab attention very quickly and compete with the shops and other activities. We found that the best way to build an audience was through a walking tour. The walking tour is a very simple format, and it is a format that most people are accustomed to. Where **Augmented Asbury Park** added to the usual format was through the technology of the smart phone and the 3D content. We even went so far as donning vintage suits and hats on opening weekend — an eye-catching yet extremely uncomfortable strategy for the middle of summer.

The team worked to promote and share the project both before and after its launch. In the weeks leading up to the launch date, we crafted a press pack, which led to a number of interviews and coverage in local and regional press. In the weeks prior to launch, the team also gave a TEDx talk and conducted workshops on augmented reality. During the project's run, **Augmented Asbury Park**'s posters were the subject of several exhibits — both formal and informal. The poster exhibit was also an effective way to continue to keep the project alive offsite and during the offseason.

IV.6 Current Challenges with AR

Three challenges with AR 3D content currently are stability of platforms, level of detail, and archiving. The biggest challenge currently with geolocational AR 3D content is that the Metaio platform and Junaio mobile app were taken offline in early 2016. After testing different platforms, Augment emerged as a platform through which we could make our marker-based AR 3D content live again. As of mid-2018, we have not been able to reactivate our geo-locational content due to the need for a stable, easily accessible platform.

We could have modeled some structures with a great level of detail. However, keeping polygon count low and texture files as small as possible is essential for mobile platforms. Also, we think that a solution for archiving AR 3D content needs to be developed.

IV.7 Conclusion

Through **Augmented Asbury Park**, our collaborative research team has continued to find ways of sharing AR 3D models of buildings and structures, which used to stand on or near the Asbury Park Boardwalk. While there are challenges with creating AR 3D content, we look forward to continuing to find ways of designing engaging experiences that share lost history with the public.