

# ICOA803: INTERPRETING INDIANA: AUGMENTED REALITY, CONSERVATION, AND THE AGE OF THE DIGITAL TRAVELER

## Subtheme 03: Protecting and Interpreting Cultural Heritage in the Age of Digital Empowerment

**Session 2:** Use of Digital Technology for Dissemination and Interpretation

**Location:** Silver Oak 2, India Habitat Centre

**Time:** December 14, 2017, 09:40 – 09:55

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**Abstract:** While the modernist movement remains an integral epoch in American design heritage, its monuments have only recently become the subject of conservation and public interpretation. The city of Columbus, Indiana features several of these studies by internationally renowned architects and landscape architects, including Eliel and Eero Saarinen, Harry Weese, and Dan Kiley. While the Modernist movement in the United States has provided significant discourse for the architectural context as part of a theoretical tableau, the greater understanding of how to interpret and conserve these buildings for a modern public has not been previously explored.

This paper will address geocached augmented reality as a way to disseminate information and conserve/interpret significant architectural artefacts as part of the current Age of Digital Empowerment. Through digital technologies, the city can be reconstructed from archival documents, representing different phases of architectural design, while providing a non-invasive interpretation strategy to inform a diverse, international public about the buildings and their histories. Through a digital translator and embedded archival paper, audio, and video ephemera, the application enhances individual engagement and empowerment, encouraging continuing interest and opening up a user base beyond on-site signage. The technology allows the public to experience the architecture three-dimensionally and remotely, and can be modified easily to include the most recent information.

The Columbus Indiana Augmented Reality Project provides a test case for this new methodology in interpretation in the form of a combination mobile application and web platform. Through the application, the user becomes the explorer, navigating the heritage of the city, selecting personalized information through a democratic and equalized method. As the historic city considers itself an incubator for emerging technologies, the augmented reality application contextually aligns with a pedagogical practice in the city, and also provides a framework for a digital publically-accessible research database and accumulating archive of information.

**Key words:** *augmented reality, heritage interpretation, conservation, embedded archiving*

## **Introduction: The Rise of the Digital Heritage Audience**

Architecturally historic cities have remained popular tourism destinations throughout the 20th and 21st centuries, as international travellers strive to immerse themselves in context or culture. Traditional interpretation methods for many of these historic cities focus on displayed signage, tours guided by individuals, or communicative pamphlets, each of which is geared toward a different type of educational interpretation. With the proliferation of mobile technology and its impact on individual learning, however, there is significant opportunity to expand traditional methods of interpretation in order to enhance the personalized user experience at historic sites, and potentially break into new user groups.

To meet the demand of this shift in physical audience values and an expanded user base through digital means, several sites and museums have moved to augmented or computerized interpretations. Augmented Reality (AR) or Virtual Reality (VR) simulations or media provide a user experience, which enhances engagement through digital means, particularly amplifying the user's perception of objects, architecture, or space. When used as part of informational interpretation, both Augmented Reality and Virtual Reality are able to provide additional digital media to supplement a stationary object, at times allowing the visitor to choose which enhanced media is depicted. While VR requires additional hardware, such as headsets and potentially a full monitor system, AR can better utilize mobile application technology, making AR more available to the general public with less investment<sup>1</sup>.

The Johnson and Smith suggested in 2005 that the use of AR would become more commonplace in a number of different disciplines, including museum and heritage design, as well as education, in the following years (Johnson and Smith 2005). The hypothesis has been confirmed in a number of popular interpretations at heritage or museum institutions, with new augmented reality installations being implemented around the world. In 2017, the Smithsonian National Museum of Natural History in Washington DC, USA introduced a free augmented reality mobile application and web platform titled "Skin and Bones" that works in tandem with their "Bone Hall" exhibition to enhance visitor understanding of the skeletons displayed in their collection and provide a visual experience that reconstructs what the animals looked like while living (Smithsonian National Museum of Natural History 2017). Similarly, a mobile application and web platform titled "England's Historic Cities," which allows visitors to select from a list of twelve architectural heritage sites from around the country to remotely explore information about the sites. Each location is geocached and the application provides a digital historical guide associated with the site (Billock 2017). Both projects and similar applications help to reconstruct important heritage and history for visitors, providing an augmented experience in relation to the static physical displays and buildings, and promoting enhanced understanding and interpretation of the context.

## **Benefits of Digital Heritage Interpretations**

In an increasingly digital world, particularly one where the average traveller/tourist carries at least one digital mobile device, the use of these often free services can attract new audiences and eliminate the need for external or rentable hardware, previously used. If a visitor's personal device is available to provide the

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<sup>1</sup>For an expanded literature review of the development of augmented reality, please see Yu et al., 2010.

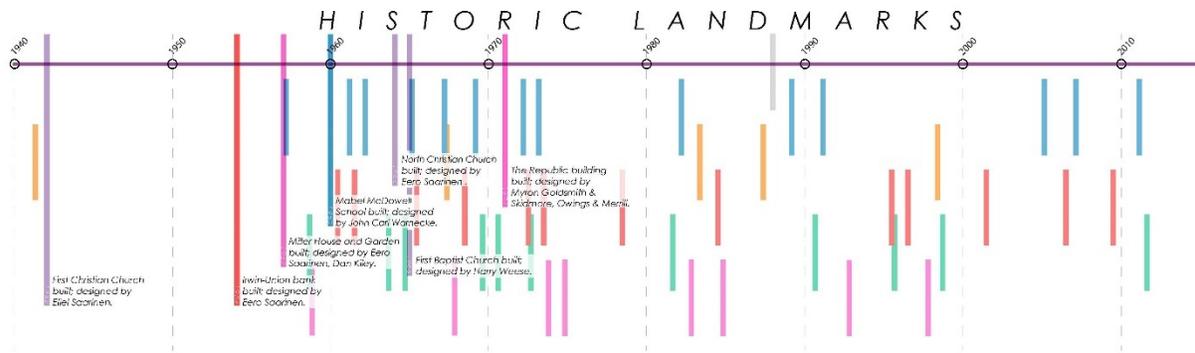
service for free, heritage and historic sites can subsequently eliminate the need for audio or printed media in multiple languages, offering a democratic approach to information sourcing. Additionally, previous investments into the procuring and printing of such translations could be instead invested into the upkeep and modification of digital platforms, where information is updated as discoveries are made. This also provides for a digitally conserved research database of primary source material on heritage sites.

Mobile AR and informational applications also provide an importance benefit to patrons with vision or hearing impairments. The ability of a mobile device to produce services for mobility support for deaf and blind patrons has been explored since the beginning of the 21st century, producing accommodations that allow for digital reading and spatial awareness for the blind and enhanced white noise reduction, and visual interpretation for the hearing impaired (Lisney 2013; Ameniya et al. 2004). The use of either available applications for private mobile technology or interactive and augmented displays at heritage sites not only provides inclusion for patrons with impairments, but also an engaging interpretation for the general patron without presenting the technology a necessary legal accommodation. The technology instead has the opportunity to engage and accommodate multiple types of learning styles, including auditory, visual, or kinaesthetic learning alongside accommodation, as each of these requires particular associated strategies (Schmeck 2013). As these technologies become more available at heritage sites, traditional interpretation methods of single or multi-language stationary signage may soon be completely replaced with interactive interpretations aimed at multiple user groups.

## **Development Methodology and Teaching Interpretation**

The emerging availability of virtual and augmented technologies to meet the rising needs of the average or specialized heritage visitor presents an opportunity engage future professionals in the practice of creating digital interpretations. The museum and heritage projects outlined by the Smithsonian Institute and similar projects can provide an introductory framework for an investigation into the development of a learning application to accommodate an entire historical site. The Columbus Indiana Augmented Reality Application Project was developed to meet this specific need for Columbus, Indiana, USA, a city that houses seven important National Historic Landmarks in the United States (Fig.1).

As an historic city with significant modernist heritage featuring buildings and landscapes by world renowned designers Eliel and Eero Saarinen (Fig.2), Harry Weese, and Dan Kiley, Columbus presented an ideal opportunity to develop an interactive and/or augmented reality interpretive application. While the opportunity to enhance public education is significant, the proximity of the site to Ball State University in Muncie, Indiana provided the opportunity for an immersive learning project with the intention of educating university students about emerging trends in historic site interpretation, while exploring the use of previously acquired skills etc. The project was presented to architecture and historic preservation students in an advanced level seminar in the Spring of 2017, co-taught by a Kristin Barry, a professor in the architecture department and Carol Street, the Ball State Drawings and Documents archivist. The graduate and upper level undergraduate seminar was conducted like a business start-up with all stakeholders given an equal role in the design and implementation of the app, and driven by a methodological approach to teaching heritage development through design and research education skill sets.



*Fig.1– Historic Landmarks of Columbus, Indiana Timeline  
(Student Jeremy Margis for Columbus Indiana Augmented Reality Project).*



*Fig.2– Project Team in front of Eero Saarinen's North Christian Church  
(Carol Street for Columbus Indiana Augmented Reality Project).*

The interpretation was proposed as an augmented reality mobile application and web platform that would provide visitors to Columbus, Indiana with on-site information about the historic landmarks through their private mobile device, or remotely using the web platform. Featuring a geocached digital environment highlighting the landmark buildings, patrons would be able to navigate the city while viewing the landmark buildings and select other important heritage structures on the mobile application in a digital reconstruction. Additional information about the city, including digitized primary source archival paper ephemera (i.e. architectural drawings, letters, photographs, reports, etc.), biographies of important architects and patrons, historic videos, timelines, and maps, would be made accessible through the menus and immersive digital environment, providing a public database of sorts. The purpose of such an application is to allow the visitor to democratically self-navigate and learn without the need for a site-specific tour guide or the implementation of permanent or semi-permanent signage around the city. The

application could be made available in multiple languages, allowing for an international tourism experience.

The methodology followed a stepped process of teaching students required skill sets (three-dimensional architectural modelling and photogrammetric modelling), which would be combined with primary source information to develop the content for the application. This was driven by an introduce/reinforce methodology, where students first completed assignments to teach skill sets and research before being asked to apply these new skill sets to the application design. Assignments included an on-site photogrammetric workshop to reconstruct the Large Arch sculpture by Henry Moore, an important piece of Columbus heritage (Fig.3), which was followed by an assignment for students to individually reconstruct a sculpture on Ball State University's campus using newly-learned photogrammetric principles. On-site workshops were supplemented by in-class workshops with the Ball State Institute for Digital Intermedia Arts (IDIA) Lab professionals, who worked with the students on digital modelling using Rhinoceros and AutoDesk Maya applications to clean up models produced using photogrammetry and build digital architectural models from scratch. These assignments expanded the students' working design skill sets, and provided a framework for producing the geocached augmented reality space.



*Fig.3– Photogrammetry Workshop on-site in Columbus, Indiana and the resulting photogrammetric model of Large Arch (Student Caylon Beville for Columbus Indiana Augmented Reality Project).*



*Fig.4– Digital reconstruction of Mabel McDowell Elementary School in Columbus, Indiana (Student Anna Goodman for Columbus Indiana Augmented Reality Project).*

The digital models (Fig.4) were developed using original architectural drawings provided by partnerships with the Columbus Indiana Architectural Archives (CIAA) and Ball State University Drawings and Documents Archive, who provided professional resources and digitizing services for the application. Extensive primary and secondary source research conducted by students was paired with the digital models to provide context and written information that will be made available to patrons through the application menus and navigable geocached space. Co-teaching the course enabled an archivist to be embedded in the course alongside a design professional, emphasizing the role of both professions in the process of creating an accurate, informative, and engaging heritage interpretation. The students were given equal input as the professors, and were integral in the design, planning, and implementation of the educational environment. The application graphic design (Fig.5) was based on colour theory from the time of the construction of the buildings and fonts chosen for universal readability.



Fig.5– Application design mock-up using universally-readable font and contemporary color scheme  
(Student Tyler van Kirk for Columbus Indiana Augmented Reality Project).

This seminar was intended to provide the content for the application, which at the time of writing is in the funding state to provide for programming. The eventual application and web platform will be constructed by professionals as part of the Ball State IDIA Lab, which has developed the technology to produce the application and recently launched a similar virtual companion application for Mounds State Park in Indiana ([idialab.org](http://idialab.org) 2017). The Columbus, Indiana application is scheduled for testing in 2018.

## Implications for Future Interpretation of Indiana Heritage

Augmented and Virtual Reality applications provide a universal space for interpretation, making information about heritage structures accessible to a wide audience. The Columbus, Indiana application and web platform acts as a case study in teaching and interpreting methodology, walking students through the use of primary resources in information, digital modelling of historic architecture, and the navigation of historic cities, yet it also provides a framework for future Indiana heritage projects. While the Columbus Landmark buildings reconstructed in augmented reality are existing in-situ in some state, other cities in Indiana with historic sites that have either been demolished or are currently facing demolition, may benefit from the interpretation methodology proposed. Gary and Indianapolis, Indiana have both seen major historic buildings demolished, but retain significant archival records, including architectural drawings and historic photographs that could be used to bring the buildings back to life in digital form, perpetuating the lifecycle of the heritage and making it available to infinite future audiences.

## Biography

Dr. Kristin Barry is an Assistant Professor of Architecture at Ball State University, specializing in architectural history/theory and heritage interpretation. She has published articles and book chapters through a variety of peer-reviewed international venues on architectural innovation in the Middle Ages; monumental sculpture and its iconographic and political status; people-moving techniques at historic sites; architectural collections and the recreation of context; and the 4D interpretation of cave art spaces.

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# ICOA803: INTERPRETER EN INDIANA: REALITE AUGMENTEE, CONSERVATION ET L'AGE DU VOYAGEUR CONNECTE

## Sous-thème 03: Protéger et interpréter le patrimoine culturel à l'ère de l'autonomisation numérique

**Session 2:** Utilisation de la technologie numérique pour la diffusion et l'interprétation

**Lieu:** Silver Oak 2, India Habitat Centre

**Date et heure:** 14 Décembre, 2017, 09:40 – 09:55

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**Résumé:** Alors que, pour le patrimoine du design américain, le mouvement moderne demeure une époque intégrante, ses monuments ne sont que récemment devenus sujet de conservation et d'interprétation auprès du public. La ville de Columbus, Indiana, présente plusieurs de ces études réalisées par des architectes et des architectes-paysagistes de renom international, tels que Eliel et Eero Saarinen, Harry Weese et Dan Kiley. Même si le mouvement moderne aux États-Unis a joué un rôle significatif sur la théorisation du contexte architectural, une meilleure compréhension de la façon d'interpréter et de conserver ces bâtiments pour le public contemporain n'a pas été explorée jusqu'à présent.

Cet article traitera de la réalité augmentée comme moyen de diffuser de l'information et de conserver / interpréter des artefacts architecturaux importants dans le contexte actuel de l'ère numérique. Grâce aux technologies numériques, la ville peut être reconstituée à partir de documents d'archives, représentant les différentes phases de sa conception architecturale, tout en fournissant une stratégie d'interprétation non invasive pour informer un public international diversifié sur les bâti et son histoire. Grâce à un outil d'interprétation numérique et à des documents papier, audio et vidéo éphémères intégrés, l'application renforce l'implication individuelle et l'autonomisation, stimule l'intérêt en continu et donne accès à une base d'utilisation bien supérieure à une simple signalétique sur site. La technologie permet au public de découvrir l'architecture de façon tridimensionnelle et à distance, et peut facilement être modifiée pour inclure les informations les plus récentes.

Le « *Projet de Réalité augmentée de Columbus Indiana* » fournit un test pour cette nouvelle méthodologie d'interprétation sous la forme d'une combinaison d'application mobile et de plateforme Web. A travers l'application, l'utilisateur devient explorateur, navigant

à travers le patrimoine de la ville, sélectionnant des informations personnalisées à travers une méthode démocratique et égalitaire. Alors que la ville historique se considère comme un incubateur de technologies émergentes, cette application de réalité augmentée s'aligne sur une pratique pédagogique de la ville, mais constitue également le cadre d'une base de données de recherche numérique accessible au public, permettant d'accumuler des informations d'archive.

**Mots clés:** *réalité augmentée, interprétation du patrimoine, conservation, archivage intégré*