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Implementing Augmented Reality in Academic Libraries

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Abstract

The rising popularity of augmented reality (AR) was punctuated by the Pokémon Go craze of 2016. Individuals of all ages were glued to their phones, attempting to catch creatures that displayed on their phone but were not physically in front of them. There are free and low-cost applications that libraries can use to harness the magic and create their own AR content to enhance library usability and marketing. This column explores the history of AR, explains how it works, and provides some examples of how librarians can use it to market their services and provide additional assistance to library users.

Keywords: augmented reality, academic libraries, marketing, outreach, library services

Implementing Augmented Reality in Academic Libraries

Introduction

Augmented reality (AR) is a technology available on mobile devices that allows users to experience a layered, computer-generated enhancement to their real-world perception. It blends digital components into the real world as a user becomes immersed in an augmented view of reality. This technology uses mobile device applications that display augmented media such as digital images, sounds, graphics, and GPS data. Augmented reality does not require the use of external, head-mounted gear since users are merely supplementing their place in time with the lens of their mobile device screen and camera. When the device's camera is moved away from an AR-enhanced object, the user's true reality of space and time is returned. This is one major difference from virtual reality technology, which closes the user off from the external world through head mounted displays.

Augmented reality (AR) has gained wide public appeal in recent years and earned its place in mainstream society with the global Pokémon GO craze of 2016. Although AR has been around for more than sixty years, the term was not officially coined until 1990, as it began to find its way into military machinery, theatre, broadcasting, and visual flight navigation systems. Augmented reality has made a significant impact on technology and found its way into our ordinary world. In March 2017, Samsung released its new Galaxy S8 mobile phone which has enriched augmented reality and virtual reality features as part of its standard package. With Samsung's S8 new intelligent interface, known as Bixby, users are able to operate AR technology to identify landmarks, translate foreign signs, and shop for products they see through the phone's enhanced camera.

Given the increasingly common presence of AR in everyday life, libraries would be wise to integrate these popular tech trends into services, marketing, and outreach efforts. Academic libraries, in particular, have a unique opportunity to take advantage of this technology while it is trending and patrons are aware of how it works. There is growing interest in utilizing AR in the mainstream environment by connecting with opportunities to use the tech firsthand in as many ways as possible. This column provides a brief history on augmented reality, suggests free and low-cost applications for creating AR content, and outlines concrete examples of how AR can be implemented in academic libraries in the areas of outreach, marketing, and technology programming.

History on Augmented Reality

The humble beginnings of AR are associated with computer scientist Dr. Ivan Sutherland and his student, Bob Sproull, at the University of Utah. In 1968, Sutherland and Sproull developed the first head-mounted display (HMD) system which Sutherland called The Sword of Damocles. Sutherland's HMD device was attached to a mechanical arm that suspended from the ceiling of the laboratory space. This first HMD system used computer-generated graphics to show users simple wireframe drawings (McCracken, 2013).

Although The Sword of Damocles did not make it far past the experimental phase as an early vision, it made important contributions to AR technology as a whole. Within the span of eight years, Sutherland paved the way for AR to break into other fields like visual art, dance, theatre, and the military. He provided the inspiration for others to tinker with artificial reality laboratory spaces as the technology gained wider interest.

The Optical Vision Site (2011), provides a timeline of AR advancements, including the technology's appearance in artistic projects like *Videoplace* at the University of Wisconsin-

Madison in 1974 and *Dancing in Cyberspace* in Australia in 1994. These examples of AR technology bridge the realm of artistic expression as they use projectors, video cameras, and special hardware to place users into an interactive environment where AR is utilized as a performance tool. Despite the use of AR technology during a twenty-five year period, the term “augmented reality” was not coined until 1990.

Creation of the term “augmented reality” was claimed by Thomas Caudell, a Boeing researcher (Lee, 2012). Caudell and his colleague, David Mizell, developed a see-through, head-mounted display that guided workers on accurate wire placements as they built aircraft (Metz, 2014). After formal adoption of the term, AR made its way into military training and the space industry in 1999, as naval researchers developed a wearable unit for soldiers and NASA produced a Hybrid Synthetic Vision system that enhanced visual navigation with map overlays during flight (Augment, 2016).

The last highly influential component of AR history involves Hirokazu Kato’s 1999 creation of the ARToolkit, an open-source software library that uses video tracking to overlay computer graphics on a video camera (Kato & Billinghurst, 1999). After ten years, Kato’s ARToolkit became more broadly accessible as it was ported to Adobe Flash, allowing the technology to be used on web browsers. With this, AR exploded in popularity, becoming widespread in the broadcasting, health, and education sectors in addition to the others previously mentioned.

Free and Low Cost AR Applications

Augmented reality technology has come a long way since its inception. It is now possible for libraries and other organizations to develop AR-enhanced materials for little-to-no money. The applications described below have been used by the author to create AR experiences for

library patrons. Libraries interested in AR development software should also watch for new programs that are released on a regular basis.

The HP application Aurasma uses a specific terminology for its augmented reality enhancements: auras. After installing the Aurasma app, auras are created by selecting a trigger image (typically a 2D sign, flyer, or handout) and then an overlay (e.g. an audio file, video file, or GPS-enabled data file) that will appear when the user has interacted with the trigger image. Using the Aurasma platform is fairly straightforward. Accounts can be utilized on both mobile and desktop platforms, and user statistics can be pulled to see how much traffic a particular aura has produced. The Aurasma app can be found on Android and Apple platforms and has an accompanying website (www.aurasma.com) where users can create and maintain their AR enhancements.

Another AR app, called Blippar, is free for users who are utilizing it for educational purposes. Blippar works similarly to Aurasma and allows users to create interactive learning environments that can be shared with outside users. Its mobile application is available on both Android and Apple app markets and its website is www.blippar.com.

Mentioned earlier, the ARToolkit (www.artoolkit.org) can assist individuals who prefer to develop their own AR application. It allows users to download open source code and instructions for how to develop, program, and use their own AR mobile applications. This option is best for computer programmers or individuals who want to create a custom application that meets their needs without paying an outside company to set it up for them.

Utilization of AR Technology and Features

For librarians unfamiliar with AR, it can be challenging to understand and visualize how it might be used in libraries. For example, how does a library patron interact with AR-enhanced

features in the library? This section describes how AR apps function, what steps are necessary to create augmented reality advertisements and flyers, and how users should be instructed to interact with AR-enhanced materials if they see them.

The first step to developing AR content is selecting an AR application to use, such as Aurasma, Blippar, or ARToolkit. The quickest options are to set up an institutional account with Aurasma or Blippar. Once an account is created, librarians can begin to create enhanced flyers and advertisements. It is good to have an idea of what projects to augment before starting so that utilization of the tool can begin immediately.

Augmented reality can be applied to existing library flyers by using an app like Aurasma. While inside the app, librarians can create a new “aura” by selecting a trigger image and overlay file. The *trigger image* is an image on the flyer where patrons will point their mobile device camera. After the camera has recognized the trigger image, the associated overlay file will be displayed on the screen of the mobile device. This *overlay file* is a related image, video, or map selected by the librarian. As an example, the library may have an exhibit featuring a particular artist. Patrons see an exhibit flyer, which prompts them to download or open the Aurasma app and point their phone camera at the artist’s photo on the flyer. This image triggers a video to appear on the patron’s phone that provides background information on the artist and how she began her career.

In order for patrons to interact with AR enhancements, they must first know that the flyer is AR-enabled and be instructed to download their library’s AR app. In the example above, the app is Aurasma. Patrons must also follow their library through the Aurasma app in order to activate AR-enhanced materials created by that library. Additional signage and training may be needed so patrons will know how to interact with the new technology. This may not be as

difficult as it seems, since younger patrons often have their mobile devices handy or are speaking to them via Snapchat apps or while going Live on Facebook. They are growing more accustomed to using their mobiles as windows or viewfinders into their world and what they experience.

Why not take advantage of this new behavior and capitalize on it for the interest of our libraries and the information we have to share with patrons?

Practical Uses of AR in Libraries

Generating a buzz about the library by engaging a technologically-conscious student base can be fun and exciting. By sharing this excitement with students and meeting them at their point of need, the library can generate more walk-ins and visitors to physical library spaces. Academic libraries can use this technology to enhance existing outreach and marketing materials as well as technology programming.

Outreach

Subject librarians. Subject librarians have a vested interest in establishing relationships with both students and faculty in their subject areas. It can be difficult to grab and keep hold of users' attention. Augmented reality can be used to attract users into the library when this hands-on technology is implemented. Students can use AR to orient themselves with augmented advertisements located outside of the library or on message boards throughout campus. Students can interact with the advertisements via the AR app that they download onto their mobile device. When they point their mobile phone camera in the direction of the augmented advertisement, the ad triggers additional content to display on the phone. This content could be a video of a subject librarian introducing himself or of the library as a whole. Message boards are plentiful on college campuses and are situated near academic departments and student organizations. Augmented

library flyers on campus can inspire students to visit the library by introducing subject librarians, outlining library services, and suggesting resources.

Library tour pamphlets. Augmented reality can also be implemented with existing library tour pamphlets. The library can add AR to specific elements of the pamphlet to provide additional information about a variety of places around the library. For example, GPS tagging can be utilized as the overlay file of the aura created by librarians in the Aurasma app. Library users would enter areas in the physical library space that are connected to the library tour through the Aurasma app. When they point their mobile device camera at a designated trigger image, they are taken to videos or outside resources that provide details about a particular place of importance. Without AR, the videos have no way to formally connect users to a physical space in the library during a specific time. This is a great opportunity to use AR to provide background or historical information about the library space or institution as a whole.

Incentive programs. If a library has funding or special incentive programs set in place, like digital badging, students can gain gamified acknowledgement, prizes, or swag for simply engaging with AR-enhanced items in your library. The University of Central Florida's LINK Loot program engages students and fosters a culture of involvement with campus activities and programming. Students registered for LINK Loot gain points when they attend on-campus programs and swipe their student ID at the event. They can earn university swag or gift cards for their participation. Library programming can be listed with LINK Loot and use AR-enhanced flyers to advertise LINK Loot, how it works, and how to sign up. Combining incentive programs with dynamic AR advertising can increase student interest in library programming.

Scavenger hunts. Old library scavenger hunts can be livened up with the use of augmented reality. In the Aurasma app, librarians can use GPS tagging as the overlay triggered

by images located on flyers throughout the library. Students would hunt for these AR-enabled flyers that are described in the library scavenger hunt, just as they might hunt for creatures in the Pokémon GO app. After pointing their phone camera at the trigger image, the overlay file would appear on their phone. The overlay could be a video about the library's history or another useful video related to the library. In this example, both GPS tagging and an overlay would be used together in the Aurasma app. This allows for students to use their mobile device as viewfinders while searching each floor for the AR-enabled flyer regarding, for example, service desks. Once the students find the flyer they are searching for, they point their device camera at the flyer and wait to see if they are taken to a video or other AR experience. If they are not, then they know that they do not have the correct image and have to keep searching.

In another example, if students need to find a library service desk as part of a scavenger hunt, the added AR overlay to the paper scavenger hunt can lead users to an informational video on where to find in-person help throughout the library. Using AR to link users to informational library resources, tutorials, and content is a great way to increase their visibility and broaden their audience to the surrounding community. The benefits of AR in libraries are not limited to outreach. Library marketing can also harness the fun of AR to communicate with the campus community.

Marketing

Most libraries have a fleet of signs throughout the building. There are signs at the front door, the circulation desk, and in bathrooms and elevators. Libraries communicate all kinds of information in the form of physical signage. Utilizing AR to enhance physical signs can add life to a rundown method of conveying information. Using the Aurasma app, librarians can add digitally-overlaid content that is triggered by images located on physical signs. Once users

point their mobile device camera at the sign, their screen displays a video file that the library has linked to the trigger.

Construction and events. If the library will close early on a specific day because of an event, or if there is construction information to display on large whiteboard signs, AR can be used to enhance announcements and take users to a different dimension. Added AR overlays on signs allow users to navigate directly to a video that explains what is going on in a specific area of construction. If a special event is happening, AR can take users directly to videos showcasing what the event entails and why they might want to attend. Ensure that there is sufficient signage instructing users to download the Aurasma app, follow the library account in Aurasma, and use their phone camera to access AR content. Simple signage and training is typically all that is needed to get patrons engaged with this content.

Special collections. Promoting special collections or university archive material is of special interest to academic institutions. Many academic libraries struggle with how to share special collection materials and attract student and faculty interest. This is another area where augmented reality can help. If there is an exhibit being showcased on a floor with low foot traffic, pre-existing marketing materials can be enhanced with AR. Adding AR-enabled auras to signage about the exhibit allows patrons with the Aurasma app to access additional content about the exhibit, such as a video sneak peek, without having to physically encounter the exhibit. This can increase awareness of the display among individuals who do not frequent the area where it is located.

Benefits of AR in marketing. Using AR in marketing efforts inside the library has benefits that extend beyond marketing. It helps to bring together all of the public-facing departments and their staff. Use of AR apps by Circulation, Reference, and Special Collections,

can promote broader communication between all areas of public service in the library. In the signage example, particular announcements might be run by Circulation staff, while other signage regarding subject librarian services would be run by Reference library staff. As each library builds its collection of AR-enhanced materials, someone from the Reference Department could be in charge of monitoring the AR app account and creating overlays for the entire building. This would mean that cross-departmental relationships could be strengthened, allowing staff to collaborate more openly with one another and providing some potential cross-training opportunities as well.

In addition to the team-building benefits of AR, it also has the benefit of accessible usage data. The AR applications typically have data on how many times an augmented enhancement was accessed, when, and by how many individual users. Having these circulation statistics or digital views of the exhibit is useful to library administrators. It can also be impactful to our disabled patrons, since some may be hesitant to engage with exhibits due to location or lack of accessibility. Having AR link to videos of exhibits allows patrons to see and engage with the material as though they were physically standing in front of it or walking through it.

Technology Programming

The final area where augmented reality can be utilized is technology programming. Augmented reality can interact with existing services, such as dedicated tech zone space or sandbox programming, which provides hands-on demonstrations and training with circulating library technology like virtual reality headsets, Raspberry Pi computers, and iPads. Installing AR applications onto library technology allows patrons to follow along and experiment with creating their own AR-enhanced content during technology programming. The implementation of AR

training during technology programming introduces patrons to creative uses of AR while simultaneously creating a buzz about the circulating technologies available at the library.

There is evidence that mobile technology utilization is part of the digital divide which creates barriers to access (Rice & Katz, 2003). Academic libraries that are willing to acquire mobile technology and virtual reality headsets have a unique opportunity to give their patrons the gift of technology. By circulating these items, patrons can become their own creators and users of AR technology. Allowing the technology to be circulated amongst the library staff can also help them to get better acquainted with growing trends as they play with the devices and software themselves. As virtual reality gains popularity and the cost of most technology remains high, libraries that offer a variety of technologies as a part of a larger circulating collection can add value to the services and programs they provide to their users.

Conclusion

Libraries can further engage their users by implementing AR technology into their outreach efforts, marketing, and technology programming. By taking advantage of free or low-cost tools that put users in contact with emerging tech trends, the library can generate more interest and garner a reputation with students as being tech-savvy. The integration of AR content with library flyers and signage can be simple to achieve, and many students can easily learn how to access it with a small amount of informational marketing from the library. The sky's the limit for how technology can provide new ways to interact with library patrons. Imaginative librarians can develop their own unique ways to integrate AR technology into their library. Happy augmenting, or if you prefer, "Stay Calm" and Augment On!

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