Mobile Augmented Reality Applied in Public Libraries

行動學習與擴增實境於公共圖書館之應用

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Introduction

- The dynamic advancement of mobile technology has changed the way we learn
- Technology also changes how we perceive information.
- Mobile learning becomes a new trend of learning.
- Particularly in the environment awareness, location based information services with AR technology can assist users become familiar with the physical world.

Introduction

- In the real world, people construct knowledge and gain experiences through interacting with their surroundings.
- Public libraries play a role in setting up environment for people to read, learn, and experience
- In recent years, public libraries embrace new technology; constantly modernize the promise, to provide users with better and enjoyable reading spaces.

Introduction

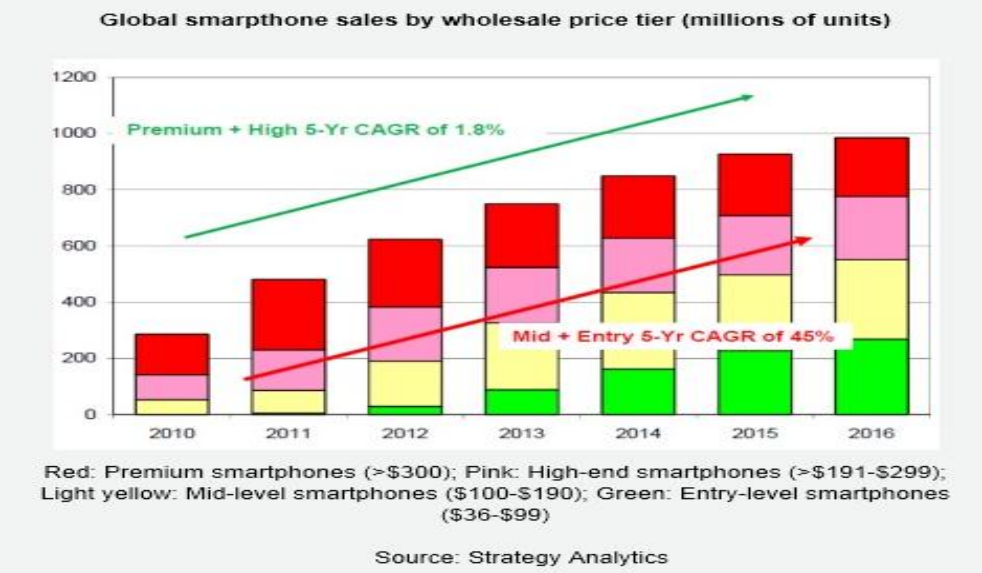
- Architects transform library physical entities into urban landmarks, in creating functional space in an artistic ways.
- Information engineers bring in innovative learning environments by implementing personalized services.
- Augmented Reality (AR) technology on smartphones is one of them.

Overview

- Mobile technology and mobile learning
- Sensory cognition and use of AR
- Practices of AR navigation
- Application with visualization in special navigation – Museums & Libraries.
- Suggested application of AR in public libraries

Mobile technology and mobile learning

- Global smartphone sales



According to Strategy Analytics, the global smartphone sales increased almost 3 times from 2010-2012.

Retrieved August 23, 2012, from http://www.eetimes.com/electronics-news/4376108/MediaTek-to-bring-premier-smartphone-features-to--150----200-handsets

U-Taiwan 2007-2011
I-Taiwan 2009-2012

行政院國家資訊通信發展推動小組 (National Information and Communications Initiative Committee (NICI)

Ubiquitous Taiwan – Strengthen ICT application, resolve developing issue and support technological service industry.

Intelligent Taiwan – core concepts seamless connection, serving the public, efficient ICT (energy saving environment), nurturing live with aesthetics, and adaptive education

http://duct.cpami.gov.tw/intro/Conference/06/M6-1.pdf

http://www.intelligenttaiwan.nat.gov.tw/content/application/itaiwan/generalb/guest-cnt-browse.php?vars=3e83390f4d53e5350b4bf46d202cca4f7a86bb827f86e932bdc8780f635441fbcbdd0942ee5a21fa90502387333e04e70f803da64fc55e9bced8570298d56b3b

U learning and I learning

- Tools for Leaning - Mobile learning system scaffold individuals' learning with mobile devices and sensor techniques
- "Ubiquitous learning" : Learning without being limited by space and time
- "Intelligent learning":
  - Learning should be a part of nurturing our lives.
  - Learning should be adaptive to individual needs – in terms of time, space, and satisfying personal enjoyment

Sensory processing

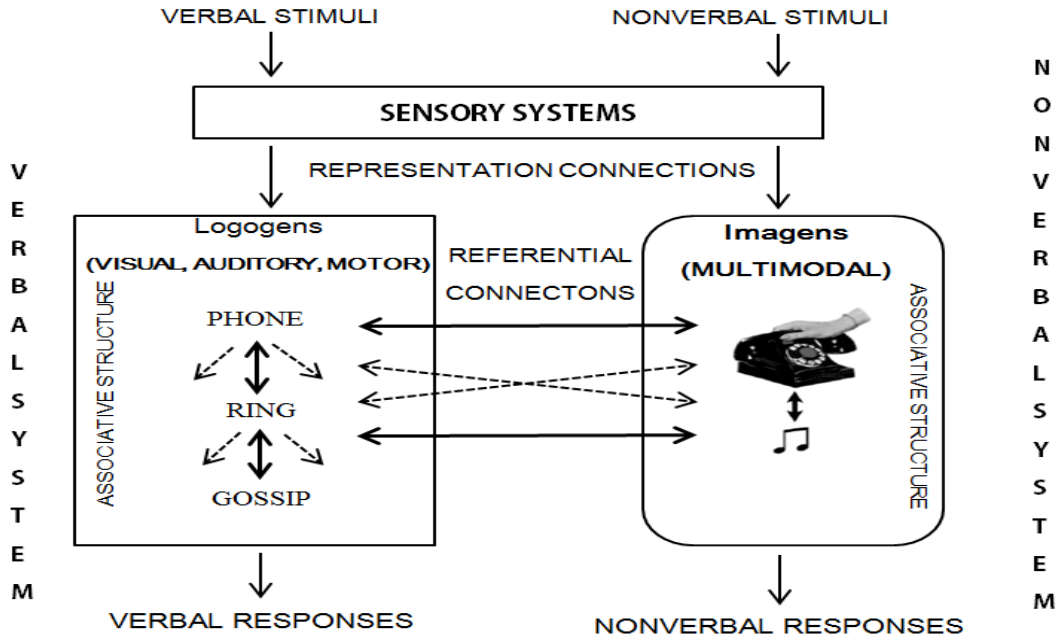
"a picture is worth 1,000 words"

How to know when it's time to stop driving

The use of better representations in indexing information to support efficient cognitive processing. (Larkin & Simon, 1987)

http://www.fillmoregazette.com/humor/how-know-when-its-time-stop-driving

Dual Code Theory



Human cognition deals with verbal and nonverbal objects simultaneously in processing events (experiences).

Paivio, A. (2010). Dual coding theory and mental lexicon. *Mental Lexicon, 5*(2), p 209.

Different Modality – Need for Sensory processing

- Computer animation, visual effect, or virtual reality (VR) provide different visual experiences for cognitive needs.
- Multimodal presentations provide more processing alternatives, and is easier to be memorized than single-modal representation.
- AR creates different modal of representation

Smartphone self-guided learning

- Smartphone can help people to explore spatial knowledge freely.
- Location-based information can be assessed within a specific setting.

Columbia University Campus Tours on Smartphones

Purdue University Arboretum walk

Augmented Reality (AR)

- AR provide alternative modality
- Augmented information (in environment learning) bridges the gap between virtual learning context and real world context.
- It provides an adaptive manner to increase the use of metacognitive strategies
- AR fosters reflection and awareness in the self-regulated learning process.

Augmented Reality (AR)

- AR combines smartphone functionalities:
  - GPS: setting location
  - Internet connection
  - Creating an image layer on top of real environment through the camera.
- AR exploits additional location based information hidden behind objects.

Fu-Jen University self-guided touring system, 2012

Augmented Reality (AR)

- *We're at the beginning of a new era for social Internet innovators who are re-imagining and re-inventing a Web of people and places, looking beyond documents and websites.*

- John Doerr, 2011

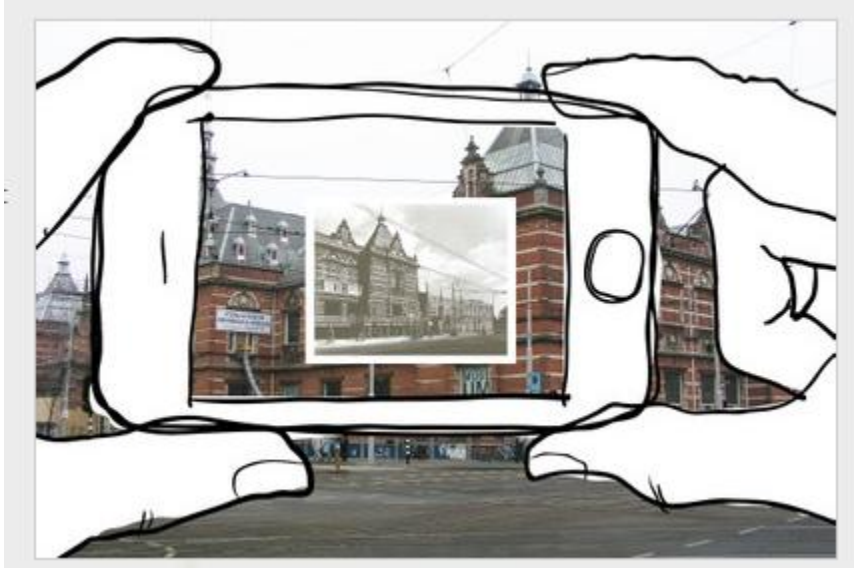
Serve the user needs:

http://www.slideshare.net/kleinerperkins/kpcb-top-10-mobile-trends-feb-2011

John Doerr, an American venture capitalist in KPCB. Doerr funded Netscape, Google, Amazon, and Bloom Energy.

Augmented reality applications in Museums

- Stedlijk Museum, Amsterdam – ARtours (2010)



ARtours is an Augmented Reality project of the Stedelijk Museum Amsterdam (2010-). Museums re-use their digitized collection and reposition it on all possible locations in the city.

http://www.v2.nl/archive/works/artours/view

Augmented reality applications in Museums

Augmented Reality: Rogue Art Exhibition at MoMA

The show allows MoMA visitors to be able to see additional works on each of the floors by using a location-based augmented reality technique.
Visitors with will be able to admire an unofficial showing.

http://tribalddb.com/news/blogs/augmented-reality-rogue-art-exhibition-at-moma/

Augmented reality applications in Museums

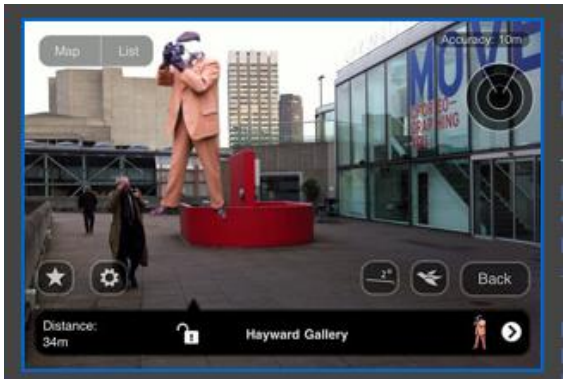
City of Denver's Public Art Tour.

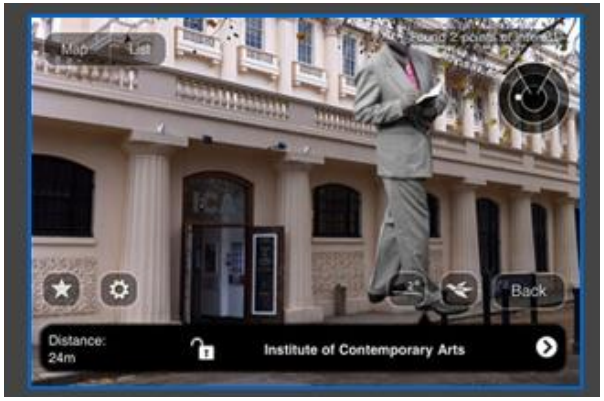
- Denver creates local based AR information on public art, including information on the artwork, artist interviews (in video and audio format)
- Provide directions from one's standing points to another piece of art nearby.

http://dgqa.denvergov.org/doca2/DenverOfficeofCulturalAffairs/PublicArt/PublicArtTours/AugmentedRealityTours/tabid/436942/Default.aspx

Augmented reality applications in Museums

The Invisible Artist, London





Provides AR city guide to top 10 London's contemporary art galleries.
The Invisible Artist guides the visitor from one location to the next.

http://www.johngoto.org.uk/invisible-artist.htm

Augmented reality applications in Museums

Museum of London “Streetmuesum”

Provides Museum of London’s historical collections from 1666 to 1960.
Use smartphone on London map to see old images happened on the same locations.

http://www.museumoflondon.org.uk/Resources/app/you-are-here-app/home.html

Augmented reality applications in Museums

American Museum of Natural History
. *Special exhibition. Beyond planet Earth. The future of space exploration*.

Creates an AR app let visitors to see a Mars-bound spaceship, a near-Earth asteroid, watch a lunar elevator take off from the Moon, and more.

http://www.amnh.org/exhibitions/past-exhibitions/beyond-planet-earth-the-future-of-space-exploration/check-out-the-beyond-planet-earth-iphone-app

Augmented reality applications in University libraries

- North Carolina University library "Wolfwalk"

A photographic guide to the history of North Carolina State University. Users' can take a historical walking tour in NC State campus using the location-aware campus map.

WolfWalk features 1000 photographs of important people, places and events in NC State history

http://www.lib.ncsu.edu/wolfwalk/

Augmented reality applications in University libraries

- Wake Forest University Z. Smith Reynolds Library's twitter AR

Use TwittARound to see twits in the Library.

http://laurenpressley.com/library/2010/01/laurens-top-tech-trend-alamw10-alamwttt/

Augmented reality applications in University libraries

- Miami University Augmented Reality Research Group - ShelvAR

Viewing the shelf through a tablet PC, the user can see incorrectly filed books highlighted, and on-screen arrows point to their correct place on the shelf.
ShelvAR speeds up the job of finding misplaced books and returning them to their rightful place.

www.users.muohio.edu/brinkmwj/ar/index.html

Augmented reality applications in University libraries

- University of Illinois at Urbana-Champaign

This AR smartphone library e-resources link system will tell users
(a) which section she is at,
(b) total printed items that has been identified, and
(c) numbers of e-resources related to these printed items.
User can tab on the printed item to link to the electronic version items.

Hahn, J. (2012). Mobile augmented reality applications for library services, *New Library World, 113* (9/10).

AR applied in public libraries

Example: Halifax Public Library - *Titanic Mobile Tour*.

tragic shipwrecks: 1912

Halifax Public Libraries teamed up with the Maritime Museum of the Atlantic and the Nova Scotia Archives to create a self-guided tour highlighting HRM's Titanic connections.

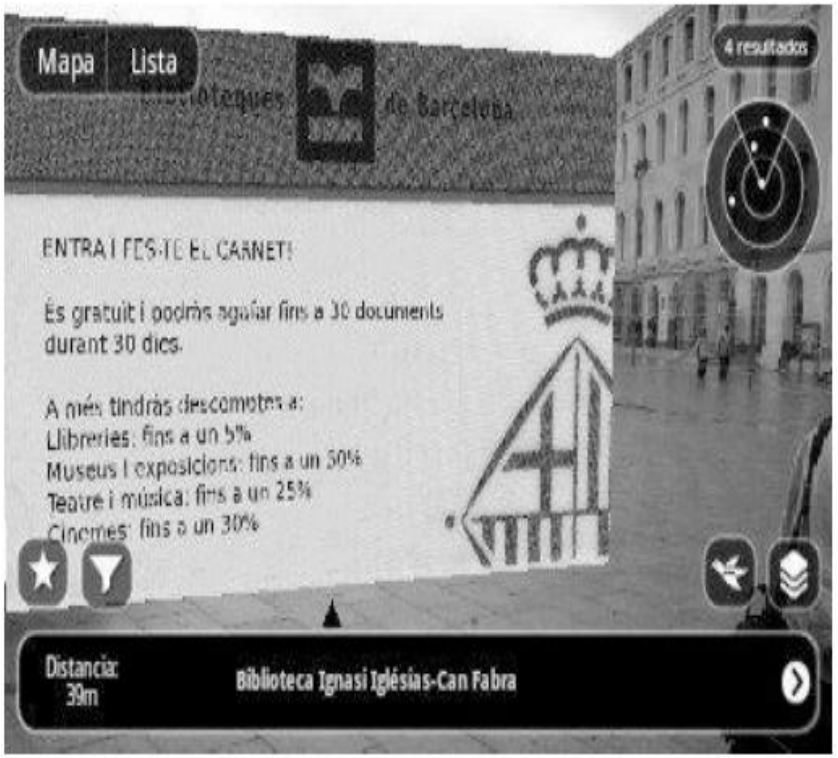
Consisting of 20+ stops to introduce historic resources through Halifax's heritage.

- Halifax Public Library (2012). *Titanic Mobile Tour*. Retrieved July 30, 2012, from http://www.halifaxpubliclibraries.ca/research/topics/titanictour.html

AR applied in public libraries

The institution Biblioteques de Barcelona

Three projects used LBS at a different Barcelona public library branches and focused on a different marketing concept: documents, services and benefits of owning the library card.



- Lázaro R.M (2012). Augmented Reality as a Tool to Bring Young Users to the Public Libraries - The Case of the Libraries of the City of Barcelona. Proceedings of the 20th International Conference on Information Science Amsterdam, 23-25 January 2012. 226-229.

Integrating Mobile Learning into environment touring

- Use of mobile device to provide timely information needed by the user.
- Embedded rich information around specific location, AR mobile learning allows users to interact with real environments, architectures, and objects

New Landmark Public Libraries

announced by Library Journal 2011

Renovation with innovation in design:
These public libraries respond to trends in green design and shifts in service models.

http://www.libraryjournal.com/lj/ljinprintcurrentissue/890303-403/ljsnew_icons.html.csp

New Landmark Academic Libraries announced by Library Journal, 2012

The 2012 NLL focus on academic libraries, will inspire and inform any building project .

Valuable information could be introduced

Tell the story

http://lj.libraryjournal.com/2012/06/buildings/national-landmark-libraries-academic-library-winners-and-honorable-mentions/

The 25 Most Beautiful Public Libraries in the World

- Flavorwire – The American Culture and Entertainment website
- Taipei Public Library, Beitou Branch one of the…
  - "While it's the books that are important, everyone likes to read in a beautiful space." - Flavorpill (2012)

http://www.flavorwire.com/280318/the-25-most-beautiful-public-libraries-in-the-world#25

AR application – Public Library

Tell the story

- The spaces: Libraries renovate the spaces for a comfortable, contemporary physical places
- The contents of the library, and the activities that take place, to fulfill its missions - to support community needs.

Incorporating visualized special navigation

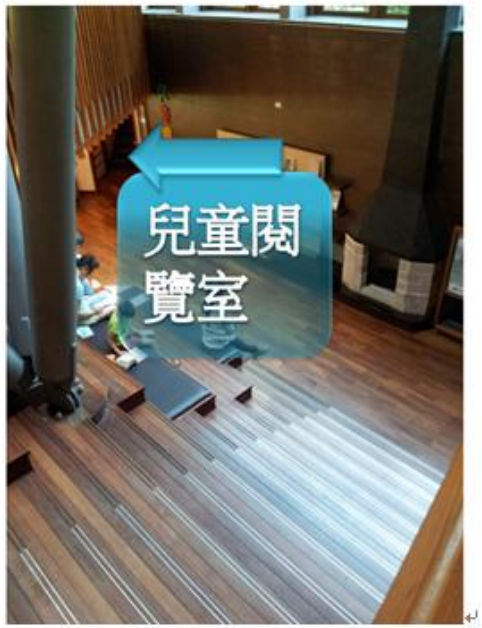
- Traditionally, environment orientations consume manpower and time.
- AR technology with self-guided mobile applications create a user - centred, visualized operation, and a real-time-feedback learning environment.

Ideas for Future Application

Provide location-based services

Search filter to meet different interests

Service links for quick service connections



AR guideline for self in-door navigation

Ideas for Future Application

QR code + Location based AR

D 區介紹

Incorporate object recognition app for current tour guide.

Ideas for Future Application

a. 圖形辨識互動按鈕

b. 圖形辨識連結圖示

資料來源：台北市立圖書館 (2012) 。活動報導。民 101 年 7 月 24 日，取自 http://www.tpml.edu.tw/np.asp?ctNode=32902&mp=104021

Object recognition applications provide access to video information, or quickly link to on-going activities / current event systems.

Ideas for Future Application

Design location based treasury hunting games to increase young patrons' satisfactions.

Conclusion

AR helps users experience visual context. Users construct an environment awareness through interacting with AR objects and accessing knowledge from the information context.

The wide spread use of the smartphones provides opportunities for libraries to explore self-learning needs among users.

Q & A

Thank you for your attention

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