

PENNSYLVANIA STATE UNIVERSITY



Richard Tinnell
Penn State University
Masters GIS Program

Augmenting Yosemite's Paper Maps

A conceptual exploration to create a
combined analog and digital map viewing experience

- An unconventional partnership of common information technologies
- A concept that brings paper maps and digital tools together
- Leverages the strengths of both in a powerful combined experience.



Case Study: National Park System Maps

- long cartographic history
- wide variety of maps products
- printed visitor information
- additional navigation aids



Juxtaposition of traditional and digital maps



Paper Maps



Digital Maps

PROS

- Portable
- Foldable
- Shared viewing

- easy mobile use
- localized
- geo-location
- dynamic
- searchable
- navigable
- geo-tagging

CONS

- Poor for mobile use
- non-localized
- out of date
- generalized data
- not suitable for navigation
- secondary info sources may be needed

- small screens
- battery life
- poor sunlight visibility
- not weather resistant
- poor for shared viewing

3 Key Features

- Image recognition
- Augmented Reality
- Data Feeds

What is Augmented Reality?

- Augmented reality is a visual tool with spatial roots. Information is overlaid in the user's field of vision when looking through a camera-equipped device. Augmented Reality can be initiated by cues in the environment or object by using hardware features on a mobile device.
 - GPS identify specific geographic locations
 - camera to scan unique markers
 - specialized sensors to detect the proximity of high tech tags
- Augmented reality has grown from gaming and viewfinder applications into powerful advertising tools and navigational aids.

WIKITU

Exa

wikitude

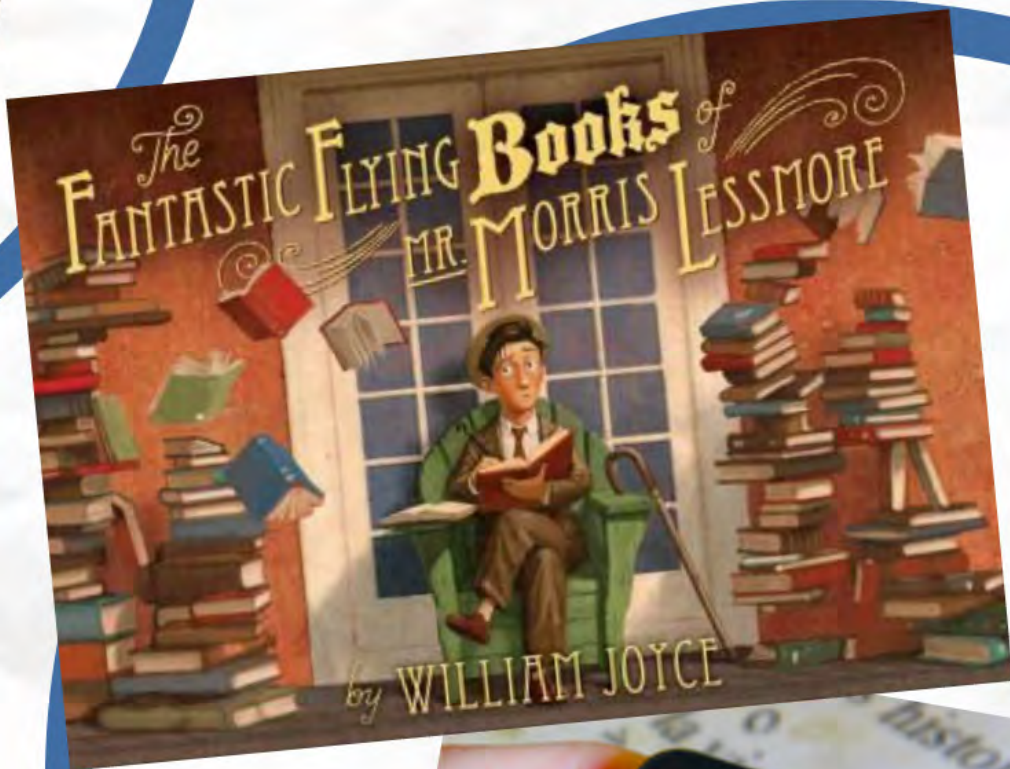


reality?

spatial roots.
ld of vision
ped device.
cues in the

Example of augmenting
an environment





Example of augmenting
an object

Available on iPhone & iPad!

What is a QR Code?

- Two dimensional symbol designed to be read quickly by scanning equipment
- First designed for the Japanese auto manufacturers to identify auto parts on an assembly line
- Can use your smartphone to scan a QR code
- Scanning a QR code can take you to a business's website, a home listing, a coupon deal, a map, etc.



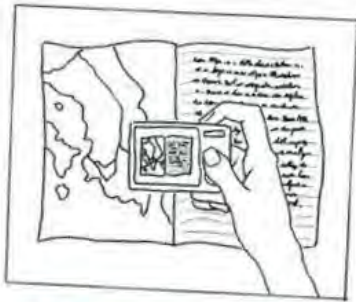
Who is using QR Codes?



Stamen Design has released two projects, Walking Papers and [unclear], which use QR codes to a map area that the

- Scanning a QR code can take you to a business's website, a home listing, a coupon deal, a map, etc.

Who is using QR Codes?



[Take pictures of your notes.](#)

[Upload](#) pages you've photographed.

Stamen Design has released two projects, Walking Papers and Field Papers, which assign a QR code to a map area that the user has selected. After annotating the printed maps with user's notes, the user can scan it back to the website by taking a picture of the map with a phone and uploading it.



Avenza, Inc. released PDF Maps for iOS in 2010, allowing geospatial PDF maps to be viewed in an iOS app. In 2012, Avenza began using QR codes allowing users to download maps from tourist destinations, transit kiosks, and travel magazines.

Study of Related Works

Data Augmenting

- RFID tag/readers (Reilly)
 - Electronic ID tags are added to a paper map
 - Additional information is displayed when scanned with a mobile device capable of detecting the ID tags
- Anoto Positioning Technology (Anoto)
 - Use of an infrared pen to detect a special dot pattern to initiate the display of additional information
- Embedded Media Markers (Liu, Liao, Wilcox, Tonyd, Bee)
 - Integrated into the design and printed as part of the final product
 - Markers tend to be obvious throughout the design



Image Recognition

- Layar:
 - Augment printed materials such as magazine ads or outdoor signage with digital content
- PhotoMap: (Johannes Schöning)
 - Take a photo of any map
 - Manual referencing of imagery by walking to and marking



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Image Recognition

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 - Take a photo of any map
 - Manual referencing of imagery by walking to and marking three points of reference
- Walking Papers and Field Papers (Stamen Design)
 - Implements QR code and embedded media markers to geo-reference a printed map or atlas
- PDF Maps (Avenza)
 - QR codes used to download specific map content in geospatial PDF format to run in Avenza's PDF Map App for iOS or Android



Data Feeds

- Social Media:
- Facebook posts, Foursquare check-ins, and Twitter Feeds
- News Feeds:
- Geonames' RSS to GeorSS Converter
 - Reads RSS feed



Data Feeds

Social Media:

- Facebook posts, Foursquare check-ins, and Twitter Feeds

News Feeds:

- Geonames' RSS to GeoRSS Converter
 - Reads RSS feeds searching for place names that are in the GeoNames database, then encodes location data into the feed
- RSSMapper
 - Application that combines google maps with the GeoNames web services to help their clients provide geo-tagged news feeds to a target audience.



	Common vs Specialized Printing Techniques	Common vs Specialized Hardware	Common vs Specialized User Experience
RFID	COMMON	SPECIALIZED	SPECIALIZED
Anoto	SPECIALIZED	SPECIALIZED	SPECIALIZED
EMM	SPECIALIZED	COMMON	COMMON
Photomap	COMMON	COMMON	SPECIALIZED
WalkingPapers	COMMON	COMMON	SPECIALIZED
FieldPapers	COMMON	COMMON	SPECIALIZED
Avenza PDF Maps	COMMON	COMMON	COMMON
Layar AR	COMMON	COMMON	COMMON
GeoRSS Mapping	N/A	COMMON	COMMON

How is the proposed solution unique?



Avenza PDF
Maps



LAYAR

Similar

- Scanning a QR codes enables interaction with the map

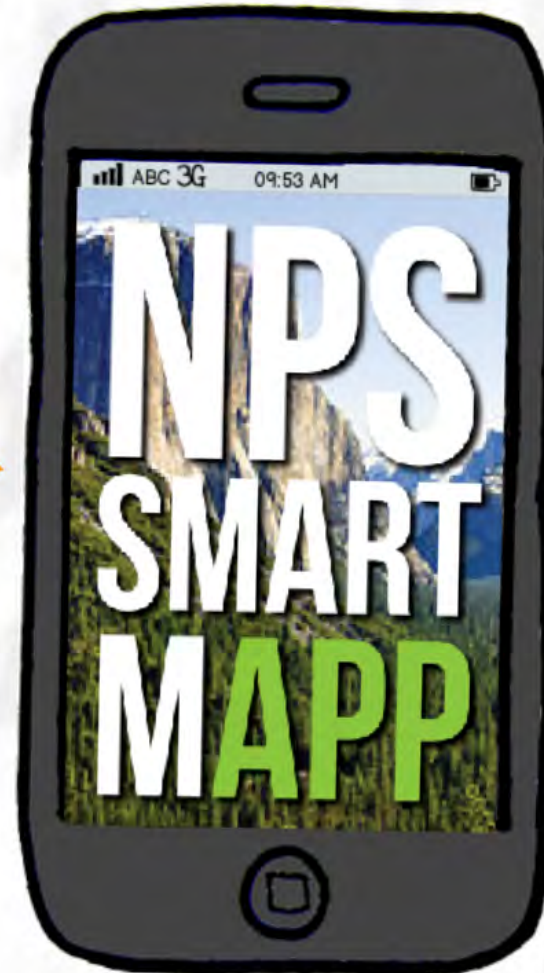
- Augments data in the users field of vision

Unique

- Maps are not downloaded to device
- Augmented data is overlaid on static map product

- Augmented data is not dynamic
- Typically a static pre-programmed marketing message

Designing a User Interface

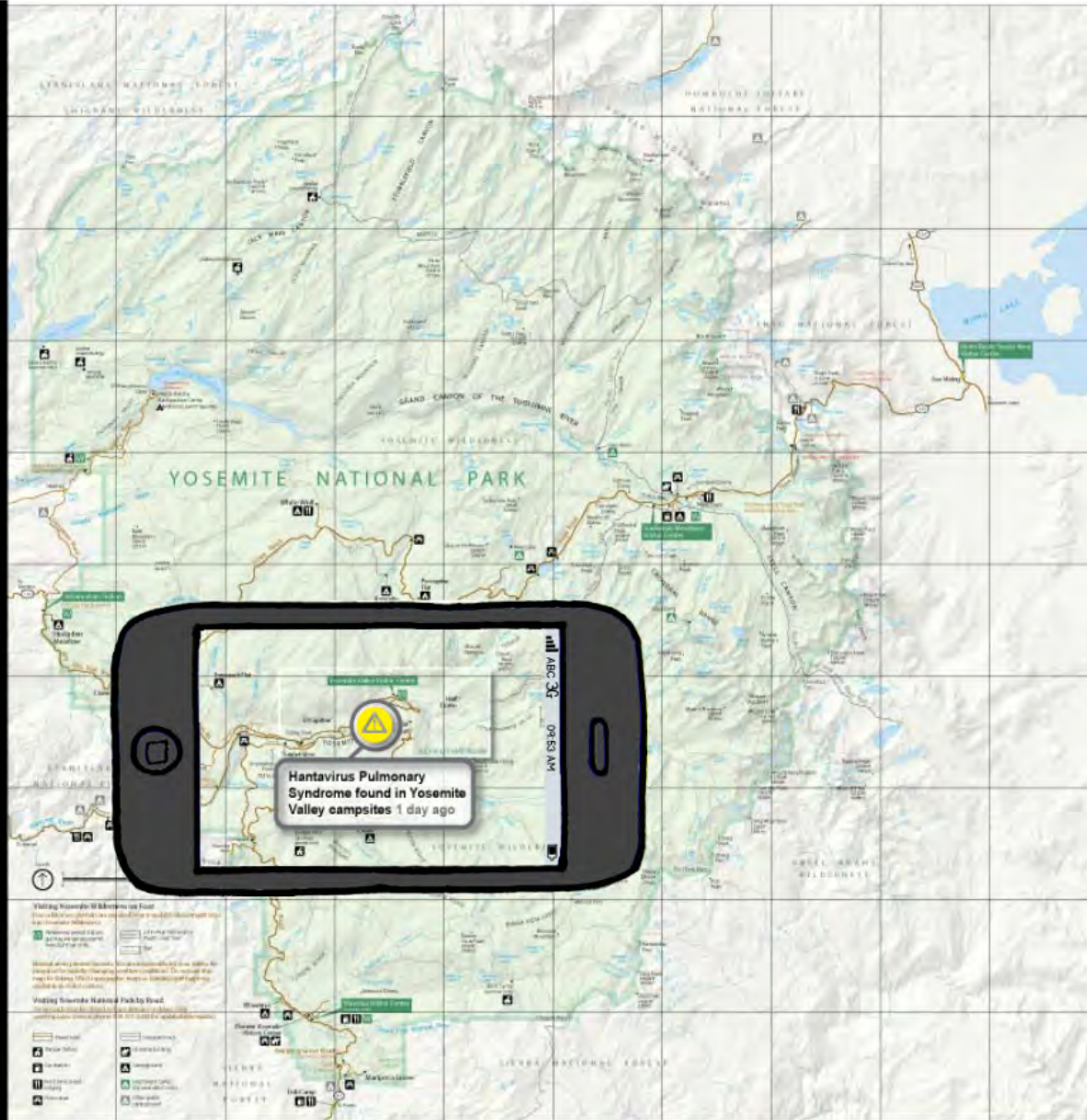




UNITED STATES NATIONAL PARK SERVICE SMART MAPP



Use your smartphone to scan the marker below to download the NPS Smart MAPP app to interact with park maps and get the latest info in the park



Conclusion

How can traditional maps and digital interactive maps be used together?