Developments in Applying Augmented Reality to Flood Risk Education

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Augmenting DFIRMs
ASFPM June 3, 2014

Augmenting DFIRMs
2014 Lessons Learned

• Not all DFIRMs are suitable triggers
• No standard AR platform
• RiskMAP products overlay was marginally meaningful

• Summary: More cool than informative
2014 Vision: Add BFE mark to buildings & link to forcasting
Amazon's Fire Phone recognizes everything around you with 'Firefly'

By Chris Welch on June 18, 2014 02:11 pm
Cede the merry-go-round to the big kids to watch and wait
What I saw

• VR resurgence
• Glass competitors
• Tablet/phone enhancements
• 360° sensors
• Internet of Things
VR Resurgence

The Surprising Joy of Virtual Reality
And why it's about to change the world
AR follows VR enthusiasm
Wearables Projection:

• About 8% of all US workers will use smart glasses in their jobs by 2025.
In just the next two years, 2.6 million workers in the US will be equipped with smart glasses.
Growing list of suppliers
Future wearables

Virtual Reality
By Saad Chandna
Apr 7, 2016 at 11:34 am EST

Samsung has patented smart contact lens technology with embedded display, camera, antenna and sensors; Bidness Etc looks at the device’s possible applications.

TechCrunch
Google Unveils Smart Contact Lens That Lets Diabetics Measure Their Glucose Levels
Tablet/phone enhancements

Enabling Tech: 3D Depth Sensing
Tablet/phone enhancements

WORLD'S FIRST
PROJECT TANGO
DEVICE FOR
CONSUMERS

LAUNCHING SUMMER 2016
www.Lenovo.com/ProjectTango
360° capture

SAMSUNG'S GEAR 360 CAMERA
THE MOBILE 360-DEGREE CAMERA IS A PORTABLE RECORDING ORB
By Dave Gershgorn  Posted Yesterday at 5.15pm

Nokia OZO

LYTRO IMMERGE
The world’s first professional Light Field solution for cinematic VR, providing lifelike presence for live action VR through six degrees of freedom.
Internet of Things

• Everyday objects have network connectivity, allowing them to send and receive data.
Add sensors to internet of things and see performance and warnings
Flood Connectivity
National Flood Interoperability Experiment (NFIE) building a Real-time National Flood Model

- Dynamic downscaling of NWS River Forecasts to NHDPlus catchments
- Catchment increase from 4,500 to 3,000,000
Onsite & Remote Walk Thru-s
Thank You

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Augmented Reality for Floods:
Handheld visualization of base flood elevation lines

Acton H. Gorton
Why Use Augmented Reality?

Infrequently used information is more understandable

Complicated tasks are easier to complete

Reveal hidden information with x-ray vision
Why Use Augmented Reality?

“The single most compelling reason to invest in enterprise Augmented Reality is to improve the productivity of people while on the job. Workplace performance is a broad concept that can be measured in many ways, and the impacts of a new user interface providing contextually sensitive information are new to most technology managers”

Why Use Augmented Reality?

“AR might give architects ‘X-ray vision’ inside a building, showing where the pipes, electric lines, and structural supports are inside the walls.”

— Feiner et al., 1995
Earliest Practical Use of Augmented Reality

Why >> Inspiration >> Goals >> Challenges >> Tech Stack >> Results

Tom Caudell, Boeing, 1990
Inspiration

Point of Interest Applications

Why >> Inspiration >> Goals >> Challenges >> Tech Stack >> Results
Inspiration

Point of Interest Applications

Why >> Inspiration >> Goals >> Challenges >> Tech Stack >> Results
Inspiration

Mapping Applications

Screen shots from Map Fan App

Why >> Inspiration >> Goals >> Challenges >> Tech Stack >> Results
Goals

- First Person Perspective
- Live / On-Demand Information Feed
- Situational Awareness
- Natural Exploration of Environment
- Low Barrier of Entry to Complex Information
- Not even “Point and Click” … just “Point”
Challenges

• Availability of Detailed Flood Information
  • Digital flood maps are not always available

• Converting Flood Maps to Compatible Format
  • Converting various map projections to UTM for x, y, z plotting decreases accuracy

• Geo Location and Spatial Accuracy
  • The reliance on a clear GPRS signal causes alignment issues

• Problems inherent to current Augmented Reality (Registration, Masking)
  • Flood lines are not always perfectly aligned to the real world
  • Flood lines are not blocked by objects closer to the user
Tech Stack

Why >> Inspiration >> Goals >> Challenges >> Tech Stack >> Results
Tech Stack

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Download the NFHL Flood Hazard Maps

Load raw data and save to the GeoJSON format

Load GeoJSON data into a hosted online database
Tech Stack

Client

Client written with C# on Game Platform

Installed onto Compatible Smartphone Platforms

Why >> Inspiration >> Goals >> Challenges >> Tech Stack >> Results
Tech Stack

Original Data (NAD 83)

UTM

Unity X, Y, Z World Space

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Results

Working within the confines of existing technologies:

▲ Data is successfully parsed

▲ Base Flood Elevation lines draw on screen

〇 Lines are accurately placed