

ArcGIS Runtime Using Augmented Reality

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ESRI EUROPEAN DEVELOPER SUMMIT



Agenda

- Introduction to Augmented Reality (AR)
- Support within ArcGIS Runtime
- AR Application Types
- Considerations when building AR applications

Introduction

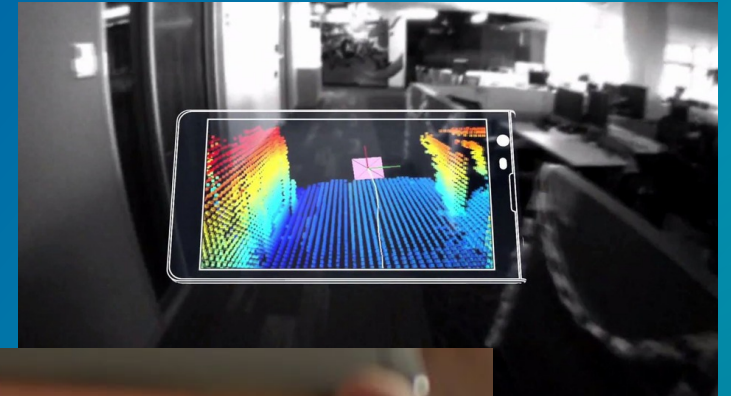
The background features a vibrant, abstract design. On the right side, there are diagonal stripes in shades of green, yellow, and pink. A map of Europe is visible, rendered in a light blue color. The overall color palette is dominated by various shades of blue, green, and yellow, creating a modern and dynamic aesthetic.

Introduction to the Terminology

- Many terms often talked about
 - Augmented Reality
 - Virtual Reality
 - Mixed Reality
 - eXtended Reality

AR - Augmented Reality

- Interacting with outside world



Standard AR

VR - Virtual Reality

- Being there



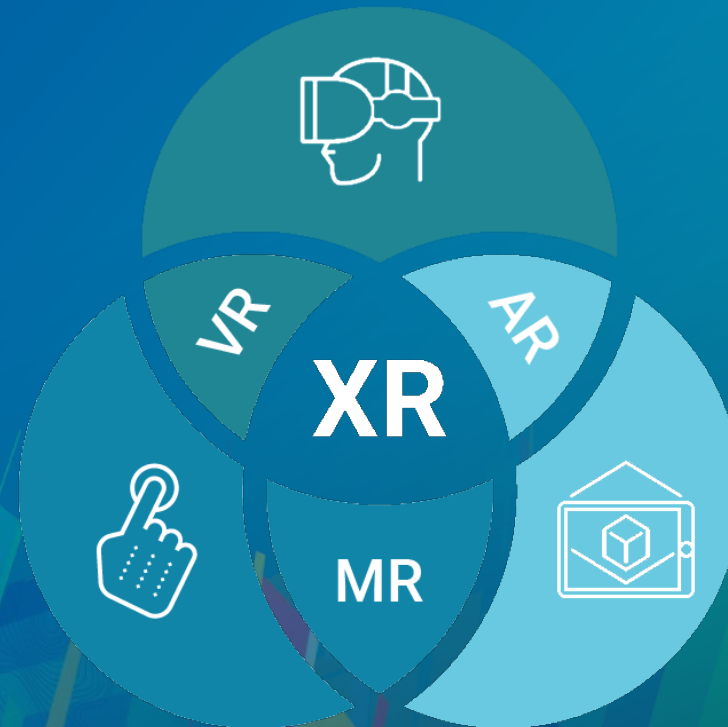
MR – Mixed Reality

- Mixed Presence
 - Microsoft Hololens
 - Magic Leap

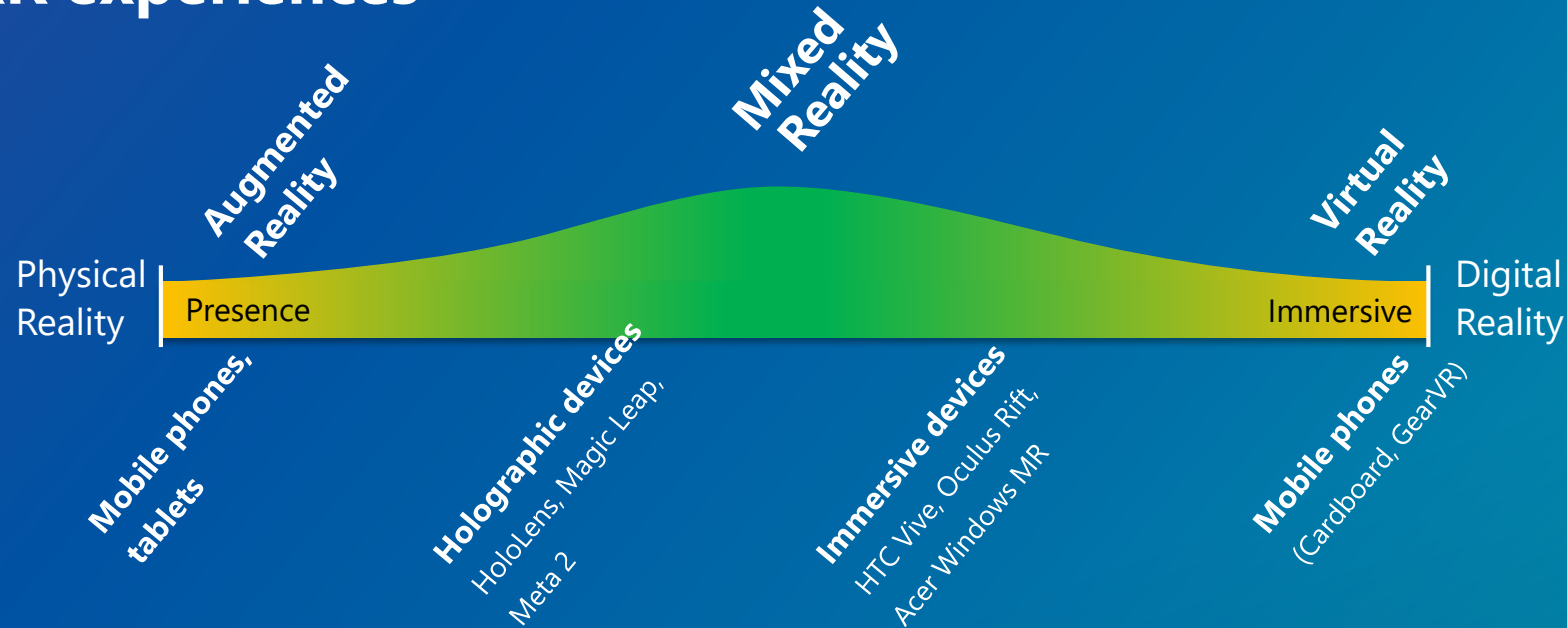


XR – eXtended Reality

- Spectrum of virtual, augmented and mixed reality
- Breakthroughs
 - VR with Oculus Rift and PlayStation VR
 - AR with Pokemon GO
 - MR with Microsoft HoloLens
- Terminologies are still forming



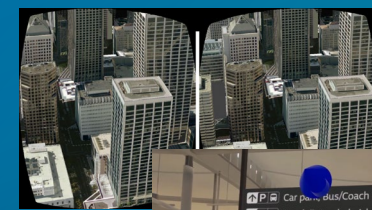
Targeting XR experiences



- Many organizations seek to use their live and local authoritative spatial content and analytics across the XR spectrum
- Critical needs for usability
 - Virtual reality needs high fidelity and responsive performance
 - Augmented reality needs positional accuracy
 - Must be cost effective

XR Market Trends in GIS

- AR/MR
 - - Field operations, resource management, planning
 - Handheld
 - Use existing mobile devices
 - Simple enhancements to existing workflows
 - Head-mounted
 - In the field, full/world scale; In the office, table top
 - Hands-free for rapid response
 - Most immersive, collaborative 3D experience possible
- VR
 - Education, planning, training
 - Mobile
 - Desktop

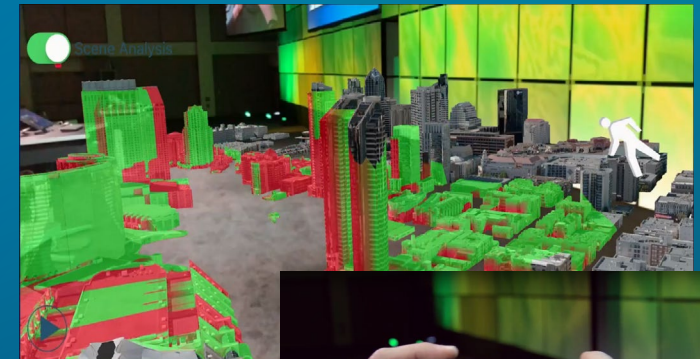
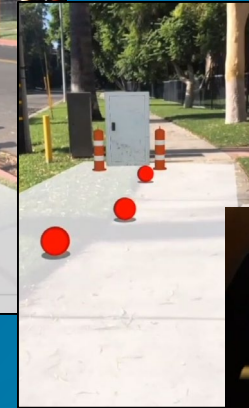


AR With ArcGIS Runtime

The background features a vibrant blue gradient. On the right side, there is a complex, layered geometric design with various colors including green, yellow, pink, and blue. This design includes overlapping lines, polygons, and a faint map outline of a region, possibly representing a geographic area. The overall aesthetic is modern and tech-oriented.

AR with ArcGIS Runtime

- Enhanced existing ArcGIS Runtime SDKs
 - Integrated with the ArcGIS Platform
 - 3D already supported on all platforms/devices
 - Native apps able to access sensors/controllers
- Available for production use with Update 6 (100.6)
 - Augmented reality for mobile platforms only
 - Available in Toolkits for .NET, iOS, Android, Qt
 - Not for VR or MR



ArcGIS Runtime AR Developer Experience

- Enhancements to existing Runtime API
 - Visual elements (stars, atmosphere)
 - Background visibility
 - Field of view control
- Additional toolkit components
 - Open source
 - Allows you to control the device runtime integration
 - Flexibility as device market continues to mature

Display scenes in augmented reality | developers.arcgis.com/net/latest/android/guide/display-scenes-in-augmented-reality.htm

ArcGIS Runtime / .NET SDK / 100.6.0 / Guide

Home Guide API Reference Sample Code Support

- > Get started
- > Fundamentals
- > Work with maps (2D)
- ▼ Work with scenes (3D)
 - Display a scene
 - Build a new scene
 - Navigate a scene view
 - Add features and graphics to a scene view
 - Follow a graphic in a scene view
 - Display scenes in augmented reality**
 - > Offline with maps and scenes
 - > Display information
 - > Search
 - > Edit features
 - > Route and get directions
 - > Perform analysis
 - > Use the cloud and servers
 - > Design considerations

Display scenes in augmented reality

Viewing: WPF | UWP | **Android** | iOS | Forms

ArcGIS Runtime supports **three augmented reality (AR) patterns** through a combination of low-level API features and components in the ArcGIS Runtime toolkits referred to as AR Toolkit. AR Toolkit is open source, so you can use it as is or modify its components to meet your needs. You can keep your changes proprietary or share them with the open source community.

In addition to AR Toolkit features, you'll need to use the following ArcGIS Runtime features when creating AR experiences:

- Scene view space effect control – Disable rendering the 'starry sky' effect to display scene content on top of a camera feed.
- Scene view atmosphere effect control – Disable rendering the atmosphere effect to avoid obscuring rendered content.
- Surface transparency – Hide the ground when rendering world-scale AR because the camera feed, not the basemap, is providing context for your GIS content. You can use a semitransparent surface to calibrate your position in world-scale AR.
- Scene view navigation constraint – By default, scene views constrain the camera to being above the ground. You should disable this feature to enable users to use world-scale AR underground (for example, while in a basement). The navigation constraint will interfere with tabletop AR if the user attempts to look at the scene from below.

Enable your app for AR using AR Toolkit

1 | Install AR Toolkit using the installation instructions provided within

In this topic

- Enable your app for AR using AR Toolkit
- Understand Common AR Patterns
- Add tabletop AR to your app
- Add flyover AR to your app
- Add world-scale AR to your app
- Visualize planes and features detected by ARKit and ARCore

We'd love to hear your feedback

Was this page helpful?

Yes No

Getting Started Demo

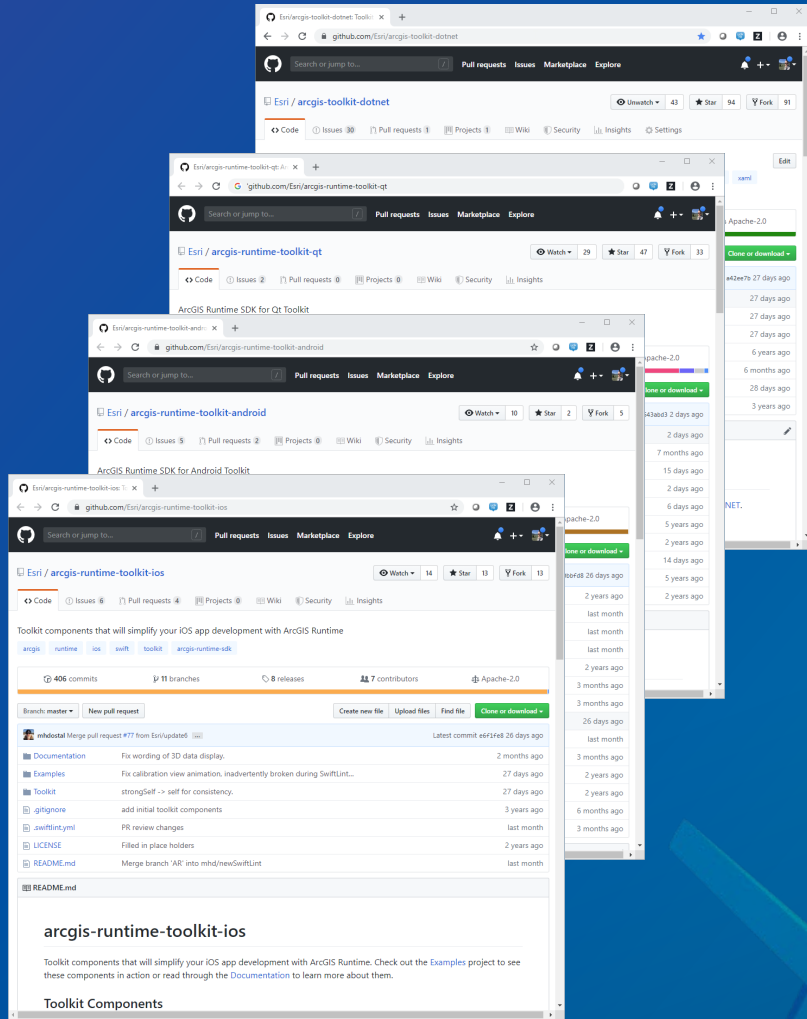
Mike

Guide Doc

The screenshot shows a web browser window displaying the ArcGIS Runtime .NET SDK Guide. The page title is "Display scenes in augmented reality". The navigation menu includes "Home", "Guide", "API Reference", "Sample Code", and "Support". The left sidebar contains a table of contents with items like "Get started", "Fundamentals", "Work with maps (2D)", "Work with scenes (3D)", "Display a scene", "Build a new scene", "Navigate a scene view", "Add features and graphics to a scene view", "Follow a graphic in a scene view", "Display scenes in augmented reality", "Offline with maps and scenes", "Display information", "Search", "Edit features", "Route and get directions", "Perform analysis", "Use the cloud and servers", and "Design considerations". The main content area has the heading "Display scenes in augmented reality" and sub-headings for "Viewing: WPF | UWP | Android | iOS | Forms", "Enable your app for AR using AR Toolkit", and "In this topic". The "In this topic" section lists links for "Enable your app for AR using AR Toolkit", "Understand Common AR Patterns", "Add tabletop AR to your app", "Add flyover AR to your app", "Add world-scale AR to your app", and "Visualize planes and features detected by ARKit and ARCore". A feedback form asks "We'd love to hear your feedback" with a "Was this page helpful?" question and "Yes" and "No" buttons.

- Guide topic in doc for each SDK
 - Android | iOS | .NET | Qt
- Overview
- Toolkit information
- API
- Platform settings for privacy and permissions
- Patterns
 - Tabletop
 - Flyover
 - World-scale
- Considerations

Toolkits



- <https://github.com/Esri/arcgis-toolkit-dotnet>
- <https://github.com/Esri/arcgis-runtime-toolkit-qt>
- <https://github.com/Esri/arcgis-runtime-toolkit-ios>
- <https://github.com/Esri/arcgis-runtime-toolkit-android>

.NET SDK – Project Templates

The screenshot shows the 'Manage Extensions' window in Visual Studio. The search bar at the top right contains the text 'AR'. The left sidebar shows a tree view with 'Online' expanded, and 'Visual Studio Marketplace' selected, with 'Search Results' highlighted. The main area displays a list of extensions sorted by 'Relevance'. The top extension is 'ArcGIS Runtime SDK for .NET - AR Templates' by Esri, with a 'Download' button. Below it are 'Arduino IDE for Visual Studio' (with a 'Trial' button), 'ArrayPlotter', 'ArmDot' (with a 'Trial' button), 'Visual Studio IntelliCode' (with a green checkmark), and 'Smart Command Line Arguments'. The right sidebar shows details for the selected extension: 'Created By: Esri', 'Version: 1.0.0', 'Downloads: 56', 'Pricing Category: Free', 'Rating: ★★★★★ (1 Vote)', and links for 'More Information' and 'Report Extension to Microsoft'. At the bottom right, there are sections for 'Scheduled For Install:', 'Scheduled For Update:', and 'Scheduled For Uninstall:', all showing 'None'. A 'Close' button is at the bottom right of the window.

Manage Extensions

Sort by: Relevance

AR

ArcGIS Runtime SDK for .NET - AR Templates Download
Project templates for building Augmented Reality apps for Android and iOS with Xamarin and ArcGIS Runtime SDK for .NET.

Arduino IDE for Visual Studio Trial
A fully compatible Arduino Edit, Build, Deploy and Debug tool. All Arduino IDE versions are supported. This is an admin install for all users. (optional Arduino deb...

ArrayPlotter
Array visualisation within the debugger for C#/C++

ArmDot Trial
A developer tool to obfuscate and protect .Net code with support of serial keys.

Visual Studio IntelliCode ✓
AI-assisted developer productivity
Microsoft

Smart Command Line Arguments
A Visual Studio Extension which aims to provide a better UI to manage your

1 2 3 4 5 ▶

Created By: Esri
Version: 1.0.0
Downloads: 56
Pricing Category: Free
Rating: ★★★★★ (1 Vote)
[More Information](#)
[Report Extension to Microsoft](#)

Scheduled For Install: None
Scheduled For Update: None
Scheduled For Uninstall: None

Change your settings for Extensions

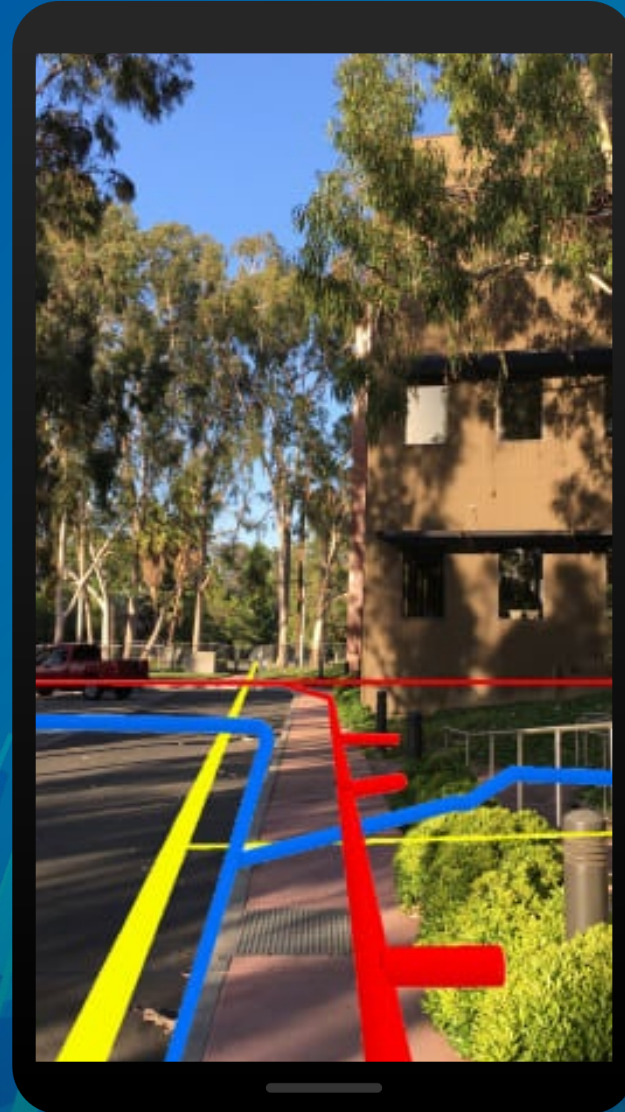
Close

The background is a vibrant blue gradient. On the right side, there is a complex, layered geometric design consisting of various colored shapes (green, yellow, pink, blue) and patterns (dots, lines, and a map outline). In the top left corner, there are several overlapping, semi-transparent rectangular shapes in shades of green, yellow, and pink, some with thin white lines.

Types of AR Applications

3 Categories of Apps

- Table Top
 - Locks the scene to a surface
- Flyover
 - Intuitive way to navigate a scene
- World Scale
 - Overlays scene on the real world



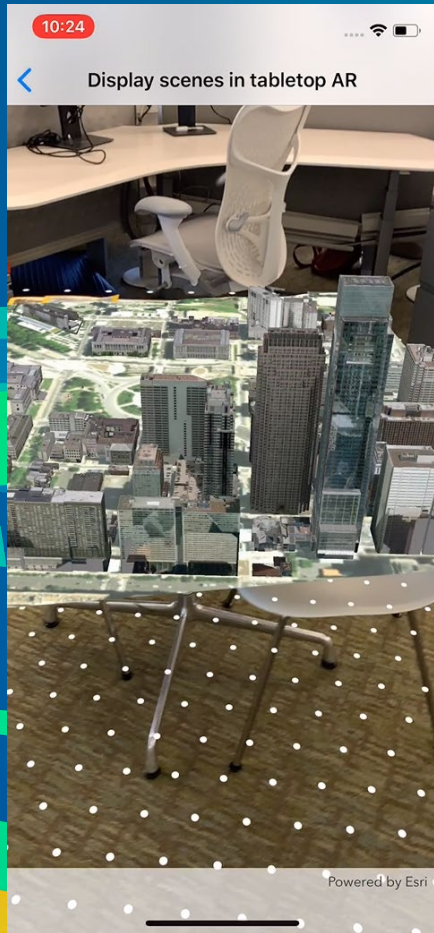


Table Top Demo

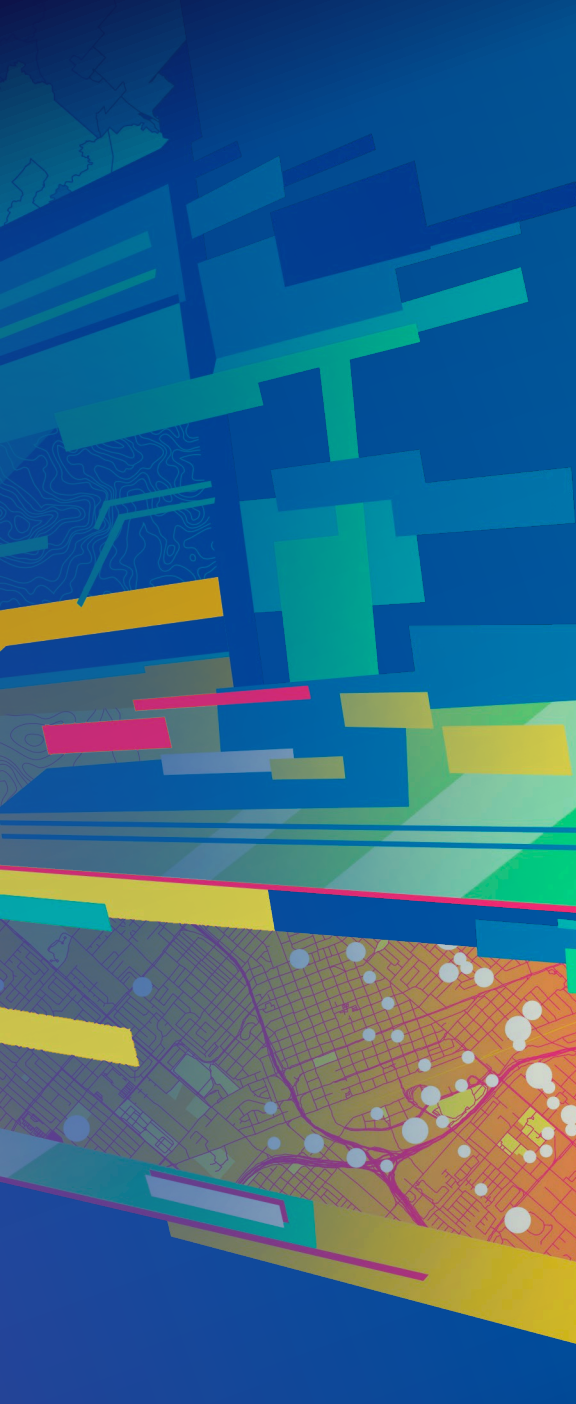
Mike

Table Top Use Cases

- Design
- Planning
- Education

- Good tool to promote collaboration





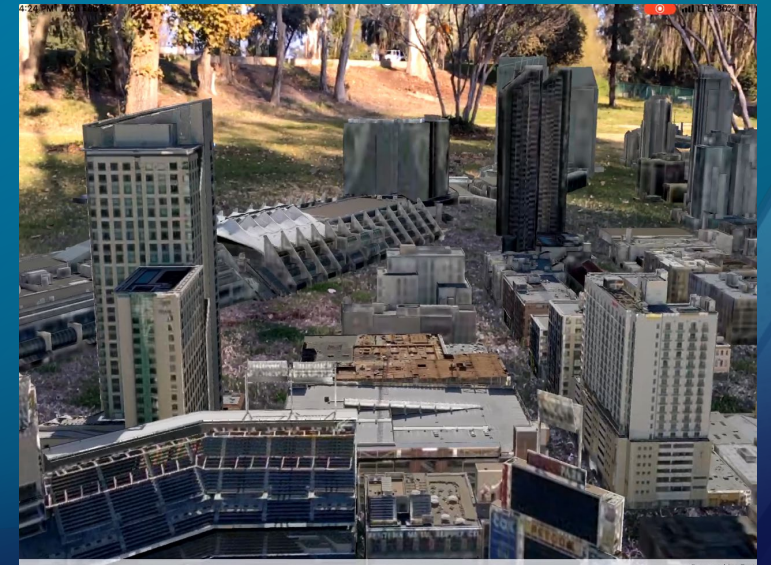
Fly Over Demo

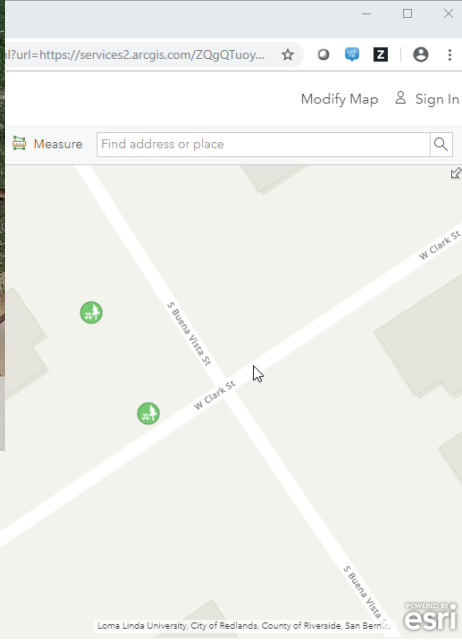
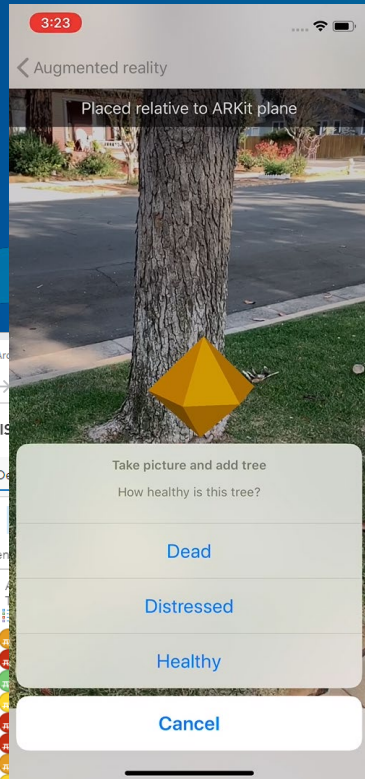
Mike

Fly Over App Use Cases

- Design
- Planning
- Education

- Provides an immersive navigation experience for an overall better experience



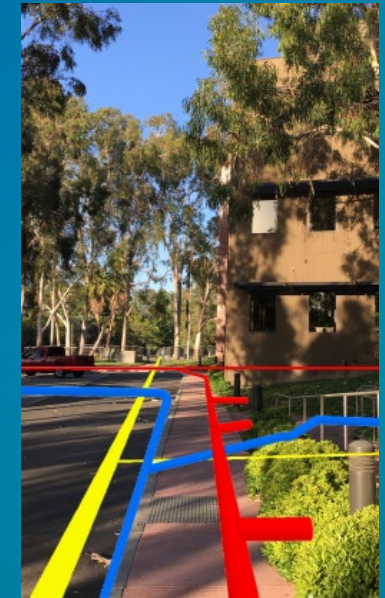
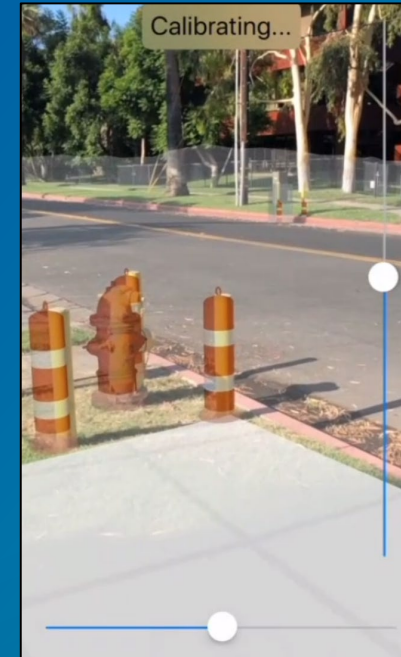


World Scale AR Demo

Mike

Full Scale AR Use Cases

- Field Operations
 - Asset location and inspection
- Situational Awareness
- Onsite visualization of proposed plans
- Routing and navigation





Development Considerations

Considerations

- Your user's ability and expectations
- Device capabilities
 - AR sensors
 - Positional accuracy
- Data accuracy in 2D and 3D space

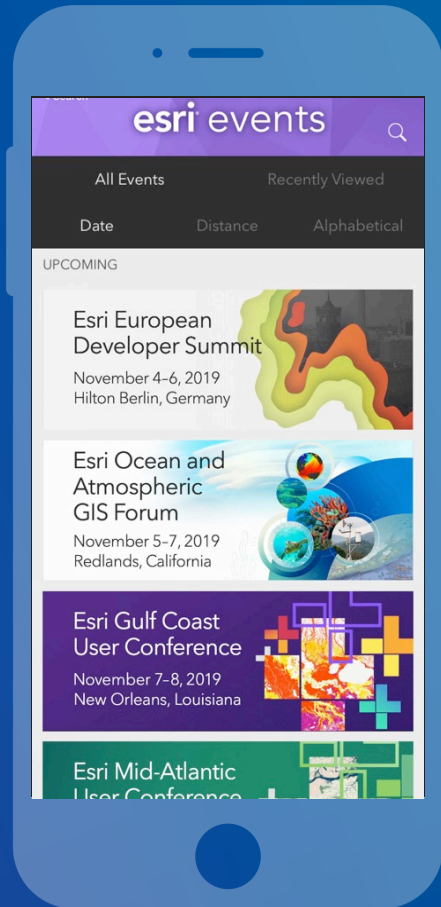
Positional Accuracy

- Local device versus Global Reference System
 - Global Positional Accuracy:
 - GPS: ~10m, outside-only
 - Wi-Fi: ~2m
 - Beacon: ~1m
 - RFID: ~1m
- Data drift away from local origin
- Perceived accuracy of overlaid data

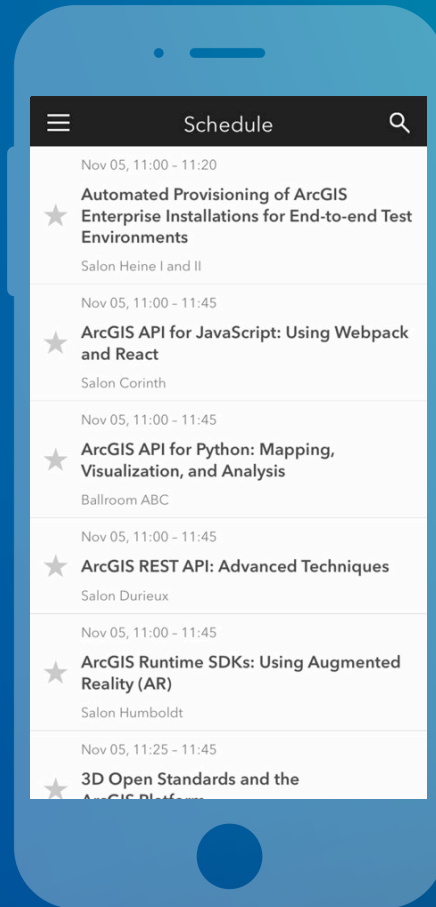


Please Take Our Survey on the App

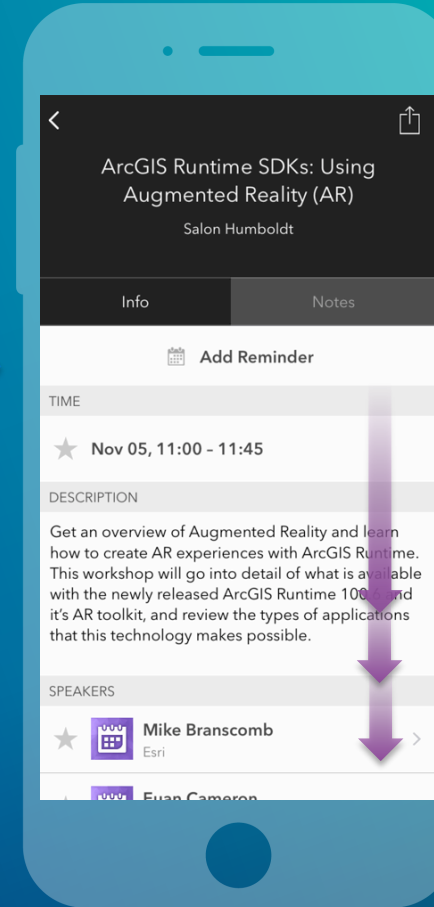
Download the Esri Events app and find your event



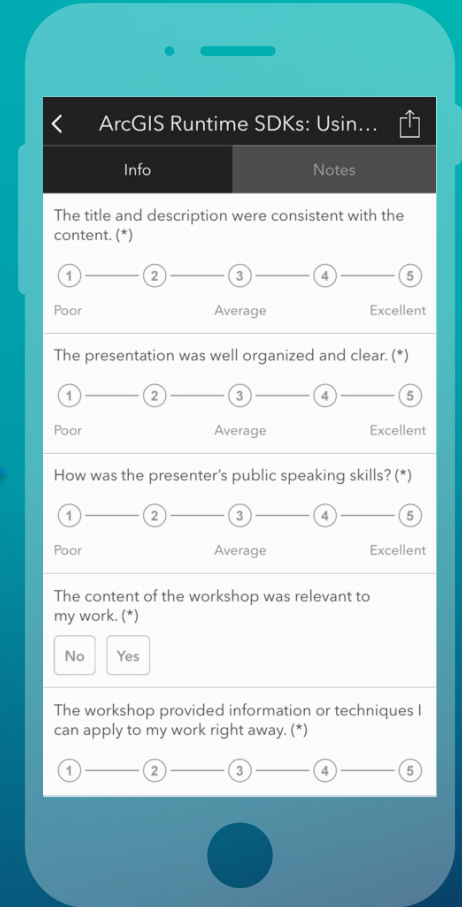
Select the session you attended



Scroll down to find the feedback section



Complete answers and select "Submit"



The background features a vibrant, abstract design. On the right side, there are several parallel, diagonal stripes in shades of teal, green, and yellow. These stripes are layered and have varying opacities, creating a sense of depth. In the lower right corner, a faint, stylized map of Europe is visible, rendered in a light teal color. The overall aesthetic is modern and dynamic.

Questions?



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