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
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
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
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

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 ‘stay 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 semi-transparent surface to calibrate your position in world-scale AR.
- Scene view navigation constraint – By default, scene views constrain the camera to be 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.

Getting Started Demo

Mike
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
.NET SDK – Project Templates
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
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