

Compiled by [Zixuan Kevin Fan](#)  
[fanz555@newschool.edu](mailto:fanz555@newschool.edu)  
[kfan.io](http://kfan.io)

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## **Summary**

### **I. AR AND VR ARE ALL ABOUT EXPERIENCES**

XR (Mixed Reality) = AR + VR

XR are all about the experience. The reason we are going for an alternative way to view the world is because we either want to enrich our current state of reality or want to create an isolated environment of brand-new experience. We've seen a lot of XR applications that didn't meet either of these two criteria. The reason the majority of us are going to accept these new forms of expressions is not because whether it is new or cool to play with. The marginal enhancement of experience we've seen so far did not prove XR to be a compelling candidate to be the next big thing.

### **II. Unity is a killer platform, but it still depends on developers to solve the problems**

Unity is the future of game engine, or as they defined, a creation engine. The whole ecosystem was already established and proven to be successful. In this conference, I've seen gaming applications built with Unity, award-winning movies made with Unity and various experiences enabled by Unity. Unity offers a cross-platform development environment that is making the whole industry converge and collaborate again to tackle the same problem. As we've seen in all other successful platforms, the primitives of technologies are there; and it is just a matter of time for the community to come up with compelling solutions to the reality to XR transition.

### **III. The answers to XR reside at the intersection of hardware and software**

I believe one of the main reasons people are not adopting XR as fast as we expected is because of the constraints of hardware we have right now. No one wants to sacrifice the huge inconvenience of having to carry phone/headset around just to enjoy a tiny bit of improvement in experience. Until the day we invented an non-intrusive auxiliary device to expand the reality, the big door of mass adoption of XR will never be opened.

=> The current difficulty is that XR requires intensive computing power to render complex graphics and compute logics. That is the reason why we need to rely on inserting our mobile device into a VR headset or use its camera as the canvas for AR. Wireless endeavours have been made by numerous companies, the most recently renowned one is Google Glass. However, Google Glass still lack the non-intrusive prerequisite of a real XR experience. It was expensive and too big/obvious as an extension of body. The current bottleneck is that we still haven't been able to achieve the harmony of portability/unobtrusiveness and excellent imagery rendering. Until then all these "useless" applications will start to make sense, such as metadata integration, navigation and virtual characters.

***"People who are really serious about software should make their own hardware."***

- Alan Kay, 1982

#### **IV. An immersive XR experience requires environmental inputs and user interactions**

To solve the low retention rate in XR applications, one thing we have to pay attention to is the lack of interaction in these applications. Yes you can build your own world or follow the storyline. But the amount of variations within these applications are still limited and sometimes are single-digits. The lack of exploration triggered by environmental inputs (sound, light, vibration, geo data) and user inputs (user events, proximity) does not reward people to spend more time within the application nor return to it.

One little highlight of all the demos I've seen at the expo or workshops is a couple of seconds in Google's ARCore demo video. The AR lion character got scared when user turn off the light. It was this single interaction that made me want to explore much beyond the predefined AR world and temporarily forgot about the laggy rendering of images.



You can find a video that has its contents [here](#).

## Keynote ➡ Oct 3

### Overview

*Bringing movie-like productions to every developers*

1. Hosted by Chief Marketing Officer (CMO) [Clive Downie](#)
2. Unity's mission
  - a. Democratize development
  - b. Solve hard problems
  - c. Enable success

### Unity 2017.2

#### Improvements

1. Quality & Stability
2. Performance
3. Graphics
4. Artists & Designer Tools
5. Platforms

### Creative prototyping

#### Details and Demo

1. Unity Asset Store
2. [Post processing stack](#)
3. [Realtime area lights/ Volumetric fog](#)
4. [Cinemachine](#)
5. Timeline

### Collaboration with Autodesk

#### Demo

1. Making Unity the first creation engine to have source code access to Autodesk FBX SDK
2. Enables assets sharing between Unity and Autodesk Maya and 3ds Max

### 2D Creation Tools and Workflows

#### Demo

1. Tilemap
2. Cinemachine for 2D, codeless solution for intelligent and automatic composition and tracking
3. New 2D specific feature, ex. Orthographic projection

### Special Guest: [Neill Blomkamp](#)

1. Created by Academy Award-nominated director, [Neill Blomkamp](#) and his team at [OATS](#), the film showcases how Unity tools can enable photorealistic, immersive worlds
2. Demoing short film creation, [ADAM: The Mirror](#)

## Performance Improvements

### Details

1. CTO, Joachim Ante showcased [Top Eleven](#) by [Nordeus](#)
2. C# Job System: a new high performance multithreaded system, that will make it possible for your game to fully utilise the multi core processors available today without heavy programming headache

## Unity Awards 2017

### [Full list](#)

## Talks / Workshops Oct 4

### I. Google blocks: 3D blocks for the rest of us

[Official website](#)

#### Features

1. [Low poly](#)
2. Visually consistent
3. Free

#### Usage

1. [Block object store](#)
  - a. Obj + mtl formats
  - b. All models share 26 materials/colors => consistency
2. 3D print block objects
3. [Google Daydream](#): Google's VR headset



## II. Facebook + Unity: Optimized for Growth

*Games for diverse group of people, even non-hardcore gamers*



### Intro

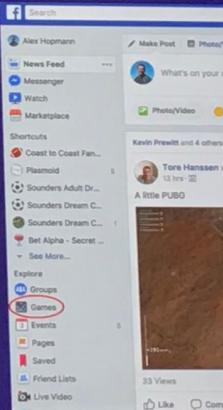
1. Discover (what your friends are playing), play, watch (more people are watching the gameplay on Facebook than playing), share (enlarge the community)
2. [Facebook Gameroom](#)
3. >100 native games shipped last year on Gameroom
4. Diverse style of titles: big studios & indie, 2D, visual...

### Features

1. Large downloads
2. Premium games & gifting
3. Fullscreen
4. Download native games from Facebook Gameroom
5. Live game streaming tab
6. Games feed
7. Games on Facebook.com
8. Integration with Graph API to query public profiles, friends
9. Facebook analytics: Log gameplays in your game
  - a. AppEvent, divided by demographics
  - b. Parameters: achieved level, customized fields
10. Monetization
  - a. In-app purchase
  - b. Higher revenue than mobile, web games
  - c. Better gameplay in native environment
11. GameStats: bring verified context from your game into Facebook groups
12. Game communities: groups, page...
  - a. Just added "video games" category to the Group Type
  - b. Find players features as customized post

## Gameroom Progress Since Last Year

- Large downloads
- Premium games & gifting
- Full screen
- Live Game Streaming tab
- Games Feed
- Games on Facebook.com



### Contacts



### III. Rick and Morty: Virtual Rick-ality' Postmortem: VR Lessons \*burrrp\*

#### Learned

[Official Website](#)

Made by [Owlchemy](#)



#### Teleportation

1. Existing (point-based) teleportation isn't great
  - a. Teleport anywhere = major issues
  - b. People stop moving
    - i. Fatigue
    - ii. Less fun
  - c. If moving around physically
    - i. Can't get yourself into bad situations
    - ii. Edge of bound issues
2. Zone-based teleportation
  - a. Look and hit button
  - b. Easy
  - c. Encourages movement
  - d. Discrete rooms to design

#### Layout Challenge

1. Only 180deg interactions
2. No disorientation

#### Portals

1. Change of environment
2. Fallbacks from the portal

## Floor Problems

1. Physically tiring
2. Use levitation system to grab stuff from floor

## IV. So You Think You Can Augmented Reality?

### Basics

#### ARKit

1. Unity [ARKit plugin](#), enables C# running natively on unity

#### ARCore

1. Developer preview apk available from Google
2. [Doc](#)

### Cross platform frameworks

1. Common interface to AR platform
2. Write once and deploy everywhere
3. Experimental: expect changes
4. Will be available on Github

#### ARInterface

1. Start/Stop Service
2. Pose
3. Plane callbacks
4. Light estimation
5. Point cloud
6. Camera syncing between Unity and device camera

### Scale

1. Do not scale content
2. Some content cannot be moved
3. Option 1: scale the camera
  - a. All positional data coming from device
4. Option 2: use multiple camera
  - a. One for the AR camera
  - b. One (more) for the content

### Shared experience

#### Shared Multiplayer

1. Start with existing “Tanks Networking Demo” project
2. Remove camera rig
3. Change flow to add “ARSetupScene” before lobby
4. Sync scene location
5. ARSetupScene creates camera with right scale and offset
6. Fit to scale table

Multiplayer tank



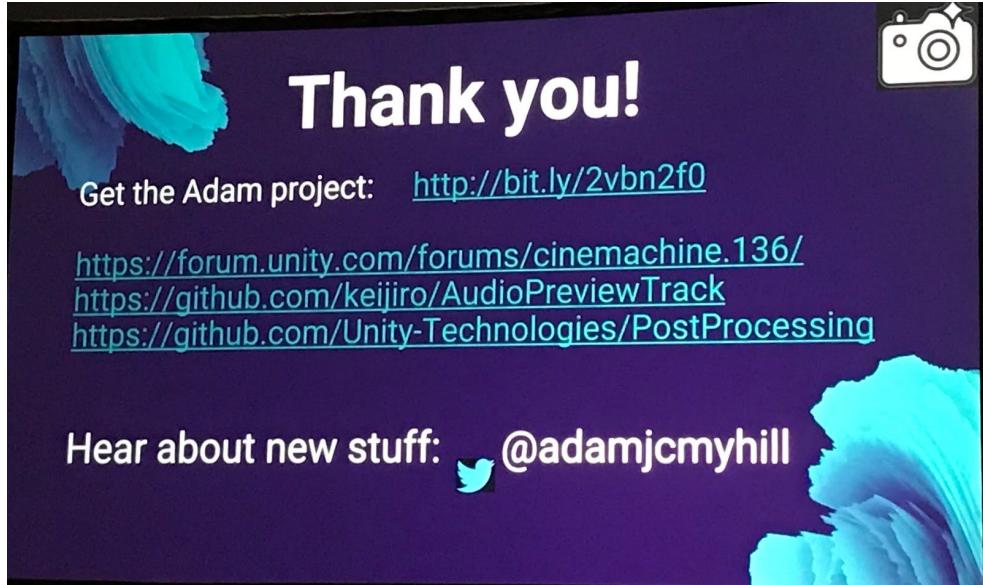
## Summary

### Summary

- ARKit and ARCore will provide a ready made AR audience for your apps and games
- You can tap into the potential of this multi-platform market by using Unity as your authoring tool
- We provide tools to quickly iterate on your AR content right in the Unity Editor
- We provide higher level components, examples and utilities to help you achieve your vision

Unite  
Austin  
2017

## V. Cinemachine For Games And Interactive: 1st Person, 2d, 3rd Person And Beyond Goodies



## VI. Get To Know The Assets Store: Accelerate Your Development And Earn Income Notable Assets

1. Inspector and Serializer: [Odin](#)
2. Interactive gameplay tool: [PlayMaker](#)
3. Terrain building tools: [Aquas](#), [Gaia](#), [Enviro](#)
4. Custom Shaders: [Shader Forge](#), [Shader Sandwich](#), [Amplify Shader](#)

## VII. ARCore: Augmented Reality at Android Scale

[Official website](#)

[Before as Tango](#)

### How AR and VR fit together

1. AR + VR = Immersive computing
2. VR can take you anywhere
3. AR can bring anything to you
4. Immersive computing is the future

## Google has been developing AR technology since 2014, with Tango

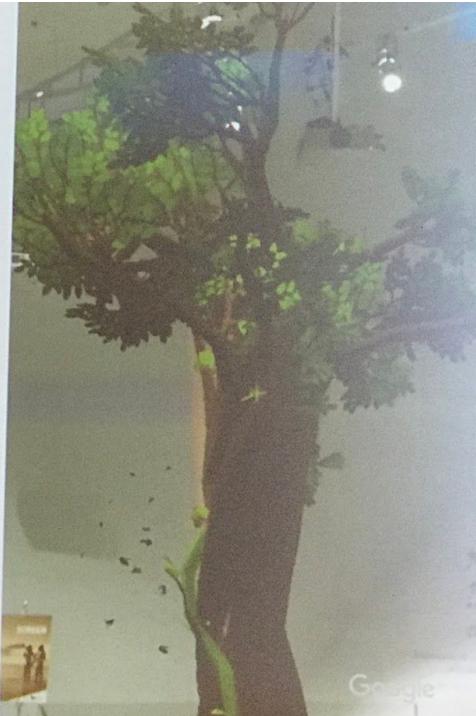
Tango uses extra sensors to see the world in 3D



It maps indoor spaces with high accuracy

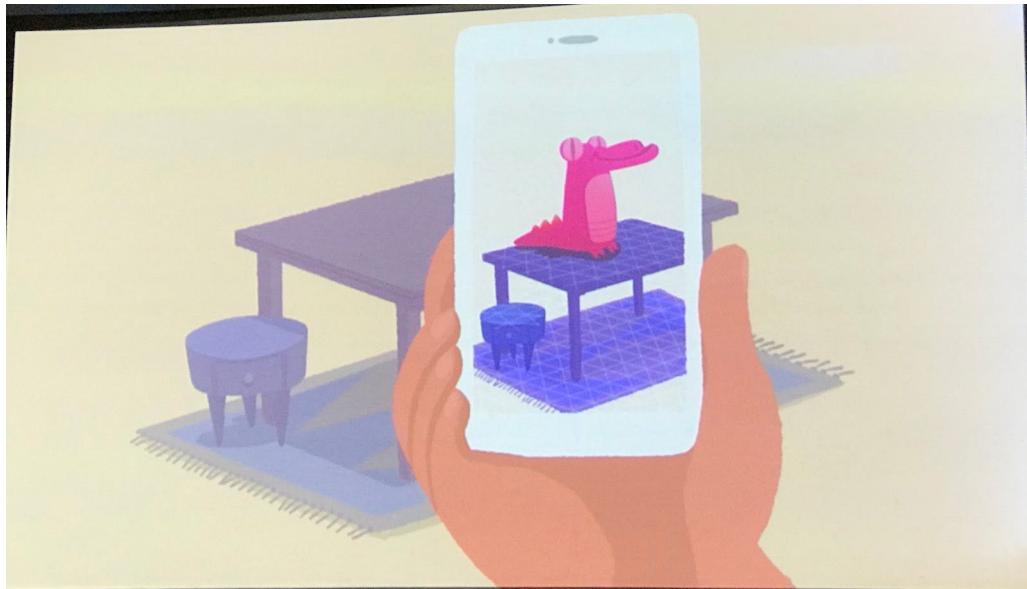


Enables virtual objects to behave as if they were real



### Core Concepts

1. Motion tracking
  - a. Concurrent odometry and mapping (COM)
2. Environmental Understanding
  - a. Any polygon can be seen at non-infinite plane



3. Light estimation
4. Running on Android 1.0 Nougat and above

## **ARCore Development Platforms**

1. Unity, C#
  - a. [Setup](#)
2. Android IDE, Java
3. Unreal Engine 4

## **Rendering Assets**

1. Use the ambient light estimation in the shaders
2. Use mobile shaders when possible. Hitting stable **30 or 60 FPS** will make apps feel much smoother
3. Non-animating objects can often get away with baked shadows and/or baked ambient occlusion

## **Blocks**

Easy 3D assets

## **Web XR**

Experimental browsers for iOS and Android for AR

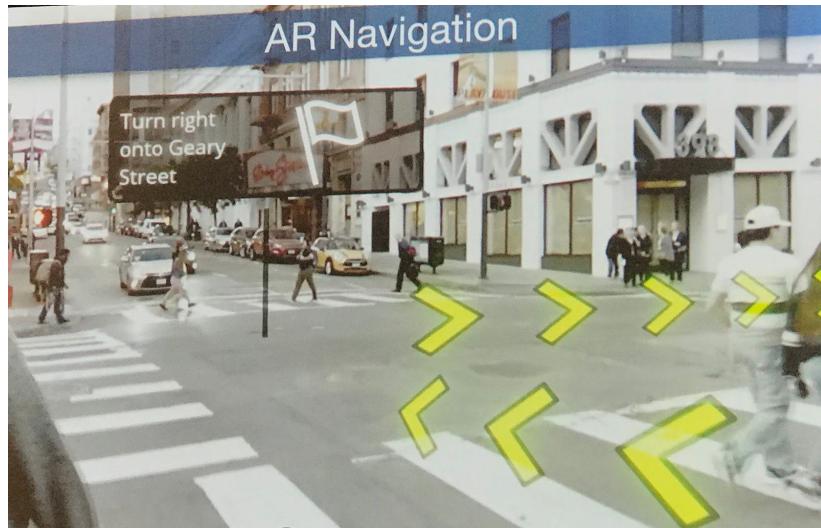
## **Talks / Workshops** 🎉 Oct 5

### **I. Creating A World Scale AR Experience: Using Geospatial Data APIs**

1. [Mapbox + ARKit API](#)
2. [Mapbox SDK for Unity](#)
3. Examples
  - a. [Tabletop AR](#)
  - b. [World Scale AR](#)

## Usage

### 1. AR Navigation



### 2. Virtual Billboards



### 3. Location information in AR, using meta data from Map APIs

## Current Limitations

1. Device orientation
2. Waiting for AR glasses
3. Geo tag information

## II. Expo Hall

### 1. [Mira Reality Goggles](#)