

Thai Phan



sdk photo & design

2010



Turning "virtual" reality into an everyday reality



USC Institute for Creative Technologies

Ken Perlin: Mother Nature is "Win Spot" for the Kinect Itself ...



USC Games

At the Games for Change Demo Spotlight (2011) CS luminary Ken Perlin speaks to the fun of playing **Mother** ...



SIGGRAPH 2015 - Immersive Realities Contest Award Presentation

402 views · 5 years ago



Liquid Science

One of the founding members of the hip-hop group Wu-Tang Clan, GZA, aka 'The Genius', takes us on a journey, meeting with the scientists and engineers that are shaping our future and bringing us into the strange complexity of his own imagination.



habitation finals 2019; Photographiert von Marc Strohfeldt -

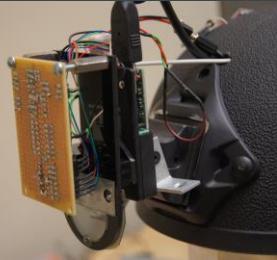
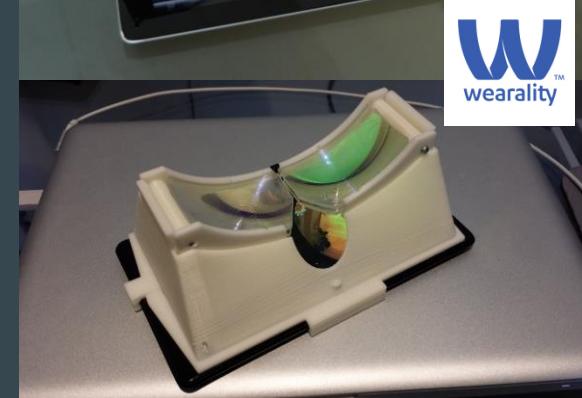
13. SEPTEMBER 2019

f t in

Tolle Aussichten für das Wohnen der Zukunft

Die Startups frameless aus Wien und sphira aus Frankfurt haben die „habitation finals 2019“ gewonnen und dürfen mit der

Industrial Design



Browsing Text in VR (DARPA Plan X)



T. Phan, D. Krum, and M. Bolas, “ShodanVR: Immersive Visualization of Text Records from the Shodan Database,” in Proceedings of the 2016 Workshop on Immersive Analytics at VR’16, pp. 31–31, 2016.

DARPA Plan X

- Immersive cyberwarfare
- Shodan search engine of IoT
- Banner grabbing
- Published in IEEE VR 2016.



T. Phan, D. Krum, and M. Bolas, “ShodanVR: Immersive Visualization of Text Records from the Shodan Database,” in Proceedings of the 2016 Workshop on Immersive Analytics at VR’16, pp. 31–31, 2016.

DARPA Plan X

- Oculus DK2 and Razor Hydras
- Browsing text in VR
- No keyboard
- UNICODE: e.g. Cyrillic, Katakana



T. Phan, D. Krum, and M. Bolas, “ShodanVR: Immersive Visualization of Text Records from the Shodan Database,” in Proceedings of the 2016 Workshop on Immersive Analytics at VR’16, pp. 31–31, 2016.

Screenshot of a web browser showing Shodan search results for "default password". The search bar contains the query, and the results page displays 32,106 total results. The interface includes tabs for Shodan, Maps, Images, Monitor, Developer, and More. A sidebar on the left shows top countries and ports.

Shodan.io results are paginated inside a web browser.



Microfilm reader



How about infinite microfilm?



What if I have three different queries...

...can I find a particular word in all of these results?

The image displays three separate Shodan search results pages, each with a yellow circle highlighting a specific search term.

- Search Term:** "default password".
Results: 32,106. Top organization: Viettel Group. Key findings:
 - 15.2.179.60.66: Default and Telnet passwords are configured to "password".
 - 63.142.44.7: Default and Telnet passwords are configured to "password".
- Search Term:** netcam.
Results: 3,109. Top organization: Viettel Group. Key findings:
 - 71.127.243.33: Default and Telnet passwords are configured to "password".
 - 148.242.216.245: Default and Telnet passwords are configured to "password".
- Search Term:** Server: SQ-WEBCAM.
Results: 1,999. Top organization: Viettel Group. Key findings:
 - 164.188.193.39: Default and Telnet passwords are configured to "password".
 - 164.164.164.78: Default and Telnet passwords are configured to "password".

"how many times does text/html appear?"



Ellis Island Wall of Honor



Shoah Memorial



Vietnam Veterans Memorial

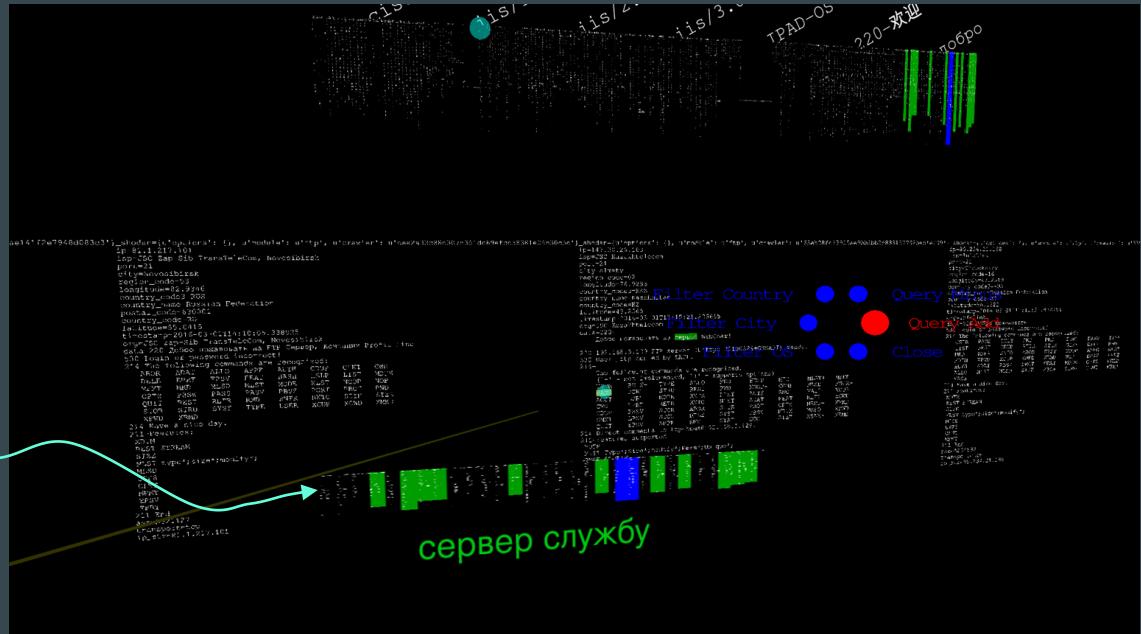
Bringing Shodan.io into Unity

See the device's
ISP, city, region,
etc.

220-欢迎
добрo пожаловать
ようこそ
स्वागत हे

Minimap at the bottom

```
 1 this._ecore = false;
 2 this._anime.call(this, 0);
 3 }
 4 tomotracker.prototype.attachToTop = function() {
 5   var panes = this.getPanels();
 6   if (panes & paneConsts.tagLayer) {
 7     this._paneContainer.appendChild(this.dom);
 8     this._updateOffset();
 9     this._attachToTop = function() {};
10   }
11 }
12 */
13
14 var api = (function() {
15   var count = 0;
16   return function(data, pane, onsuccess, onError) {
17     var js = document.createElement("script");
18     js.name = "callback"+count++;
19     js.onload = function() {
20       window[data] = function(data) {
21         document.body.removeChild(js);
22         Progress.done();
23         if (data.error == true) {
24           onSuccess(data.data);
25         } else {
26           onFailure();
27         }
28       };
29     };
30
31     if (typeof param != "object") param = {};
32     param.callback = name;
33
34     var query = [];
35     for (var i = 0; i < param) {
36       query.push(i+"="+encodeURIComponent(param[i]));
37     }
38     path = path.replace(/\?/, "?").replace(/\&/t/, "&");
39     if (path.length) {
40       path += "?" + query.join("&");
41     }
42     ja.setAttribute("type", "text/javascript");
43     ja.setAttribute("src", "/api"+path);
44     ja.onerror = function() {
45       Progress.onFailure();
46     }
47     ja.onreadystatechange = function() {
48       onsuccess();
49     }
50     Progress.start();
51     document.body.appendChild(js);
52   };
53 }
54 );
55 */
56
57 var Big(callback) {
58   var me = this;
59 }
```



This is like the minimap in the Sublime text editor.

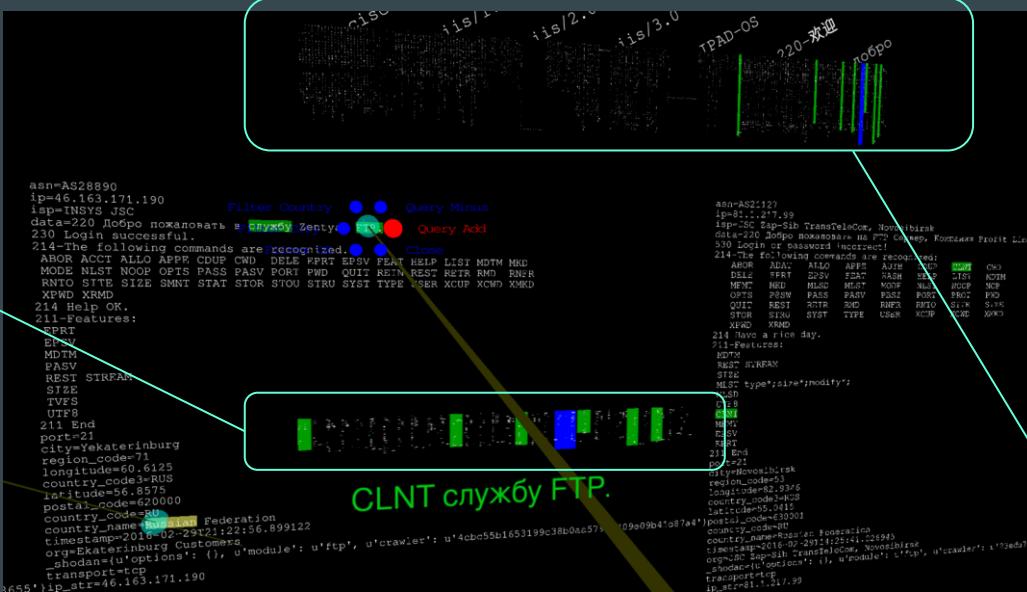


T. Phan, D. Krum, and M. Bolas, “ShodanVR: Immersive Visualization of Text Records from the Shodan Database,” in Proceedings of the 2016 Workshop on Immersive Analytics at VR’16, pp. 31–31, 2016.

Minimap of minimaps

Minimap of minimaps

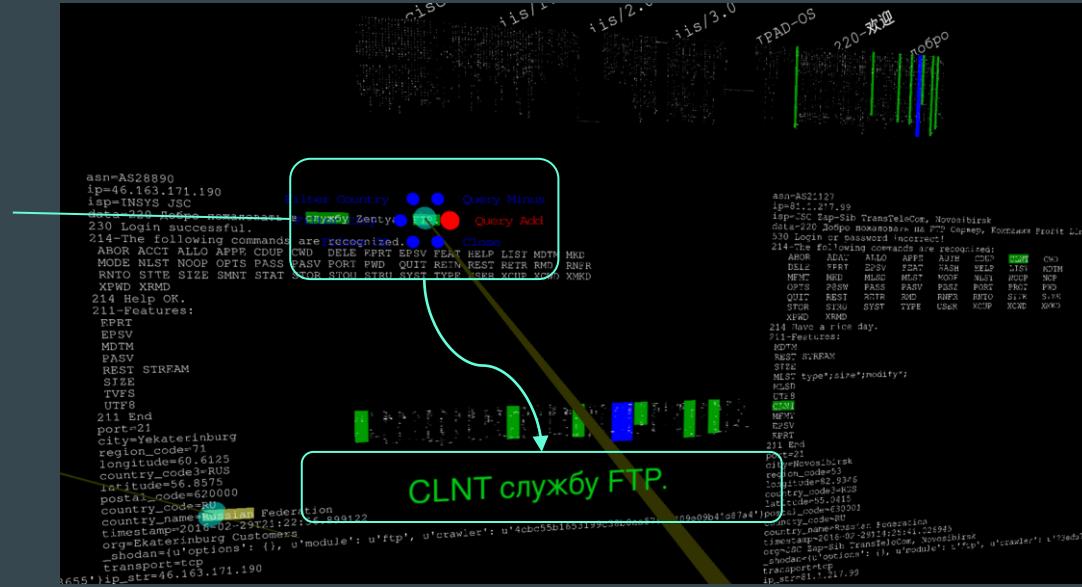
Highlighted words also show up on minimap.



If the word appears in the results of past queries, then they will also be indicated in the other minimaps.

Pie Menus

Activate the pie menu on any word and get options to add the word to a new line of search, or apply filters.

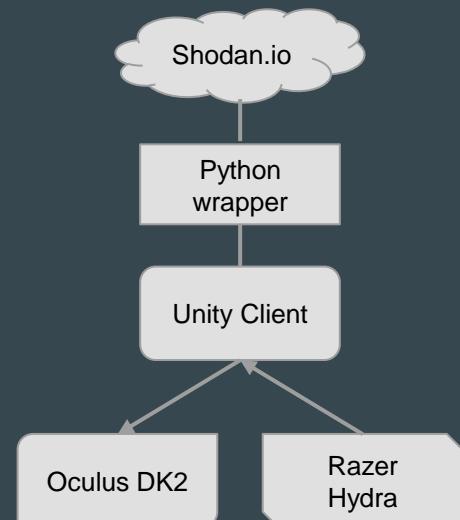




T. Phan, D. Krum, and M. Bolas, “ShodanVR: Immersive Visualization of Text Records from the Shodan Database,” in Proceedings of the 2016 Workshop on Immersive Analytics at VR’16, pp. 31–31, 2016.

Implementation

- Python socket to send queries and retrieve **UNICODE** results from Shodan.io
- Render text as GameObjects inside Unity
- Dictionary keeps track of individual **UNICODE** words
 - keys are the **UNICODE** words
 - values are the lists of text GameObjects
- Each text object has a box collider, which can change color
- Pie menus are instantiated at runtime
 - Populated by list of delegate methods



Direct-view Stereoscopy

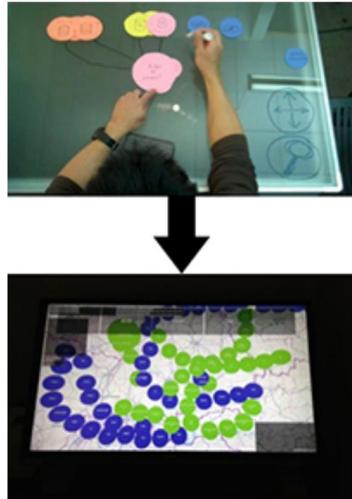


Multi-touch Interaction



XDATA Tackles the Big Data Challenge

Monday, November 18, 2013



Top: Thai Phan, USC/Institute for Creative Technologies, demonstrating design for metadata exploration interface in collaboration with JPL, MDA Information Systems and USC/Information Sciences Institute.



US Patent 9,628,783

Smartphone VR



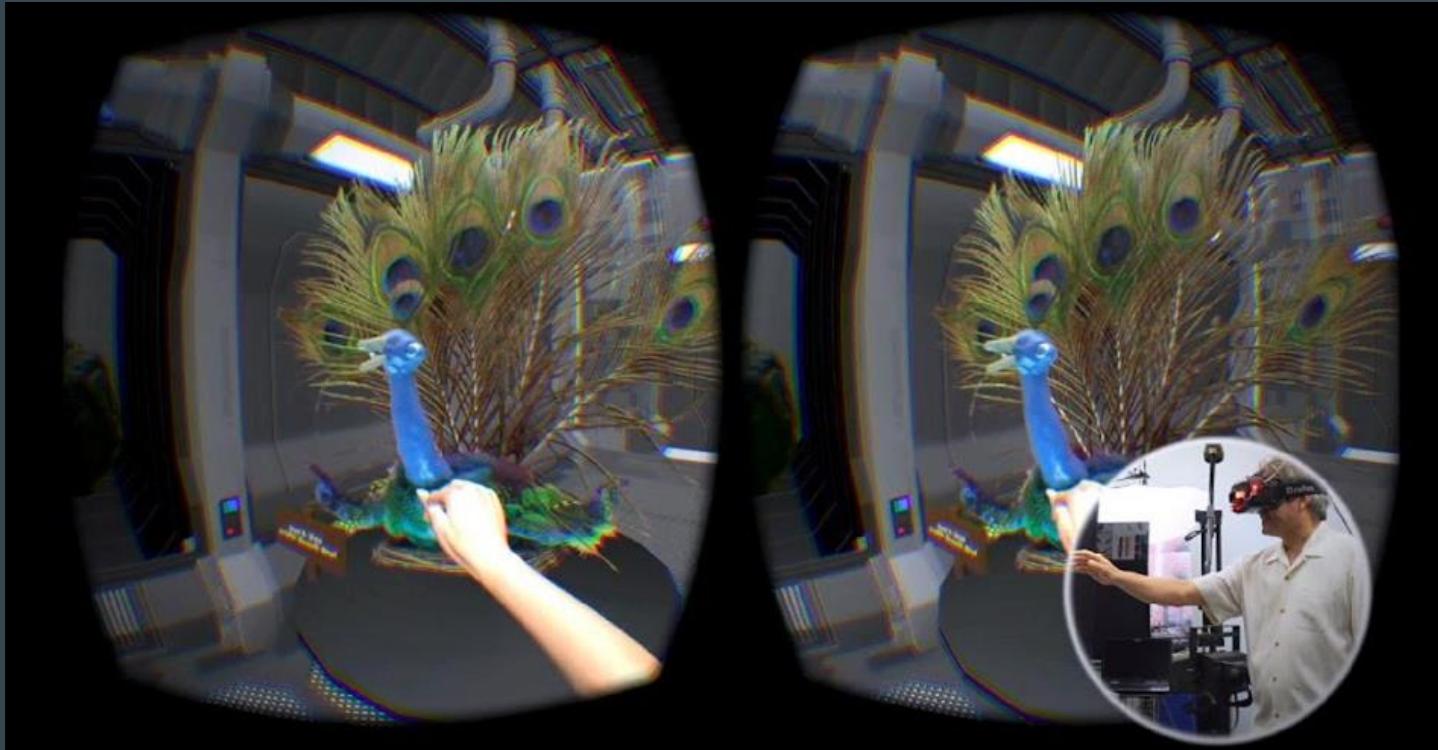
CBS THIS MORNING HealthWatch Note to Self Green Rx

CBS NEWS · June 28, 2014, 10:49 AM

Turning "virtual" reality into an everyday reality

A thumbnail image from a CBS This Morning video. It shows a person wearing a VR headset, looking through it. The video player interface includes a play button, a progress bar (4:18 / 3:59), and options for Autoplay, Share, and CC.

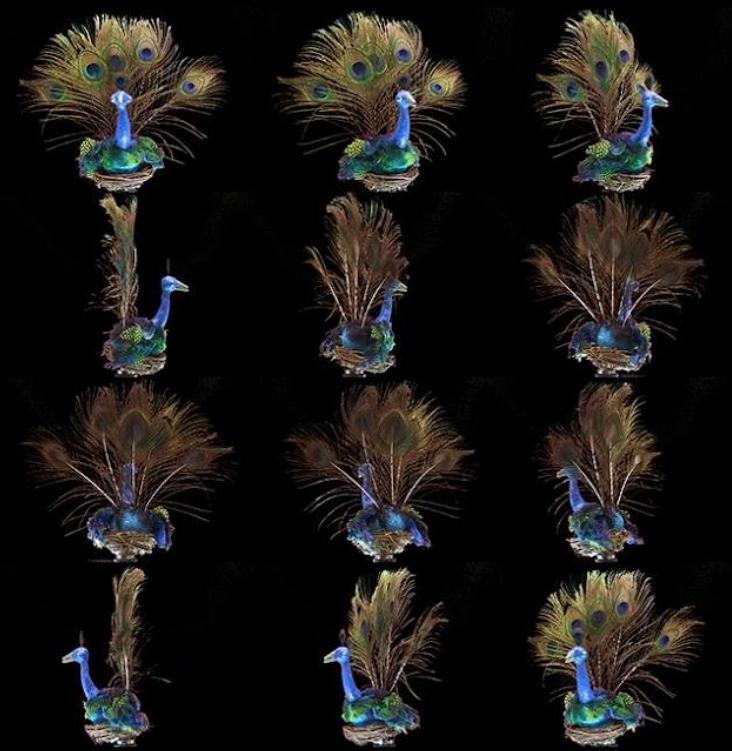
Stop-Motion Puppets in VR

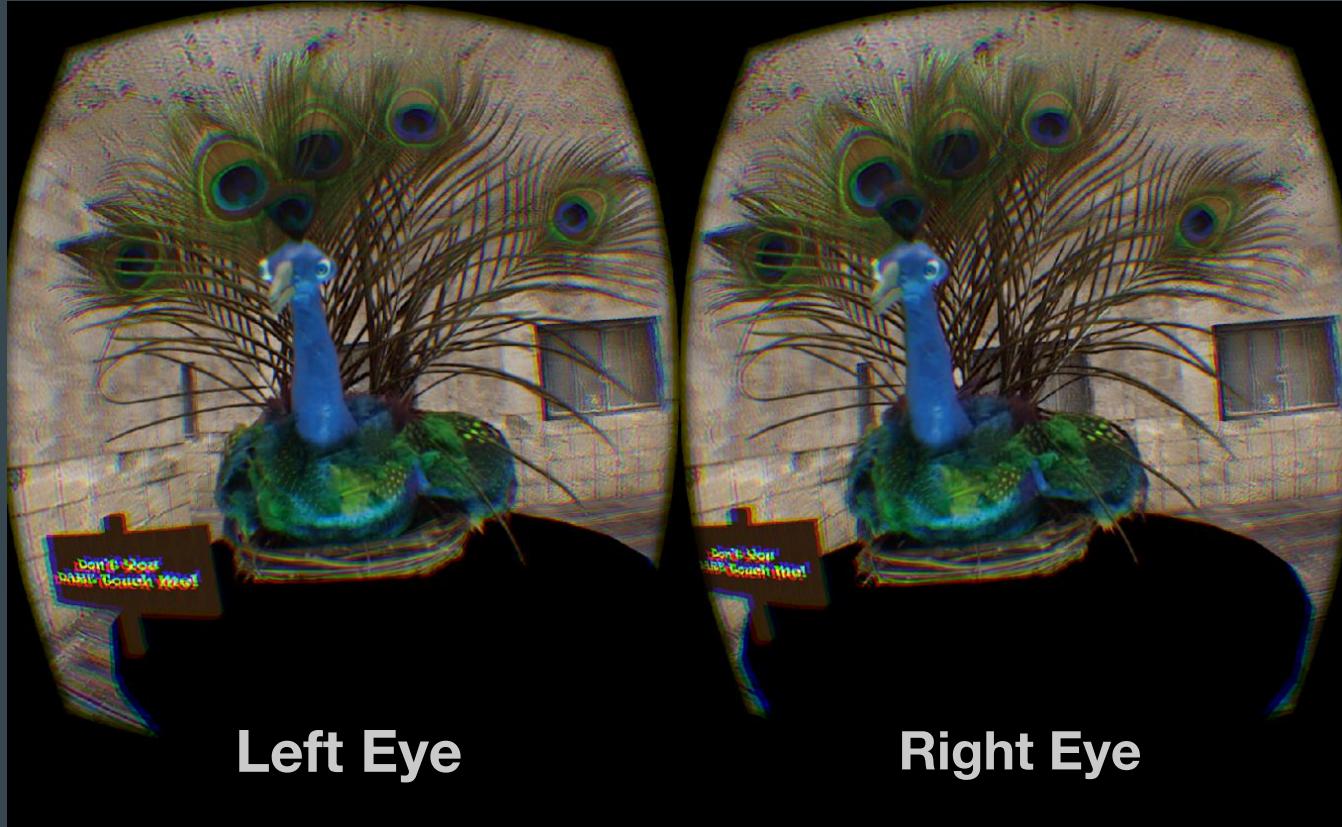


“Discovering NearField VR: Stop Motion With a Touch of LightFields and a Dash of Redirection.” SIGGRAPH 2015. Immersive Realities (AR/VR) Contest Winner.



“Discovering NearField VR: Stop Motion With a Touch of LightFields and a Dash of
Redirection.” SIGGRAPH 2015. Immersive Realities (AR/VR) Contest Winner.





Software

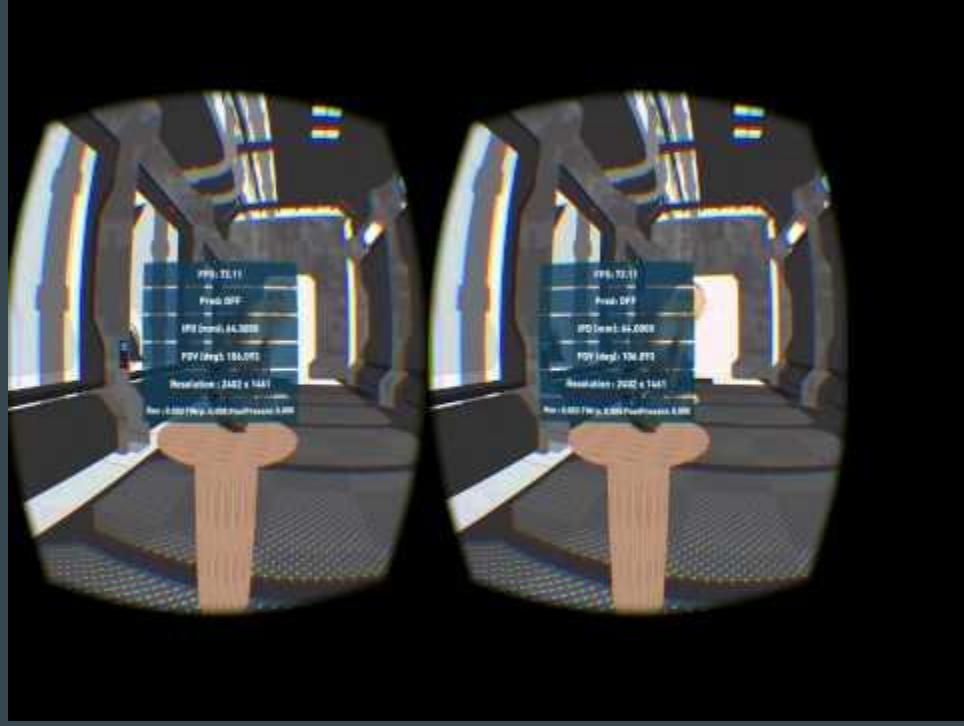
- Dragonframe
- Unity3D
- Renderheads AVPro
- HAP codec



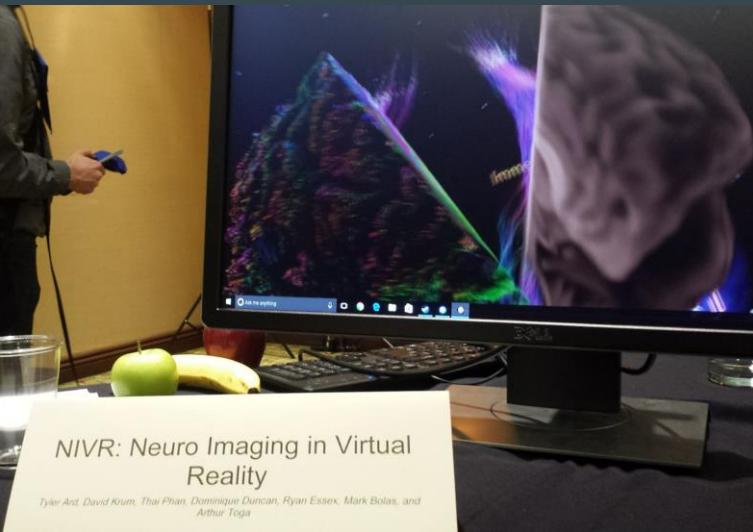
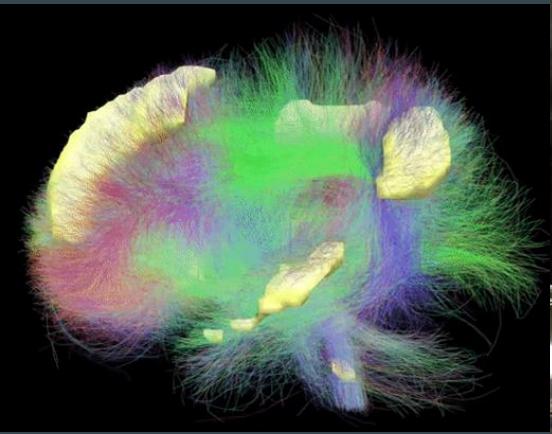
Hardware

- PhaseSpace positional tracking
- Rift DK2
- LEAP Motion
- NVIDIA GTX 980ti





Diffusion Tensor Imaging



T. Ard, D. Krum, T. Phan, D. Duncan, R. Essex, M. Bolas, and A. Toga, “NIVR: Neuro Imaging in Virtual Reality,” IEEE Virtual Reality 2017, pp. 465–466, 2017.

Tablet-Based Interaction Panels (IEEE VR 2014)



D. Krum, T. Phan, L.C. Dukes, P. Wang, and M. Bolas, “Tablet-Based Interaction Panels for Immersive Environments,” IEEE Virtual Reality 2014, pp. 91–92, 2014.

The Best Kinect Game You Never Heard Of (and Maybe the Best of them All)



Stephen Totilo

6/28/11 2:00PM

106

1



Virtual Human Research



Head-mounted
Projectors

Haptic
Priming

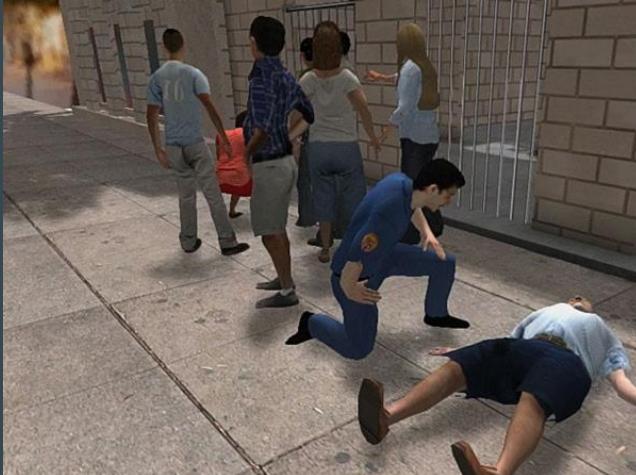


Counseling
over Skype



Hunger in LA

- Sundance Film Festival 2012
- Nonny de la Pena
 - CEO of Emblematic Group
- Immersive Journalism



THE VERGE TECH ▾ SCIENCE ▾ MORE ☰

Digital empathy: how 'Hunger in Los Angeles' broke my heart in a virtual world

By [Bryan Bishop](#) | [@bcbishop](#) | Jun 14, 2013, 6:55pm EDT

[f](#) [t](#) [e](#) SHARE



Utah Museum of Contemporary Art



Mixed Reality Collaboration Between Human-Agent Teams

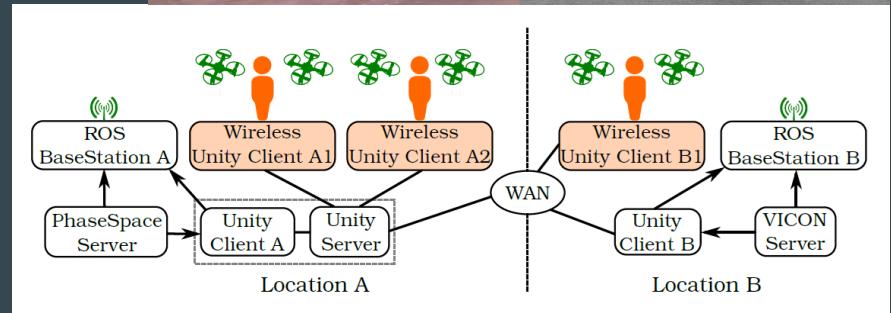
- Awarded \$1M+ in research funds.
- Test drones and UI in Mixed Reality
- Swap out virtual stand-ins as tech matures.
- Gradually acclimate end-user.
- Published in IEEE VR 2018.

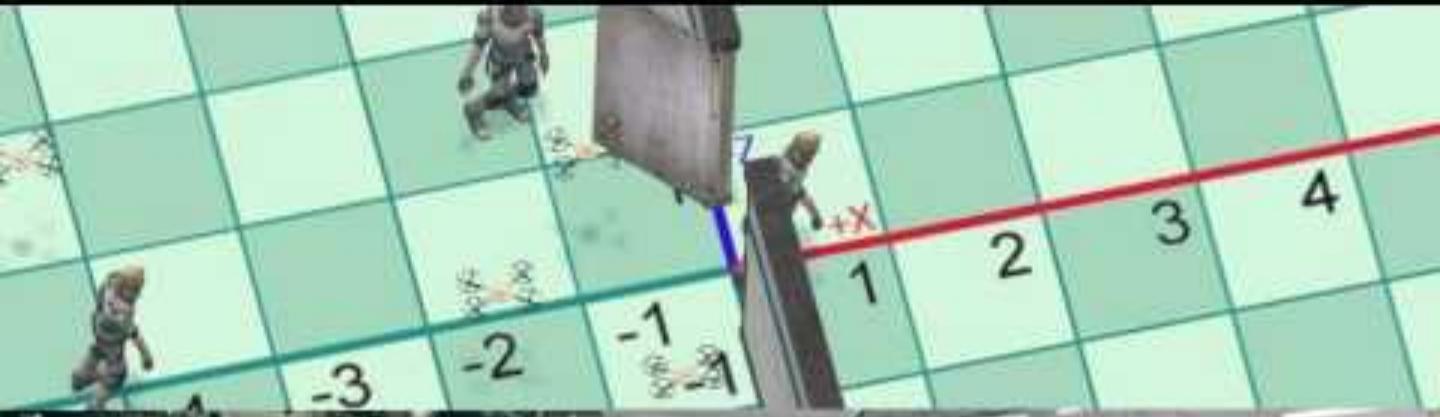


Nora Ayanian, Ph.D.
Director of ACT Lab



Wolfgang Höning, Ph.D.





TechCrunch Disrupt (before Covid-19)

Questions?



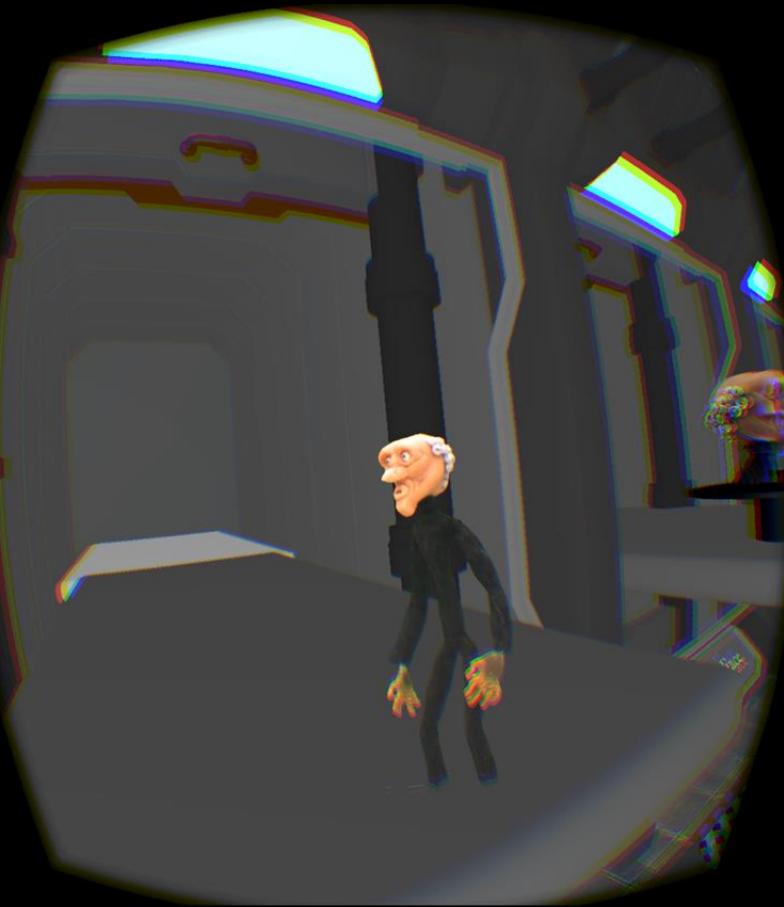
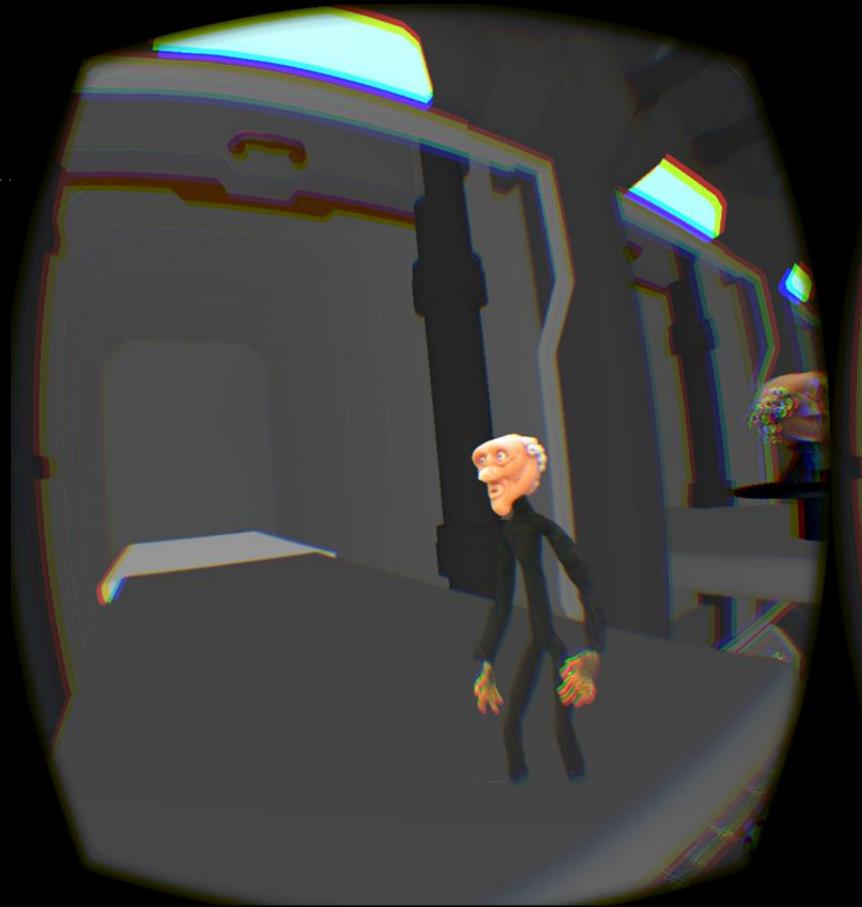




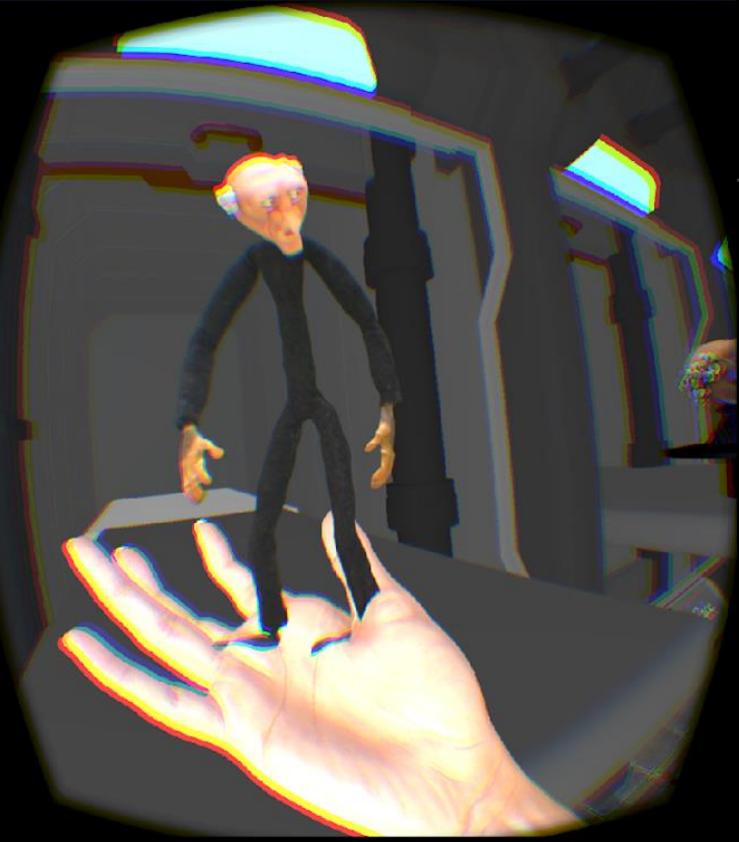
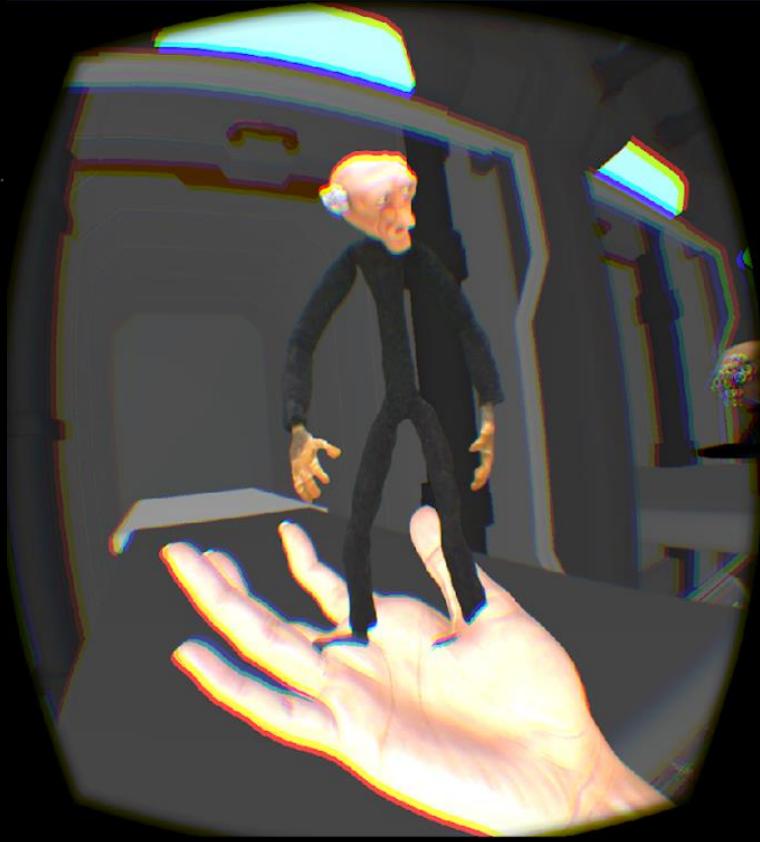
NVIDIA HairWorks

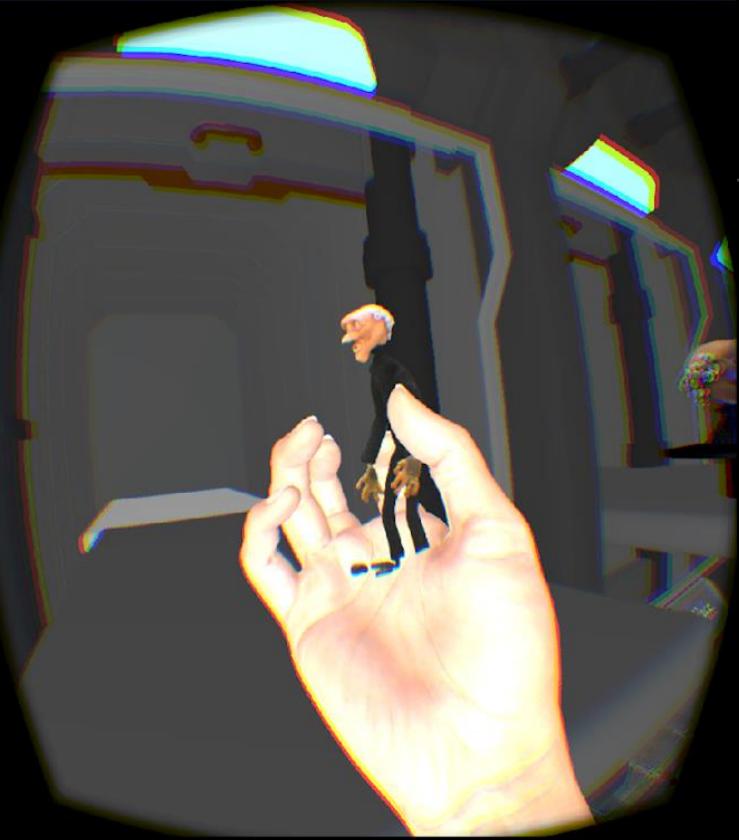
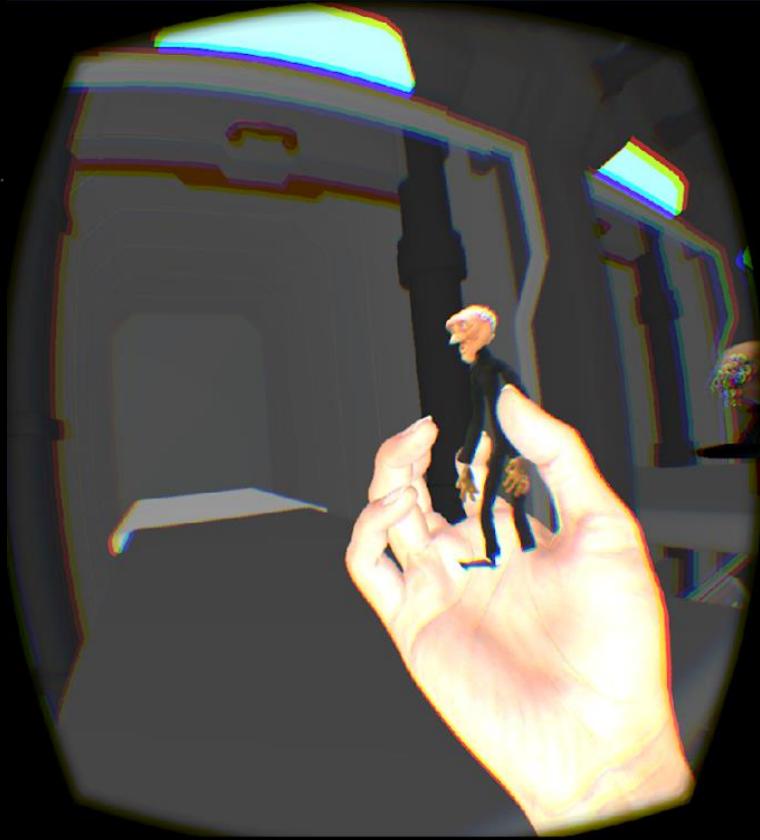


LAURA
RIZZOTTO

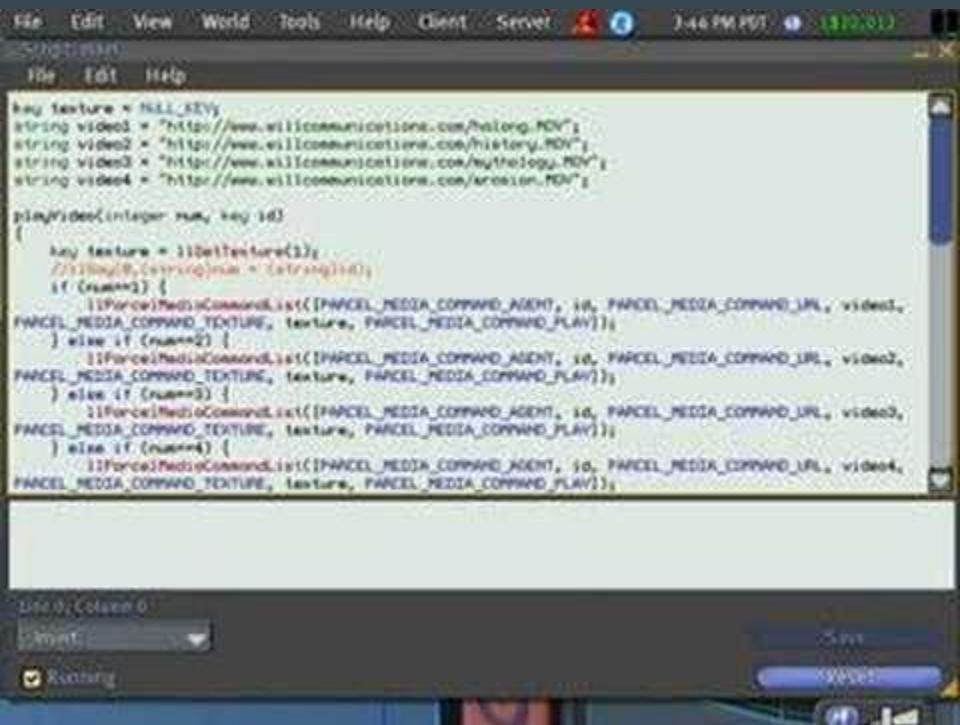








Diegetic UI in Second Life



SWAT 3 (for PC 1999-2005)



Clever Films (2003)

The screenshot shows the homepage of the Clever Films website. At the top left is a black circular logo with the white text "clever films". To its right is a photograph of a red SUV parked on a sandy beach with green hills in the background. Next is a close-up photo of a woman with blonde hair, smiling. Below these images is a horizontal menu bar with the words "News" and "Events". A large, semi-transparent dark grey rectangular overlay covers the right side of the page. At the bottom left, there is contact information: "executive producer : heather heller | head of production : kristen jansson | sales rep : jennifer walker
1040 n. las palmas ave. los angeles ca 90038 tel. 323.860.8282 fax. 323.860.8283".



E N T E R T I N M E N T



Services

Entity FX features a talented team of artists and executives from the former Light Matters/Pixel Envy, Inc., working in the same Santa Monica headquarters. In the past five years, with Mat Beck supervising, we have produced visual effects for over twenty feature films. Recent feature work includes effects for Sweet Home Alabama, Tuck Everlasting and Cold Creek Manor.

Location

The Entity studio is located in Santa Monica, California, just blocks from the ocean. We take pride in nurturing a powerful

Python Wrapper for Shodan API

```
apple banana banana  
orange pear banana  
melon orange pear
```

Let's say the socket connection between the Python script and Unity allowed us to query for fruit, and the result are these 3 lines of text on the left.

Parse Results and Instantiate Objects in Unity

```
apple banana banana  
orange pear banana  
melon orange pear
```

each word is a C# *Object* inside Unity

apple

banana

banana

orange

pear

banana

melon

orange

pear

Dictionary

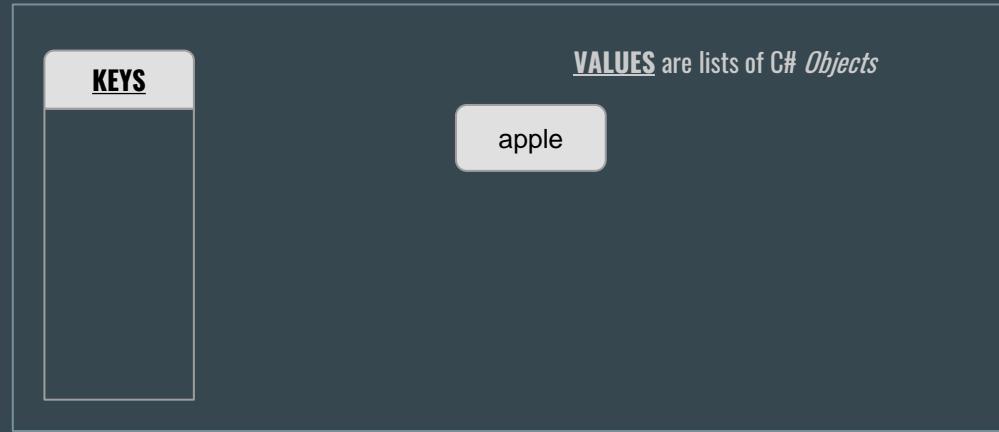
```
apple banana banana  
orange pear banana  
melon orange pear
```



As you parse for each word, if it doesn't
exist in the Dictionary, add it

Dictionary

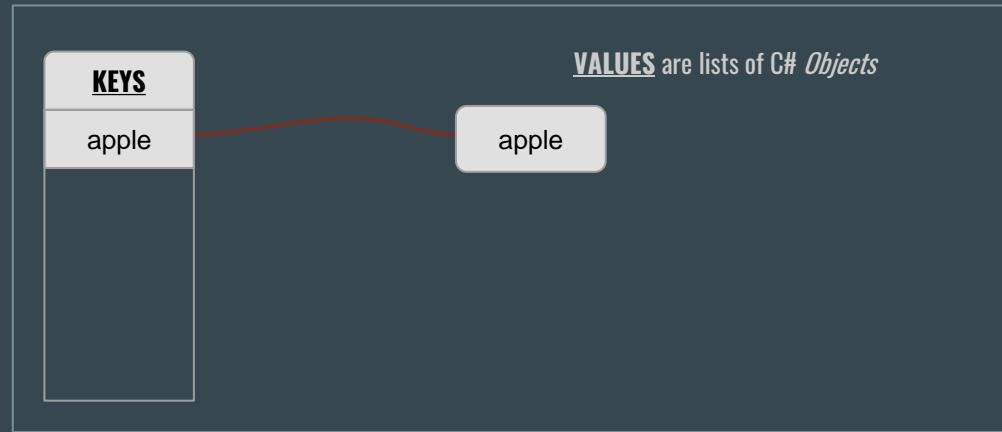
```
apple banana banana  
orange pear banana  
melon orange pear
```



As you parse for each word, if it doesn't
exist in the Dictionary, add it

Dictionary

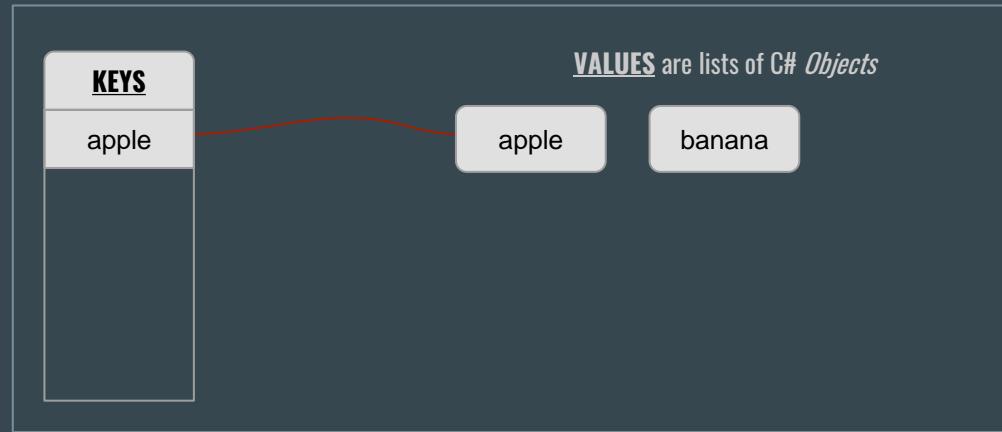
```
apple banana banana  
orange pear banana  
melon orange pear
```



As you parse for each word, if it doesn't exist in the Dictionary, add it

Dictionary

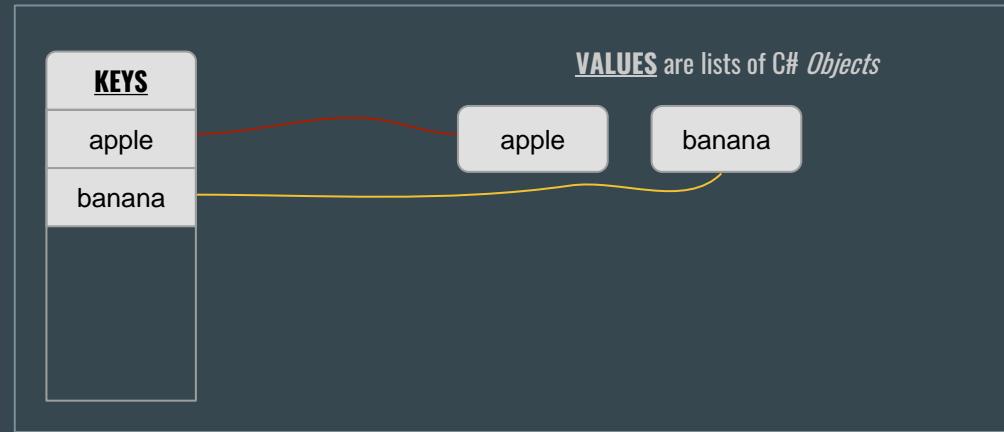
```
apple banana banana  
orange pear banana  
melon orange pear
```



The KEY banana doesn't exist in the Dictionary, so we add it.

Dictionary

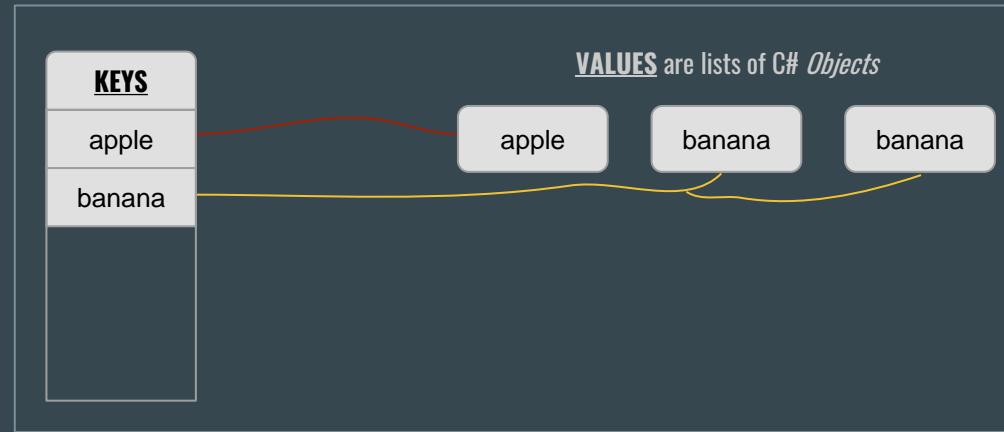
```
apple banana banana  
orange pear banana  
melon orange pear
```



The KEY banana doesn't exist in the Dictionary, so we add it.

Dictionary

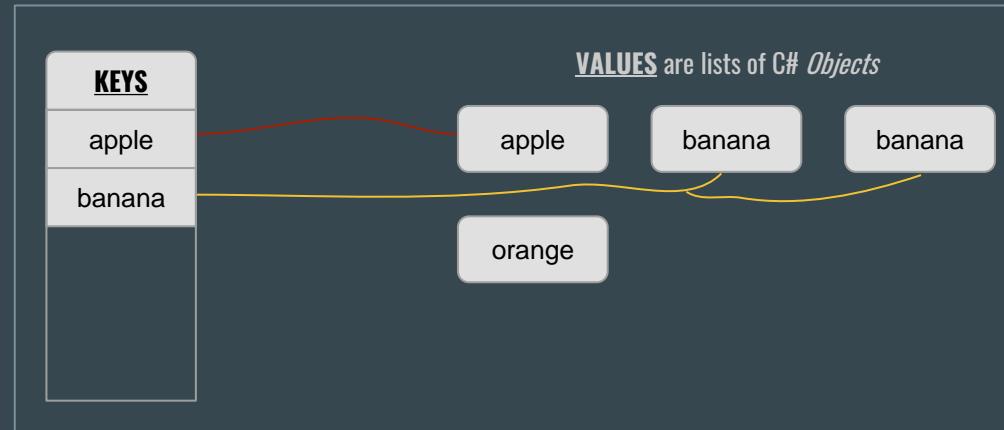
```
apple banana banana  
orange pear banana  
melon orange pear
```



The KEY banana already exists in the Dictionary, so ADD the new object to the List associated with the KEY

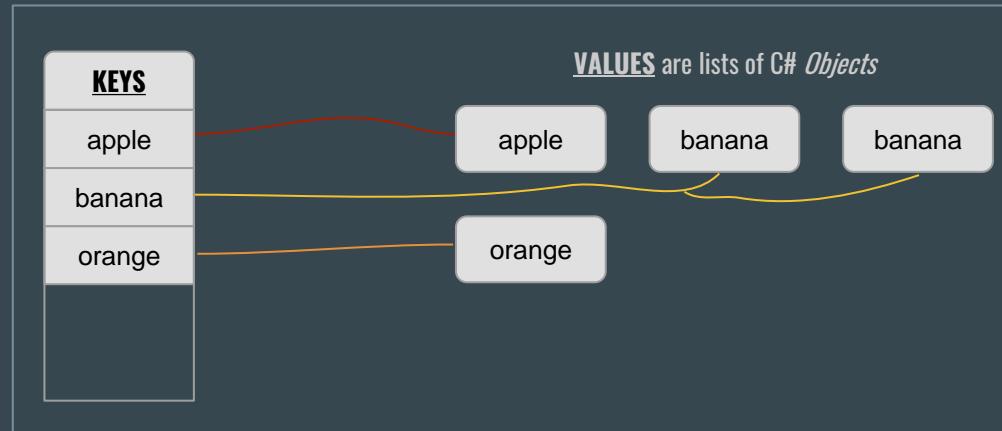
Dictionary

```
apple banana banana  
orange pear banana  
melon orange pear
```



Dictionary

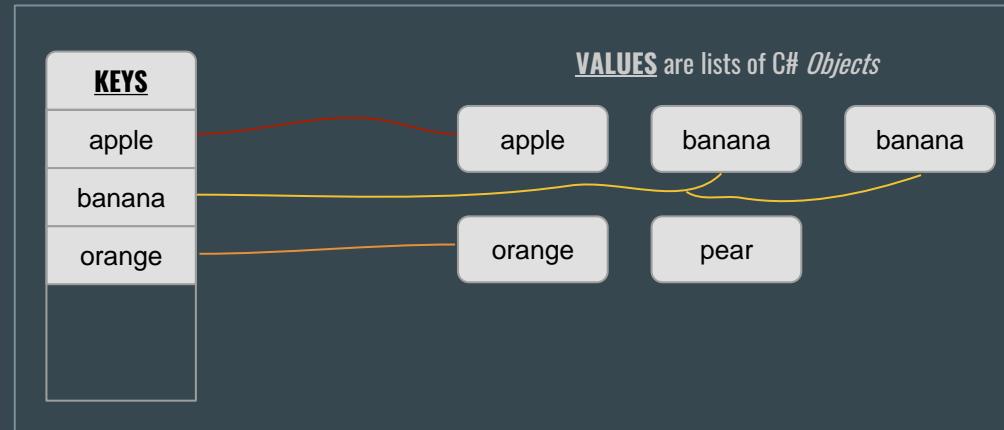
```
apple banana banana  
orange pear banana  
melon orange pear
```



Here, the KEY orange is associated with a VALUE that is a List containing just one Object

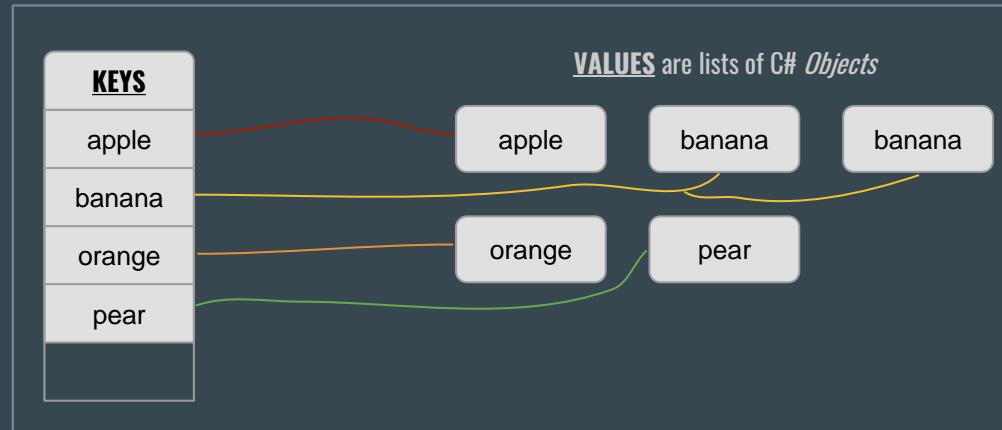
Dictionary

```
apple banana banana  
orange pear banana  
melon orange pear
```



Dictionary

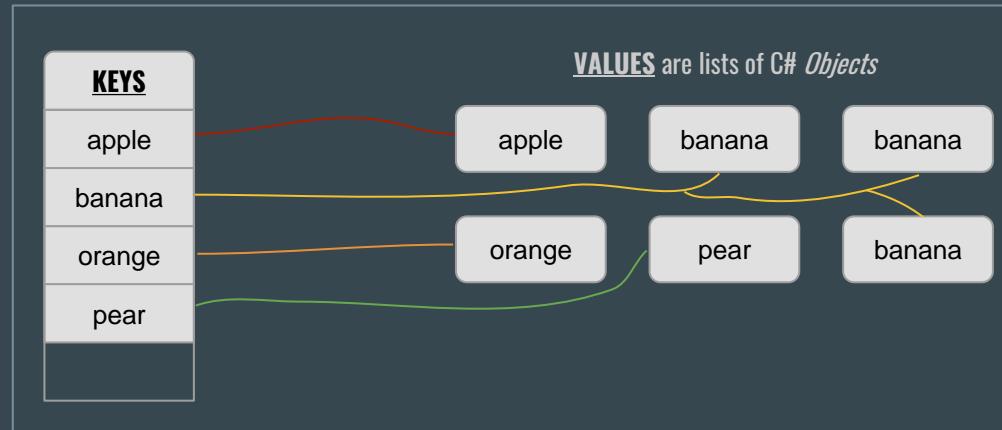
```
apple banana banana  
orange pear banana  
melon orange pear
```



Here, the KEY **pear** is associated with a VALUE that is a List containing just one Object

Dictionary

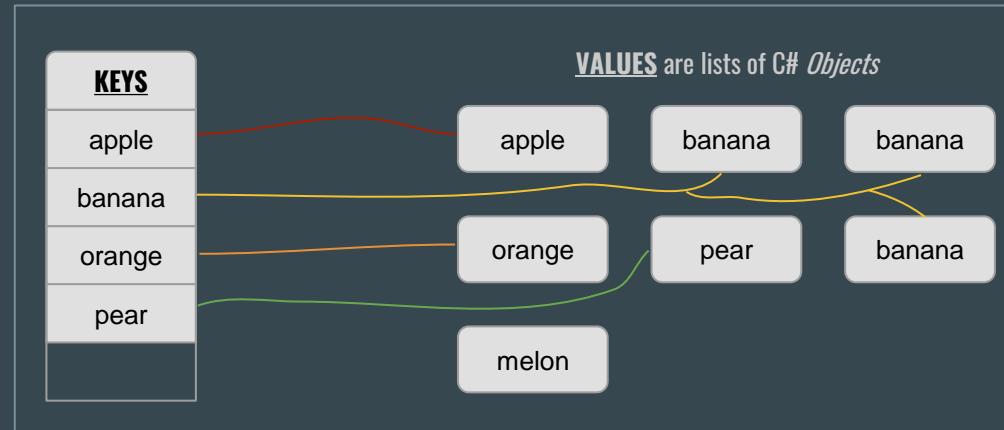
```
apple banana banana  
orange pear banana  
melon orange pear
```



Here, the KEY banana is associated with a VALUE that is a List containing three Objects

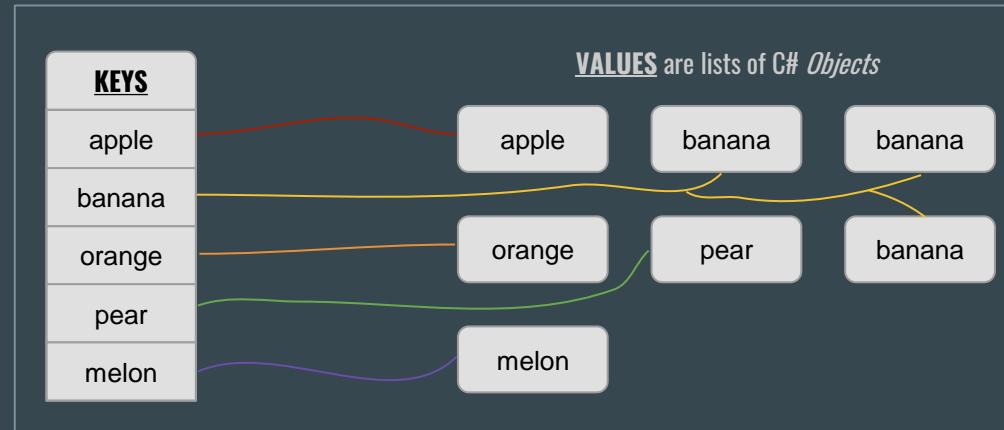
Dictionary

```
apple banana banana  
orange pear banana  
melon orange pear
```



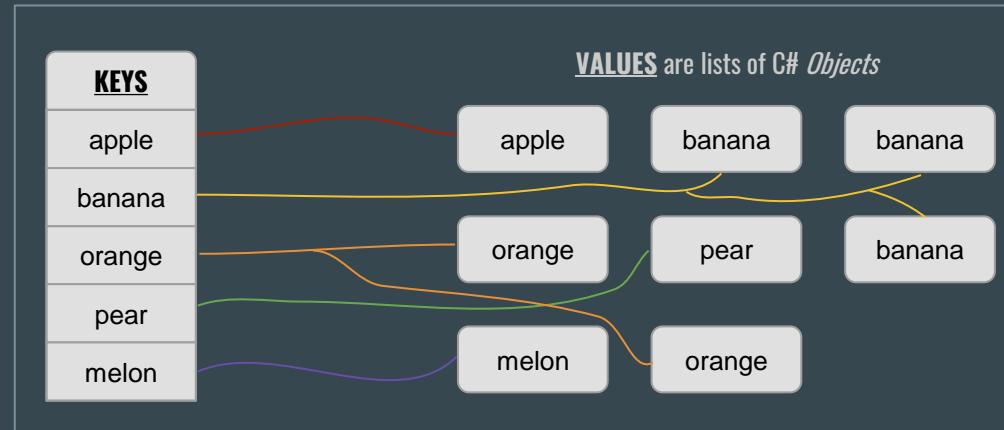
Dictionary

```
apple banana banana  
orange pear banana  
melon orange pear
```



Dictionary

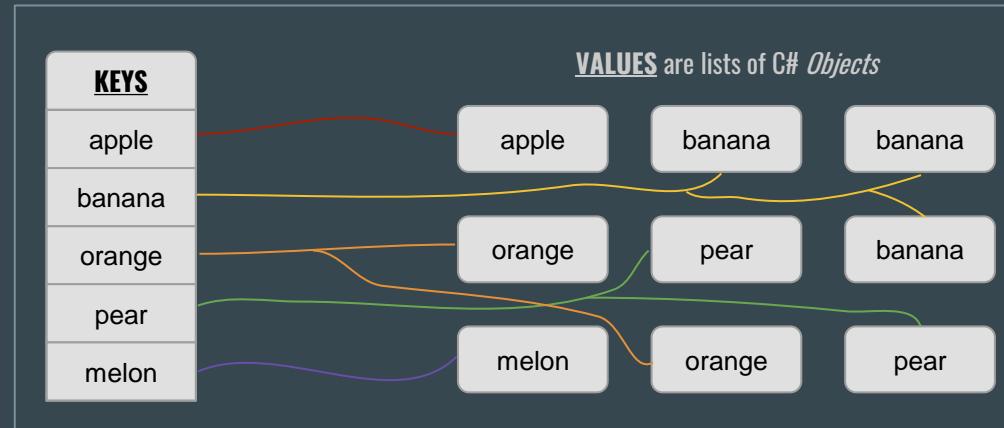
```
apple banana banana  
orange pear banana  
melon orange pear
```



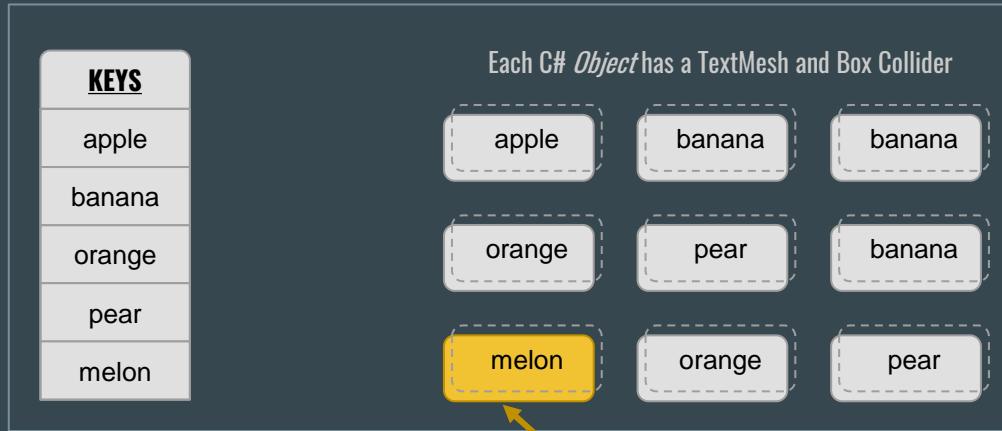
Now the KEY orange is associated with
a VALUE that is a List containing two
Objects

Dictionary

```
apple banana banana  
orange pear banana  
melon orange pear
```



Colliders for Text



Every Update, raycast
from each Hydra... if it
hits the box collider,
make it yellow...

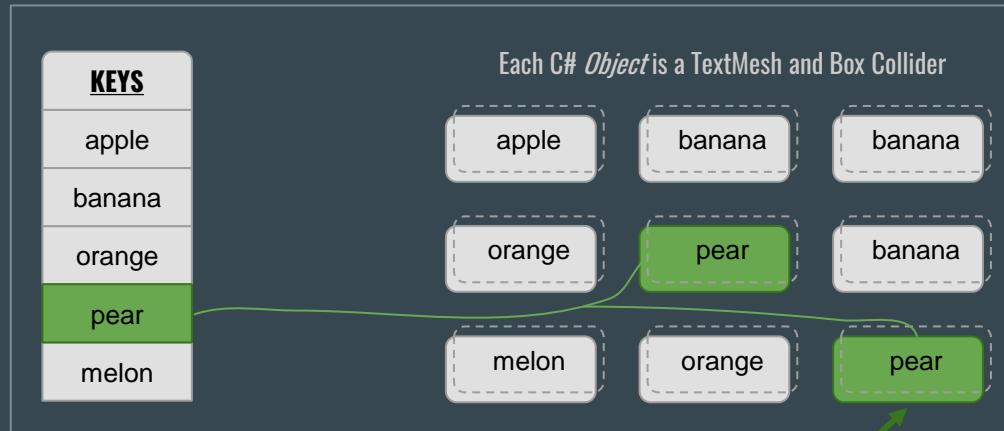


Colliders for Text



...when the trigger is
pulled, make it green
instead.

Colliders for Text



If it already exists in the Dictionary, access the List of words and make their colliders green also.



Pie Menu

- Declare a public delegate with a void return type and a parameter for which Hydra hand is activating the Pie Menu.

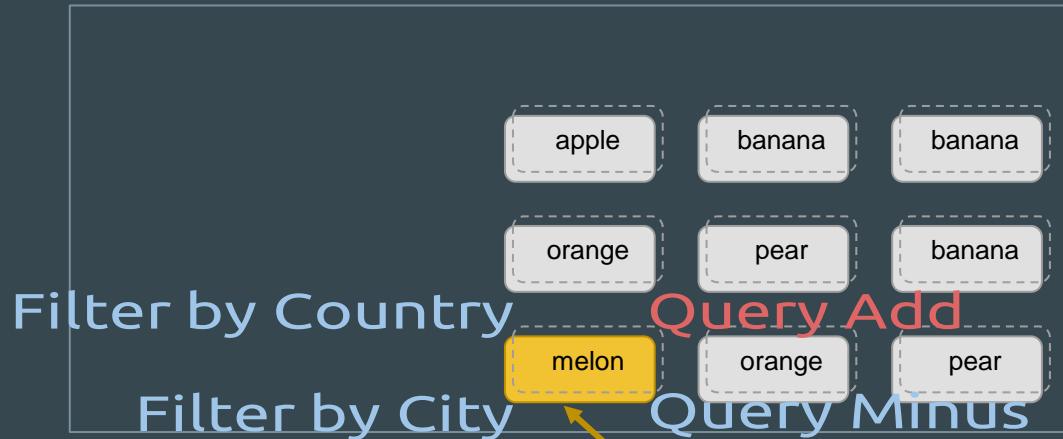
- `public delegate void PieMenuButtonDelegate(int hand);`

- That way any class can setup an array of methods/functions to populate the Pie Menu with.

- Adding a word to a search query
 - Omitting a word from a search query
 - Using the word to filter by city
 - Using the word to filter by country

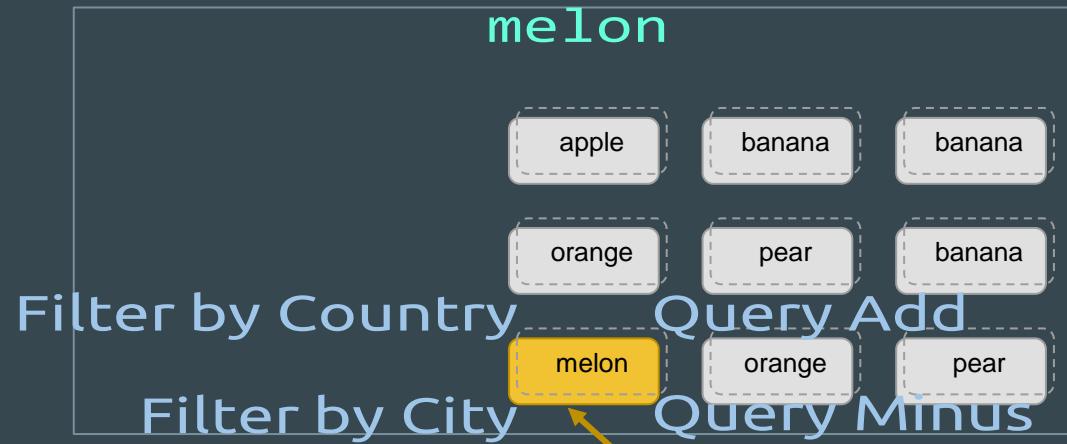


Composing a New Search Query



Activate Pie Menu on
melon and use the
joystick to choose
Query Add

Composing a New Search Query



Activate Pie Menu on
melon and use the
joystick to choose
Query Add



Composing a New Search Query



Activate Pie Menu on
pear and use the
joystick to choose
Query Minus



Composing a New Search Query



Activate Pie Menu on
pear and use the
joystick to choose
Query Minus



Send New Query to Shodan.io -- Retrieve New Results

banana watermelon
apple melon orange
pineapple peach

melon -pear

banana

watermelon

apple

melon

orange

pineapple

peach

Retrieve results that include melon but not pear.

Overview & Requirements

- Humans and drones interact in a multiplayer VR environment.
- Each human is followed by two pet drones.
- They must move through a doorway without bumping into each other.
- The door is physically real for some, but virtual for the other(s).
- There are also virtual walls. Pretend the walls are real. Nothing can pass through walls!



Location A



Location B

Implementation

- UNet for networking
- PhaseSpace or VICON for motion tracking
- ROS for controlling Bitcraze Crazyflie drones
- Samsung Gear VR and Galaxy S7 phones



Samsung Gear VR



Bitcraze Crazyflie

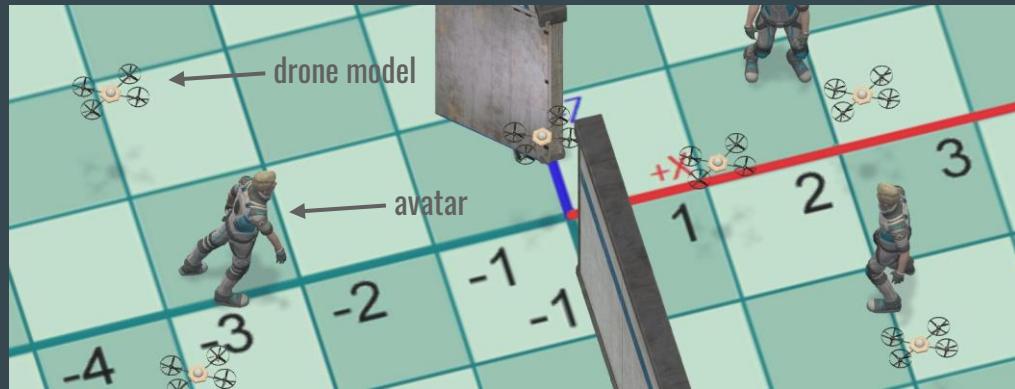
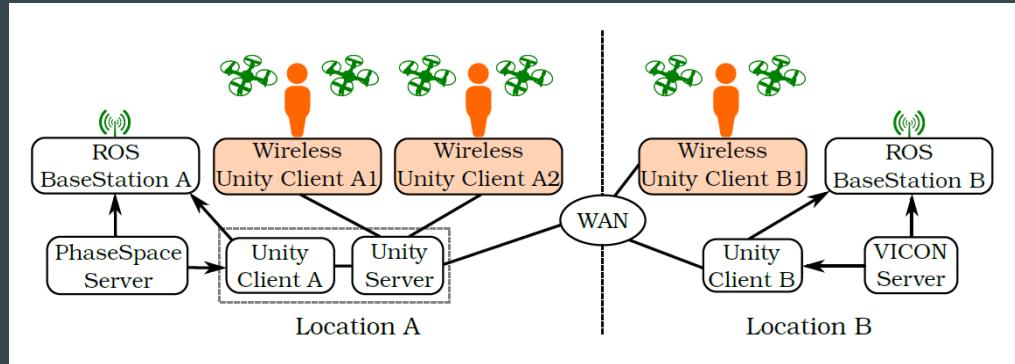


VICON



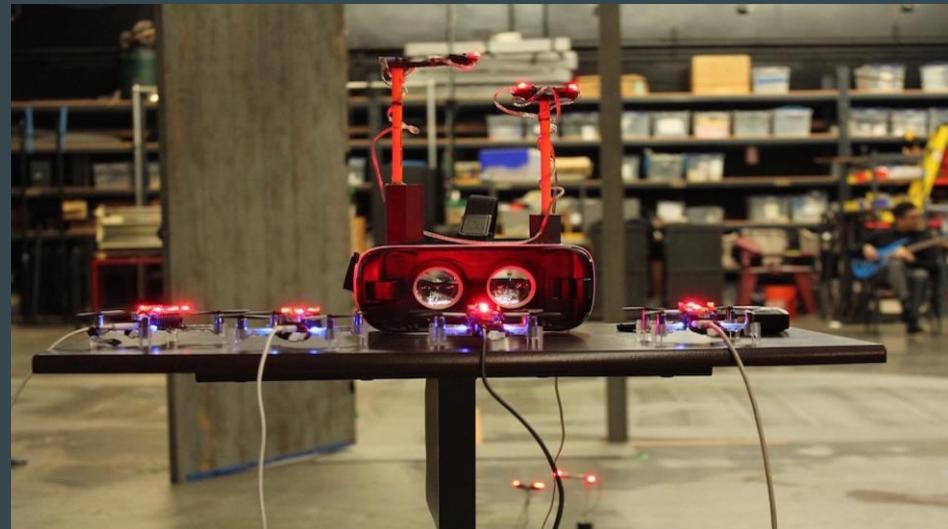
UNet High Level API

- Total of 5 clients
 - Unity Client A
 - Wireless Unity Client A1
 - Wireless Unity Client A2
 - Unity Client B
 - Wireless Client B1
- Total of 10 *NetworkTransforms*
 - Location A
 - 2 avatars
 - 4 drone models
 - 1 door
 - Location B
 - 1 avatar
 - 2 drone models



Motion Tracking

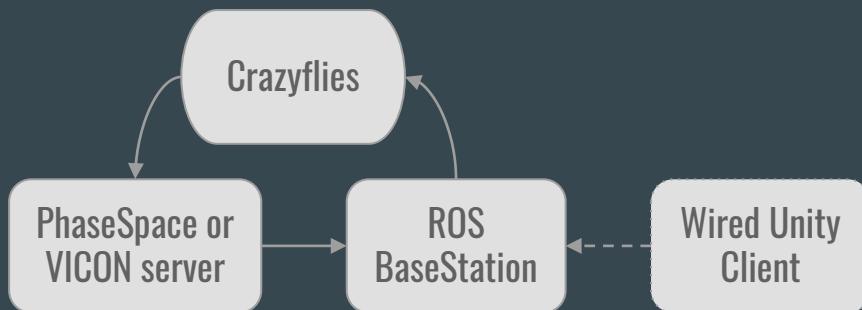
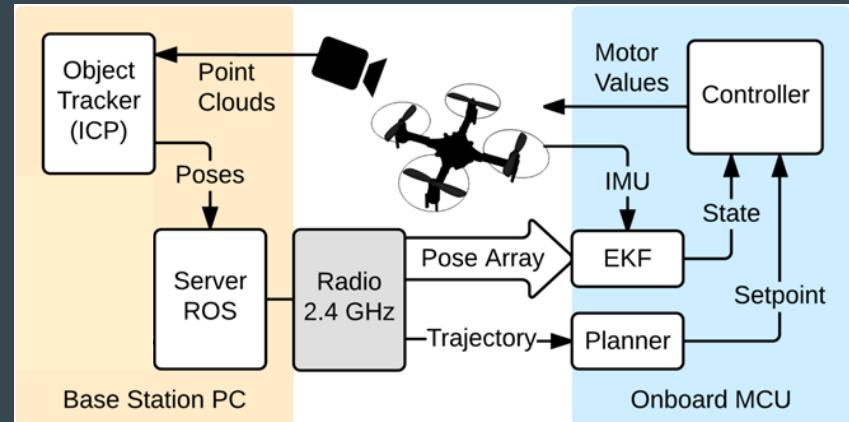
- Wired Unity clients receive motion tracking data of Gear VRs and drones
- Wired Unity clients move *NetworkTransforms* based on tracking data
- Wireless clients (the Samsung S7 phones) are merely spectators. They do not transmit any data to the Unity multiplayer server.



PhaseSpace motion tracking markers on the
drones and Gear VRs

ROS: Robot Operating System

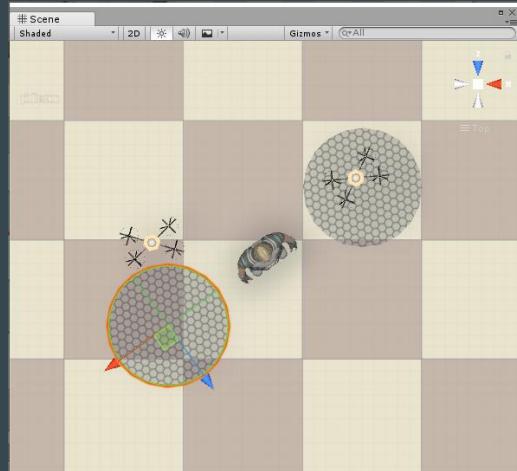
- Closed-loop control between ROS, Crazyflies, and the motion tracking server
- Each location uses its own local ROS BaseStation

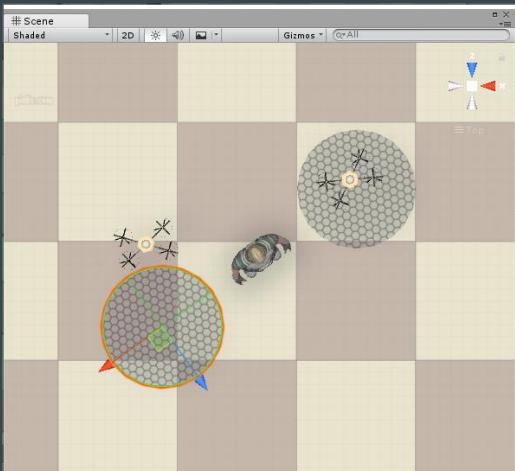
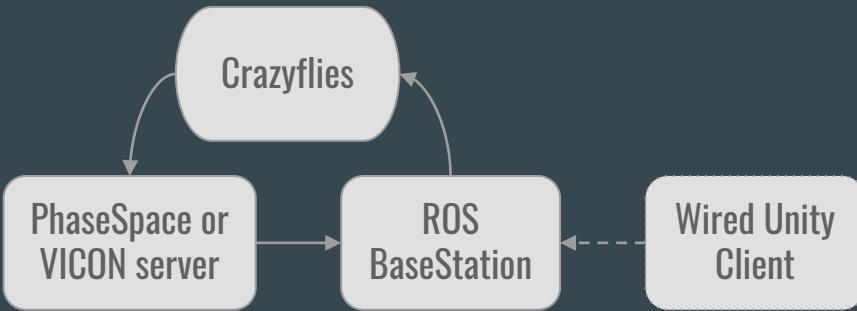


 The Unity client sends the desired position and rotation for each drone.

Navigation and Pathfinding

- Each avatar is a *NavMeshObstacle*
 - Each avatar has two *NavMeshAgents* following it wherever it goes, avoiding collisions with baked *NavMesh* and the avatars (since they're *NavMeshObstacles*)
- So, not 10. But actually 16 *NetworkTransforms*!
 - Location A
 - 2 avatars
 - 4 drone models
 - 1 door (also a *NavMeshObstacle*)
 - **4 *NavMeshAgents***
 - Location B
 - 1 avatar
 - 2 drone models
 - **2 *NavMeshAgents***





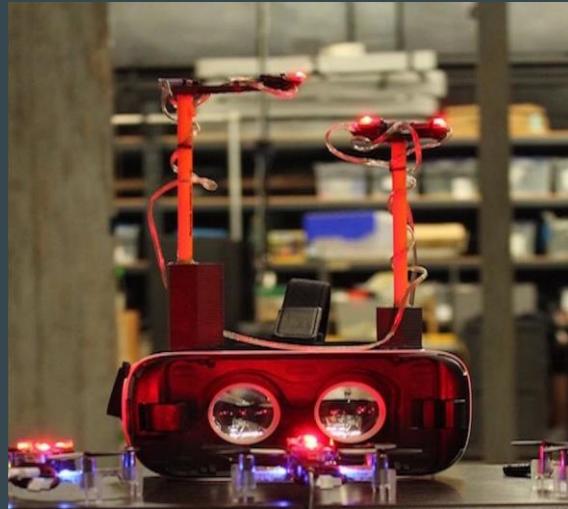
As the *NavMeshAgent* moves to stay in formation with its avatar, its position & rotation is sent to the local ROS Base Station.



The ROS Base Station tells the drone to fly to its new position.

Rendering on Samsung S7

- Wireless clients are merely spectators.
- Don't use Oculus SDK.
- Use motion tracking data.
 - Moves your viewpoint.
 - Others see your avatar move as you move your Gear VR (it's a *NetworkTransform* after all).
 - IK for avatars
- Custom distortion correction
- Render minimap in heads-up display.



Digital empathy: how 'Hunger in Los Angeles' broke my heart in a virtual world

By Bryan Bishop | @bcbishop | Jun 14, 2013, 6:55pm EDT

f t SHARE



Red Bull



Liquid Science

One of the founding members of the hip-hop group Wu-Tang Clan, GZA, aka 'The Genius', takes us on a journey, meeting with the scientists and engineers

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Government research provides a high ROI

Impactful solutions



HDNet (2010)

Dan Rather with Dr. Albert "Skip" Rizzo on treating PTSD with VR



Can we make wider FOV?
AND lower cost?



2020

BRAVEMIND: Currently found at over 60 sites, including VA hospitals, military bases and university centers

Disrupt the status quo



Samsung Gear VR



+\$1M in Army funding for AR UI to control micro flying drones.

"FOV2GO" at IEEE VR 2012, two years before Google Cardboard



2017

Disseminate knowledge

PhaseSpace head-mounted smartphone AR demo at IEEE VR 2012



UNC Chapel Hill



Mira Prism

"standing on the shoulders of giants"



2021

Cognixion BCI

DoD Research, Development, Test, and Evaluation (RDT&E):

Figure 2. Title IV and Title IX (OCO) RDT&E by Organization, FY2021

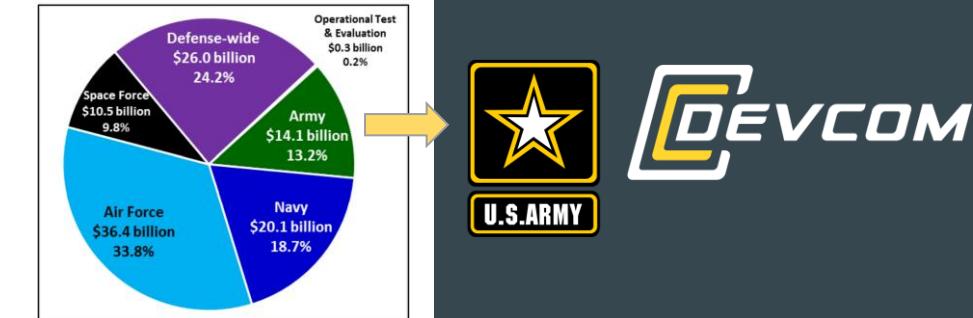
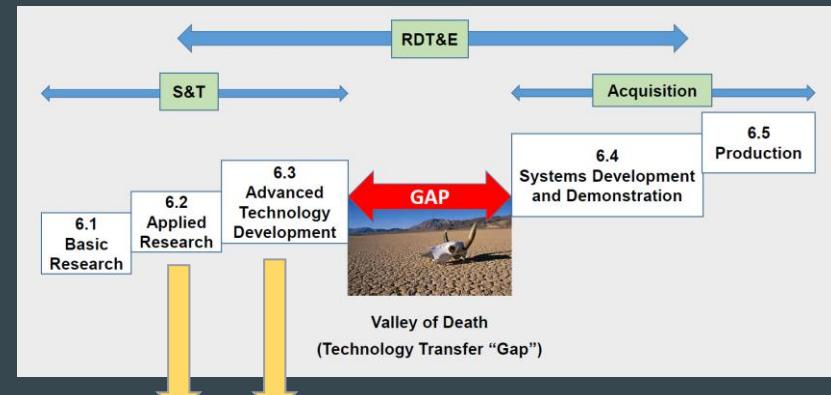
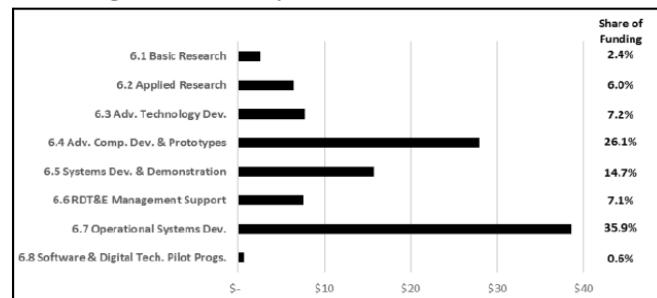


Figure 3. Title IV RDT&E by Character of Work, FY2021

Total obligational authority, in billions of current dollars



USC Institute for
Creative Technologies

Source: CRS analysis of FY2022 DOD R-1.



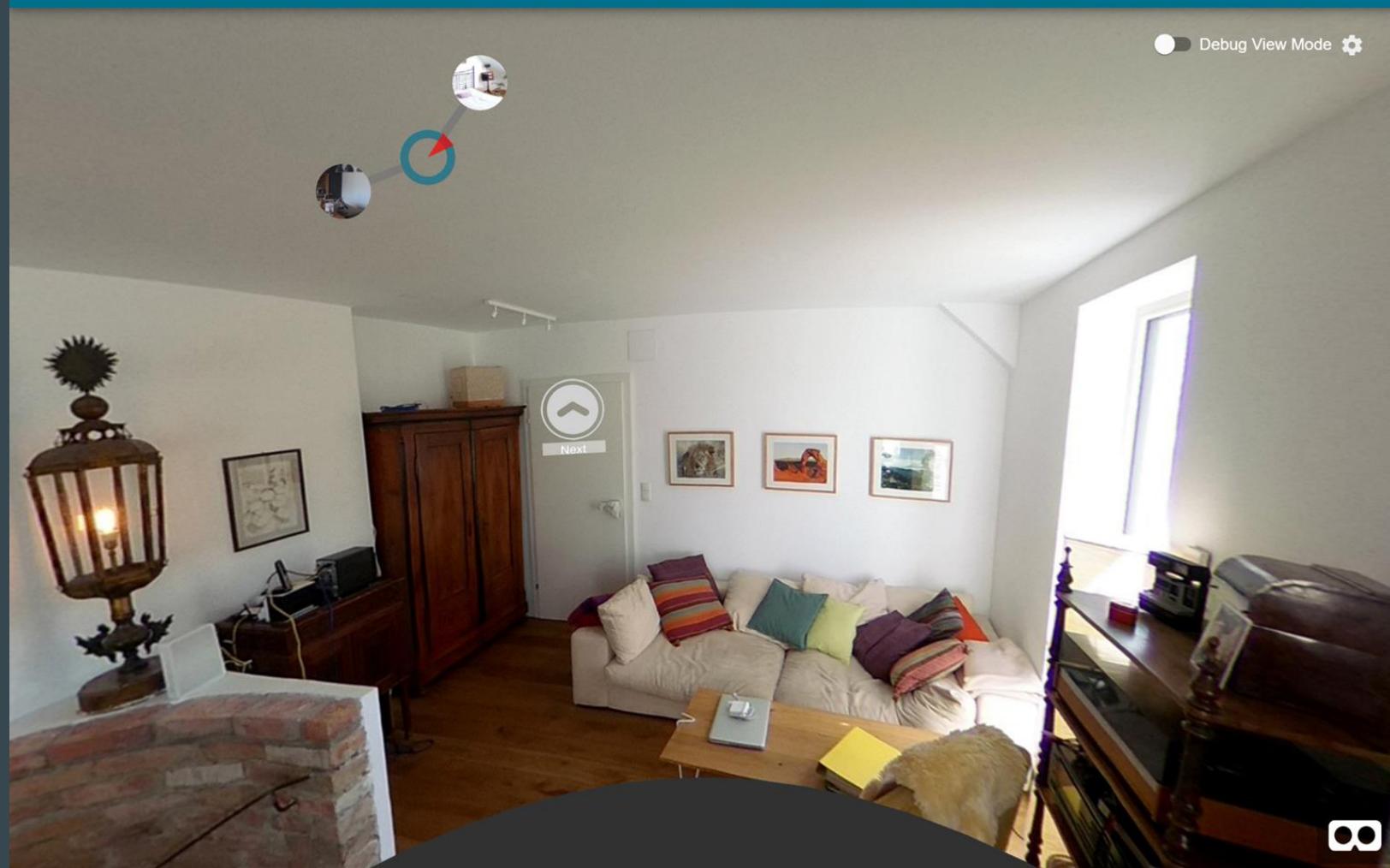
hubitation finals, Frankfurt am Main, 12.09.2019; Photographiert von Marc Strohfeldt - www.nachelf.de

13. SEPTEMBER 2019

f t in

Tolle Aussichten für das Wohnen der Zukunft

Die Startups frameless aus Wien und sphira aus Frankfurt haben die „hubitation finals 2019“ gewonnen und dürfen mit der

Debug View Mode 

Frameless Unique Selling Points



CREATE VIRTUAL TOURS ON-THE-FLY

Frameless enables real-time creation of virtual tours. No time-consuming manual steps or cloud-based processing.



WORKS WITH OFFLINE SMARTPHONE

No Internet connection necessary for creation and enrichment. Create virtual tours anywhere directly on your smartphone.



3D CONTENT MANAGEMENT ON ANY DEVICE

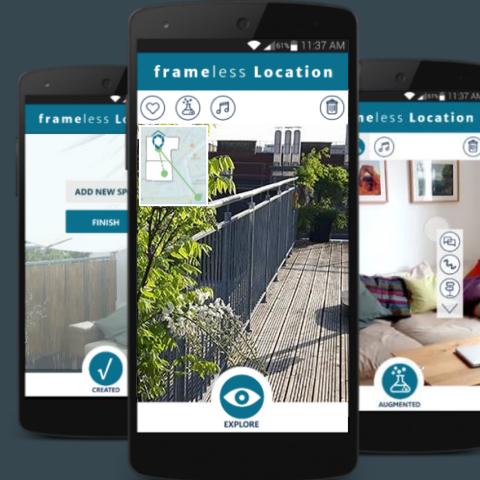
Embed additional media on any device; with a smartphone on-location, or your computer back at the office.



3D INTELLIGENCE & UNDERSTANDING

Frameless' 360 AI Engine automatically understands the captured environment:

- Object recognition & scene classification
- 3D model and floorplan generation
- Metric distance measurements



Frameless mobile solution for content creation & management.



Frameless AI Engine: Detect objects and generate 3D geometry of entire rooms.



Frameless Target Market



The Stringer



The Globe Trotter



The House Flippers



The Austrian Real Estate Agent

Frameless Competition

	 frameless	 iStaging	 EYE SPY 360	 immoviewer	 HOLO BUILDER	 REALNAUT	 GIRAFFE 360*	 matterport*
Type of Virtual Environment	360°	360°	360°	360°	360°	360°	360°	360° + 3D Point Cloud
Share with Link & Explore on any Device	✓	✓	✓	✓	✓	✓	✓	✓
App: Capture with External Camera	✓	✓	✓	✓	✓	✓	✓	✓
App: Capture with Smartphone Camera Only	✓	Extra lens & rotator	Extra lens & rotator					
App: Automatic Creation of Virtual Environment	✓						Only in cloud, Panos need to overlap	Only in cloud, Panos need to overlap
App + Cloud: Enrichment with Media	✓							
Cloud: 3D Analytics of Spatial User Engagements	✓							✓
Cloud: AI Scene Understanding	✓							✓
Cloud: AI 3D Model & Floorplan Generation	✓		Semi-Automatic (24h)				✓	✓
Integration in 3 rd Party Software & Platforms (SDK)	✓		✓		Plugin for Autodesk			✓ (closed version)

Frameless Traction

Test Customers of Closed Beta (Selection) | Q1-Q2 2019



StoreBox is a growing self-storage solution company, who used Frameless to create immersive tours of their units to reduce wasted site views before booking a unit.



Römer Real is an Austrian real estate agency currently testing Frameless within one of their portfolio properties to improve the sales process.



Paid Alpha Pilots | Q3-Q4 2018



We captured the entire “City of The Future” project for the City of Vienna’s community housing platform and showcases to potential customers.

CitY of +Vienna

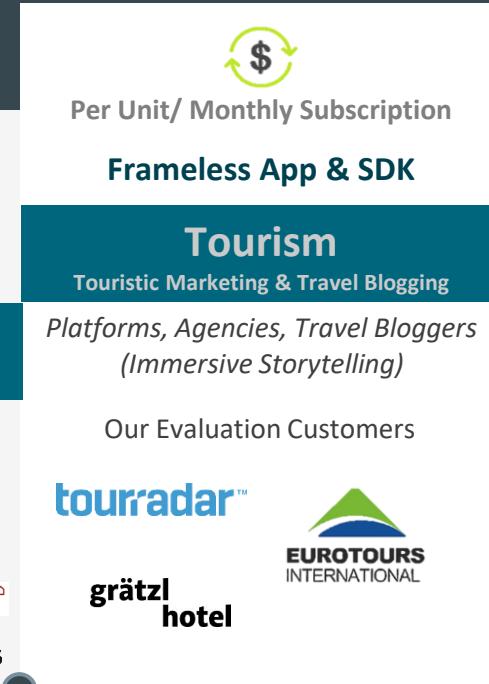
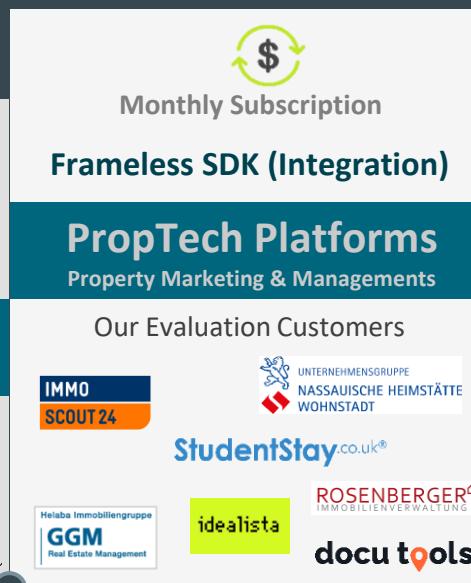
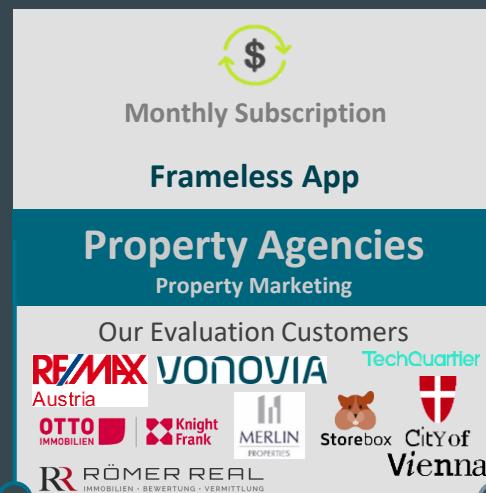


ORF tested and used our technology to create immersive backstage tours of their studios, and will use it for immersive storytelling of their news.

ORF

Growth Strategy

SaaS-based
Model



Revenue

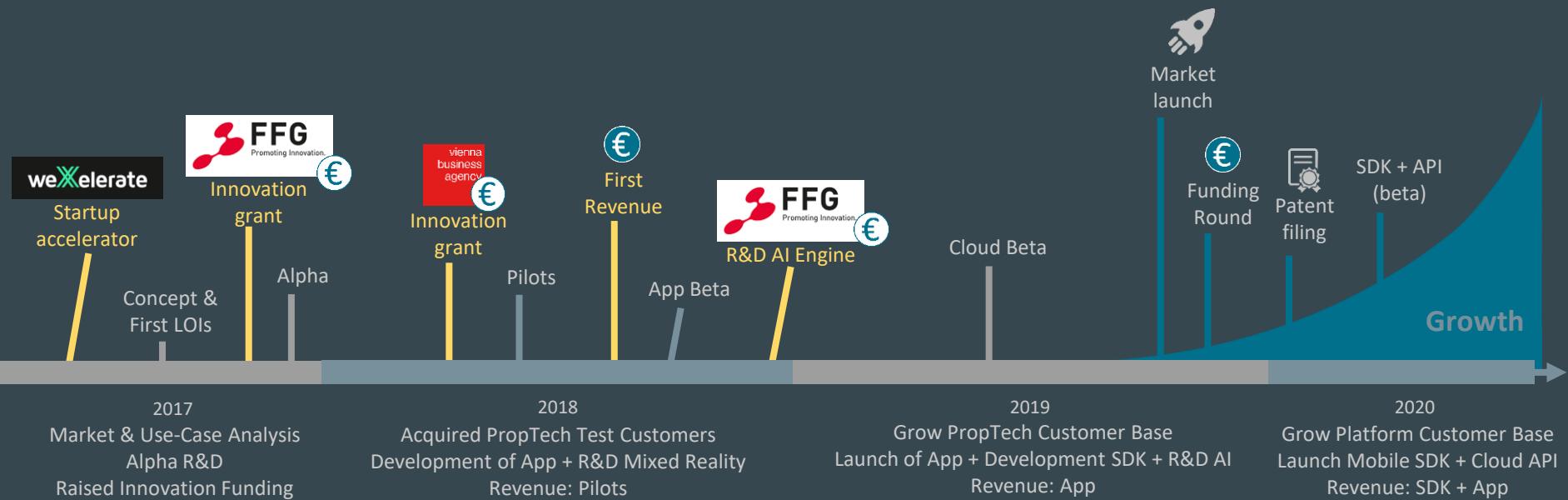


Our Vision:
Immersive Social Media



Immersive Blogs,
Immersive (Shared) Stories

Funding & Progress



Raised €300k

€220k several innovation subsidies + private

Two Pilot Projects

€35k generated revenue

Beta App ready

Market launch Q4/19 (free trial + subscription model)

Frameless Project Mgmt

- Atlassian
 - Confluence
 - Jira
 - Kanban
 - Bitbucket
- Jenkins
- Docker

