

Ground Truthing and Virtual Field Trips

Oliver Dawkins

Building City Dashboards

Maynooth University

Maynooth, Ireland.

Oliver.Dawkins@MU.ie

Gareth W. Young

V-SENSE

Trinity College Dublin

Dublin, Ireland.

YoungGa@TCD.ie



Workshop Aims

- Promote a mixed-reality research paradigm supporting mutual exploration and engagement with both physical and virtual spaces
- Encourage the use and co-creation of virtual environments as a means of promoting active learning
- Demonstrate how virtual environments can be created inexpensively from mobile phone images and recorded sounds
 - Capturing images and sound
 - Generating 3D models from captured images
 - Assembling virtual environments in a game engine
 - Hosting virtual environments in Social VR



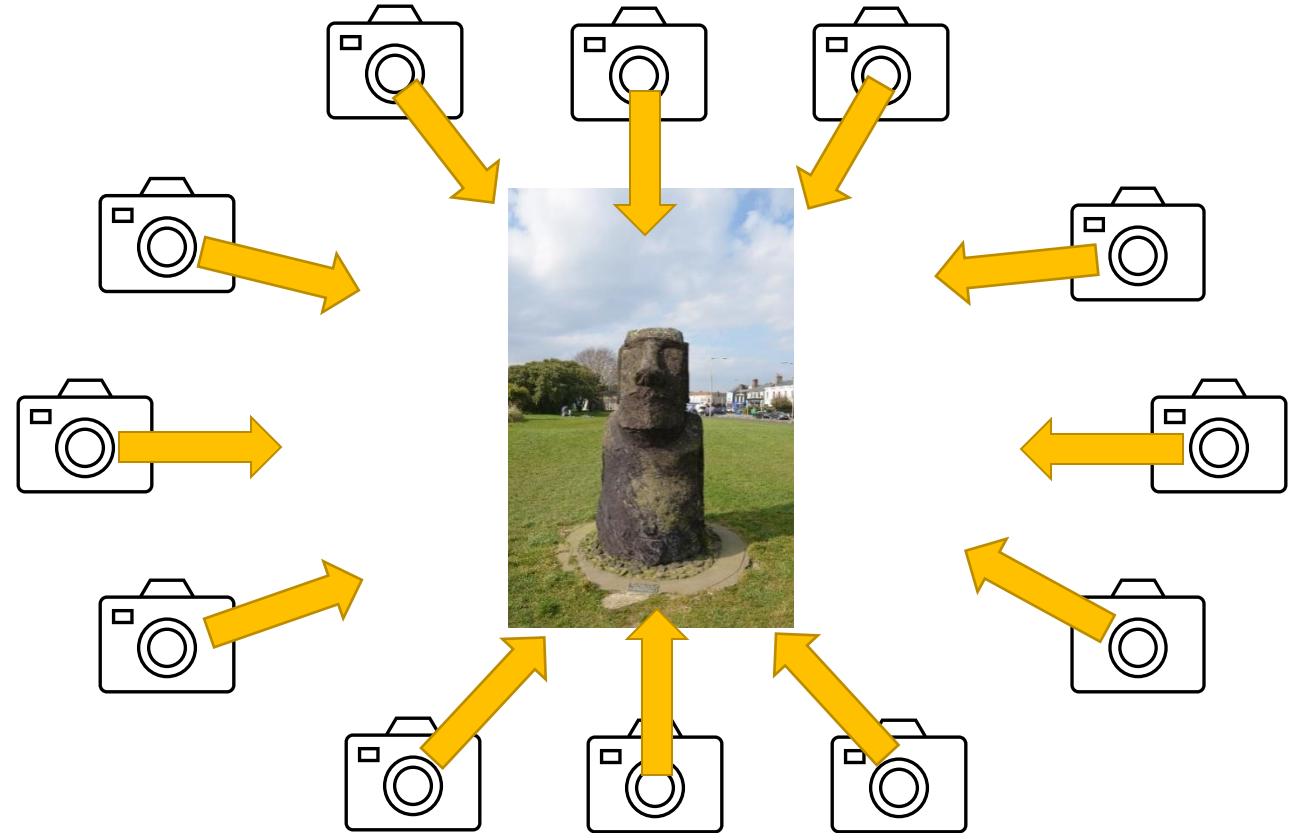
Capturing Ground Truth



Image Capture for Photogrammetry

- Take pictures from all possible angles
- Take overlapping images
- Fill each image with the object
- Include the background to help the Meshroom software identify camera orientation
- The object or area should be well lit
- Ideally shoot in indirect or diffused light (a slightly cloudy day is good)
- Avoid using flash
- Avoid reflections and transparent objects
- Avoid single coloured surfaces
- You can take close-ups for added detail where needed
- Moving objects don't work
- More images are better than less. Images that don't work can be omitted later.
- Avoid changing focal length and shallow depth of field
- Consider using manual camera settings

The quality of your images is the most important and possibly challenging part of the process as it will have dramatic effects upon the quality of the final 3D model



Example



1



2



3



4



5



6



7



8



9



10



11



12



13



14



15



16



17



18



19



20

There's a whole community doing this on Sketchfab...



Tyrconnell Tower

3D Model



39

+ Add To < Embed > Share

Report

Triangles: 558.4k Vertices: 280.1k [More model information](#)

No description provided.

Published a year ago

Uploaded with [Blender exporter](#)

No category set.

No tags set.



York Minster Bronze Model

3D Model



32

+ Add To < Embed > Share

Report

Triangles: 576.8k Vertices: 289.8k [More model information](#)

A photoscan of the bronze model of York Minster which was designed to be tactile and incorporates braille for blind and partially sighted visitors.

The photoscan was an initial test using meshroom to generate the mesh and blender to decimate it. The initial images were captured with the iPhone 6s. While the scan lacks detail its texture shows the patina developing on the bronze model.

Published a year ago

Uploaded with [Blender exporter](#)

No category set.

meshroom photoscan blender



Grand Canal Sign Dublin

3D Model



5 36 2


Download 3D Model + Add To < Embed > Share

Report

Triangles: 391.5k Vertices: 196.6k [More model information](#)

Grand Canal Dock (Irish: Duga na Canálach Móire) is a Southside area near the city centre of Dublin, Ireland.

License: [CC Attribution-NonCommercial-ShareAlike](#) [Learn more](#)

Compatible with: 

Published a year ago

Uploaded with [Blender exporter](#)

Cultural Heritage & History 3D Models Places & Travel 3D Models

Ireland sign dublin structure-from-motion meshroom grand-canal-docks

kglover1 and charley309 liked this model

...including major heritage groups and museums!

Sketchfab EXPLORE BUY 3D MODELS FOR BUSINESS Search 3D models LOGIN SIGN UP UPLOAD

The British Museum PRO London, UK
A museum of the world, for the world.
FOLLOW CONTACT 16.5k Followers 75 Followings

SUMMARY 257 MODELS COLLECTIONS 175 LIKES

POPULAR 3D MODELS [View all \(257\)](#)

- Granite head of Amen... 141.8k views 54 likes 776
- Hoa Hakananai'a 46.4k views 22 likes 449
- The Rosetta Stone 188.7k views 15 likes 376
- Horus (Falcon) 23.6k views 17 likes 340
- Stone figure of Xiucoat... 21.1k views 17 likes 338
- Seated statue of Amenh... 27.9k views 10 likes 258

ABOUT
The British Museum was founded in 1753, the first national public museum in the world. From the beginning it granted free admission to all 'studious and curious persons'.

CATEGORY
Organization / Museum

WEBSITE
<http://britishmuseum.org/>

MEMBER SINCE
October 8th 2014

STATS
1.2M views
11.5k likes
172.0M triangles
87.3M vertices

SKILLS
Blender GIMP Photogrammetry
Photoshop

The British Museum on Sketchfab: <https://sketchfab.com/britishmuseum>

Sketchfab EXPLORE BUY 3D MODELS FOR BUSINESS Search 3D models LOGIN SIGN UP UPLOAD

CyArk PREMIUM Oakland, CA
Digitally preserving the world's cultural heritage
FOLLOW CONTACT 496 Followers 5 Followings

SUMMARY 187 MODELS COLLECTIONS 143 LIKES

POPULAR 3D MODELS [View all \(187\)](#)

- Gateway Of India - Mumbai 5.9k views 5 likes 82
- Stonewall Inn Interior, NYC 3.5k views 4 likes 59
- Thomas Jefferson Memorial, ... 2k views 4 likes 50
- Mount Rushmore 24.3k views 4 likes 42
- Fountain of Peirene, Corinth 2k views 4 likes 38
- Chichén Itzá - Caracol 4.1k views 3 likes 35

ABOUT
Spurred by the Taliban's destruction of the 1600-year-old Bamiyan Buddhas in Afghanistan, CyArk was founded in 2003 to ensure heritage sites are available to future generations, while making them uniquely accessible today.

CATEGORY
Organization / Non Profit Organization

WEBSITE
<http://cyark.org/>

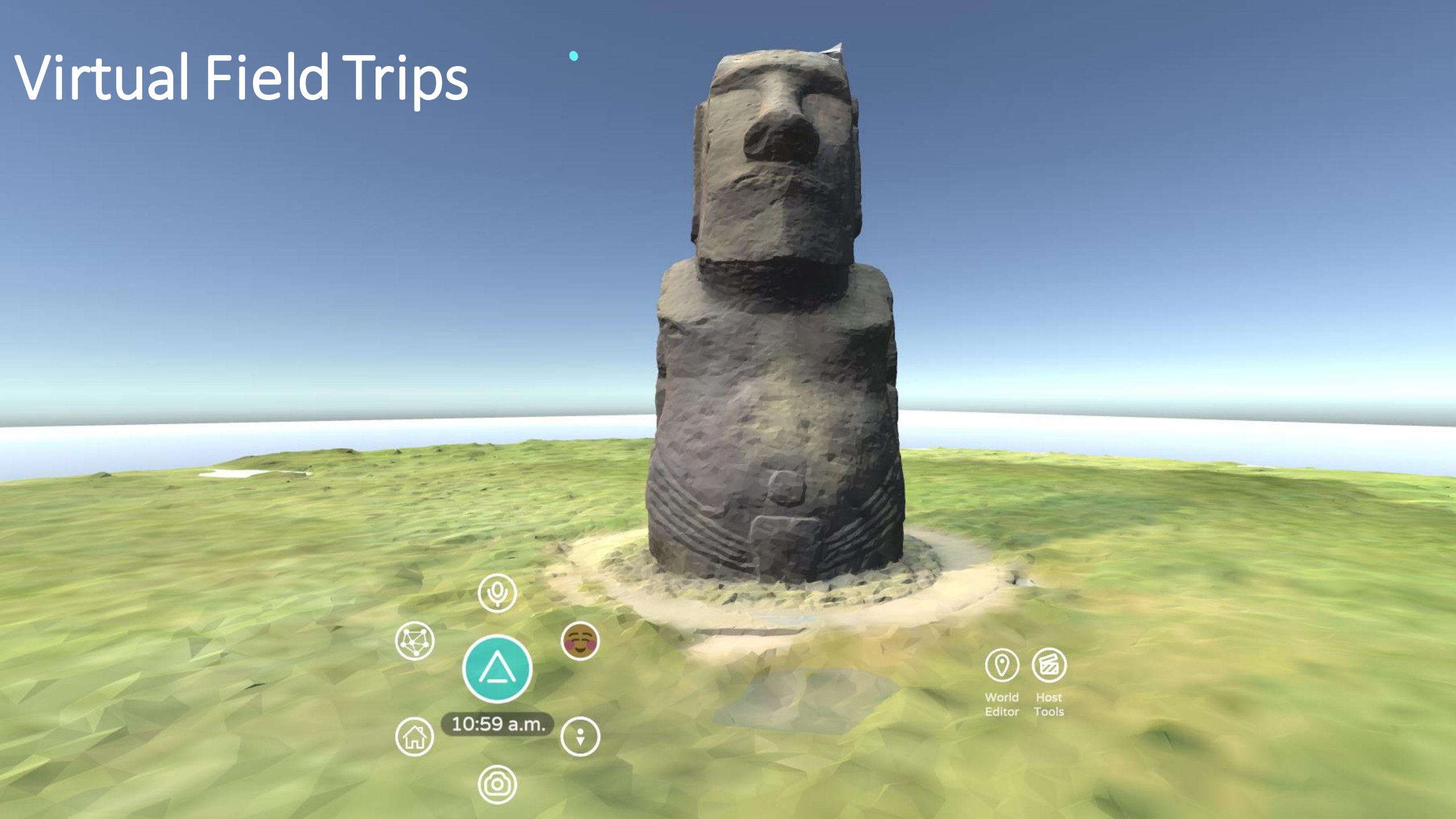
MEMBER SINCE
November 25th 2013

STATS
128.5k views
966 likes
145.9M triangles
105.2M vertices

SKILLS
3D Reconstruction 3ds Max AutoCAD
Blender Cinema 4D Maya Mudbox
Photogrammetry Photoshop Rhino
SketchUp Unity Vray

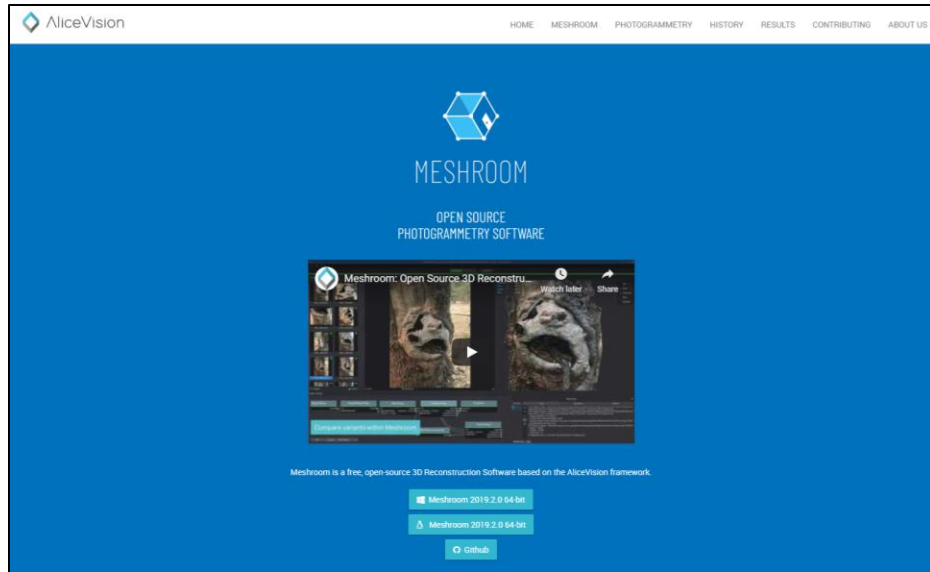
CyARK on Sketchfab: <https://sketchfab.com/CyArk>

Virtual Field Trips

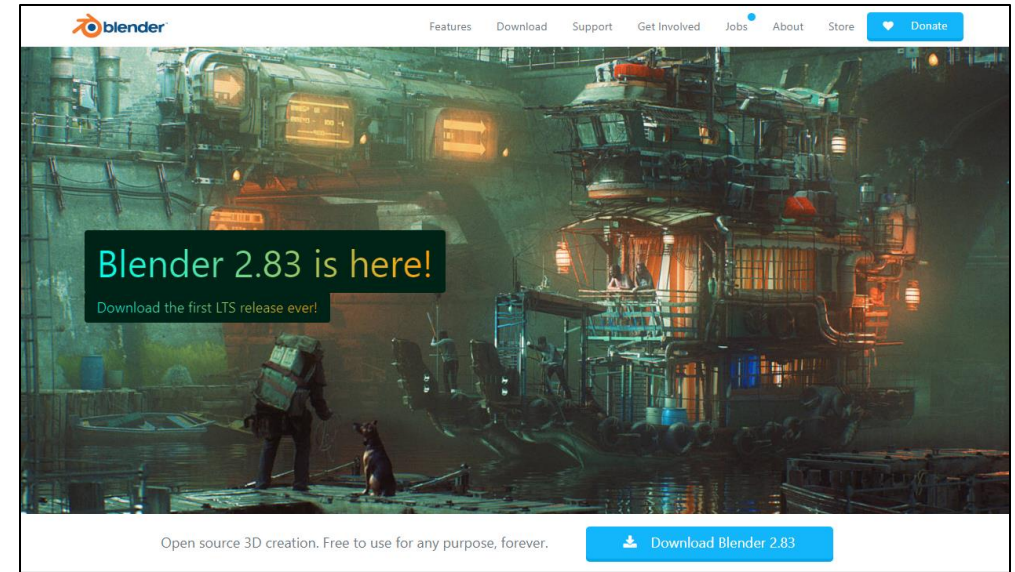


World Editor
Host Tools

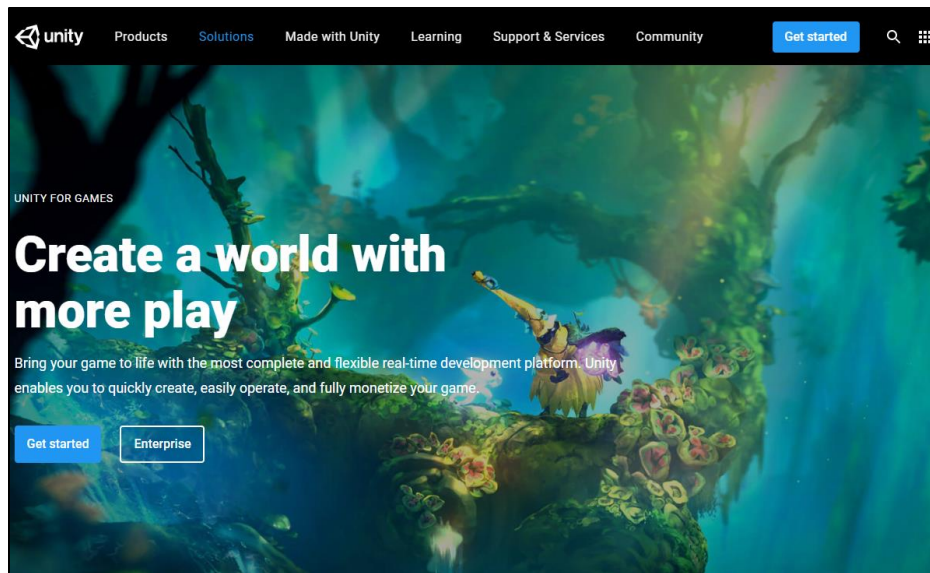
Software: Free To Use / No Code Required



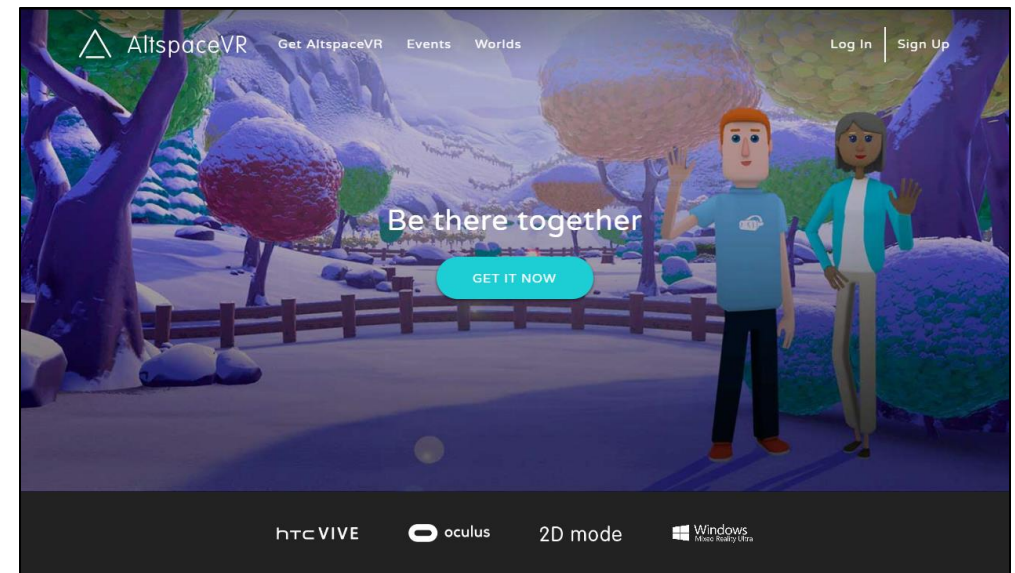
Meshroom: <https://alicevision.github.io/#meshroom>



Blender: <https://www.blender.org/>



Unity: <https://unity.com/>



AltspaceVR: <https://altvr.com/>

Photogrammetry and World Building Workflow

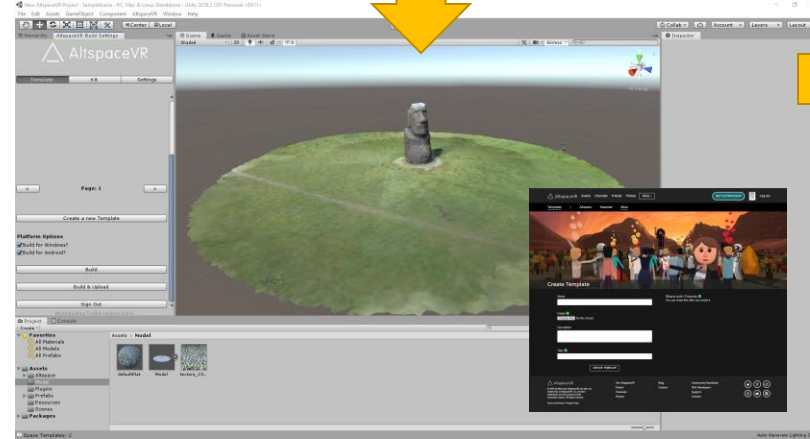
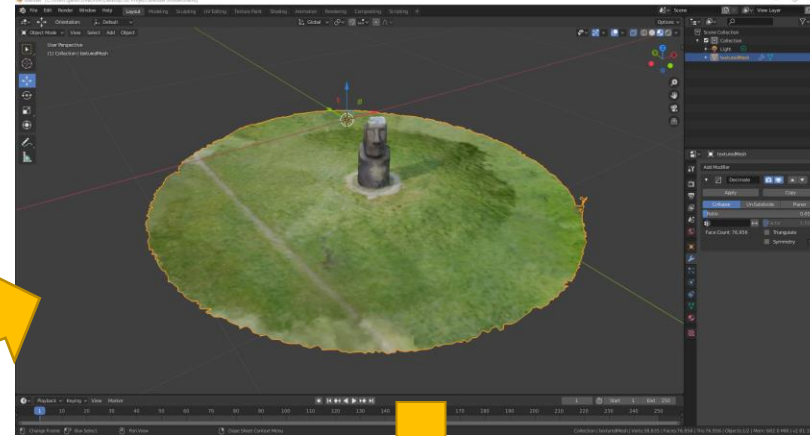
1. Capture Media



2. Automated photogrammetry using Structure from Motion in Meshroom



3. Clean up and simplify 3D models in Blender

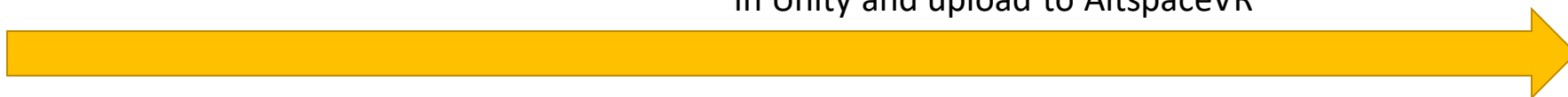


4. Assemble 3D scenes from captured media in Unity and upload to AltspaceVR



5. Meet your students, colleagues or friends on location in AltspaceVR

Physical Environment



Virtual Environment

Project Website and Workshop Materials

- Workshop proposal
- Workshop presentation and guides
- Video Tutorials
- Project Paper
- Further Information

Ground Truthing and Virtual Field Trips

About Presenters Map Contact

Ground Truthing and Virtual Field Trips

iLRN 2020 Workshop

About

This workshop will provide iLRN 2020 delegates with an opportunity to extend their knowledge of shared immersive virtual environments (IVEs) in the context of teaching and learning through co-creation. The workshop will begin by outlining methods for capturing digital media in-situ, establishing the 'ground truth' of a place as both teaching preparation and as a learning activity in its own right.

The workshop will then demonstrate how data captured in physical locations can be incorporated into online 3D models that can be experienced via social virtual reality (VR) as a 'virtual field trip'. This activity highlights the active and constitutive role of the student in the selection and capture of data representing their environment, and its value as a means for encouraging active learning through imaginative engagement with the creation of IVEs.

Workshop participants will be taken on a virtual expedition into one such model to stimulate further discussion about how these environments can be used to promote active learning. While the session focuses on the use of captured media to establish the ground truth of a location, the session will also consider the further potential of social IVEs as opportunities for storytelling, repositories of shared experience, and as a means for imagining and experimenting with counter-factual histories and alternative futures.

For more information read the workshop proposal: [Ground Truthing and Virtual Field Trips](#)

Ground Truthing and Virtual Field Trips –iLRN2020 Workshop Website
https://virtualarchitectures.github.io/ground_truthing_and_virtual_field_trips/

Time to Explore the Dublin Docklands in AltspaceVR!





Thank You!



Oliver Dawkins

Building City Dashboards

Maynooth University

Maynooth, Ireland.

Oliver.Dawkins@MU.ie

Gareth W. Young

V-SENSE

Trinity College Dublin

Dublin, Ireland.

YoungGa@TCD.ie



**Social
Sciences
Institute**

