

Introduction to *Augmented Reality* for Teaching and Learning

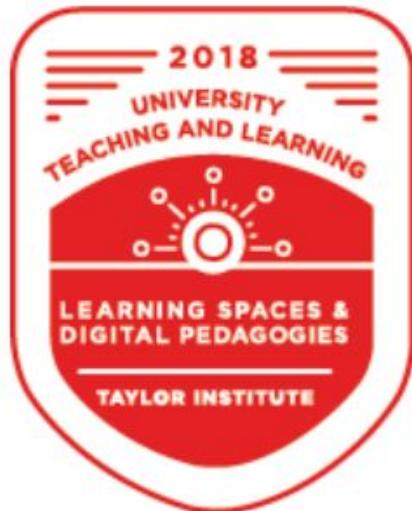


Laura L. Perissinotti
Isadora Mok-Kulakova
Kevin Saito

An important reminder

Please sign in!

*If your name is not on the sign-in sheet, please add it together with your email address – you will be registered after the course.



This badge is part of the **Postdoctoral Scholar** and **Graduate Student** Certificates in University Teaching and Learning program.

<https://taylorinstitute.ucalgary.ca/certificates>

Today's Outcome



Have Fun!

- ▶ **Explore** the uses of Augmented Reality in Teaching and Learning.
- ▶ **Experience** Augmented Reality by using different education resources available online.
- ▶ **Construct** learning materials that superimpose digitally generated objects on the user's view in a composite view of the real world.

<https://developers.google.com/ar/discover/supported-devices>

Augmented Reality ?



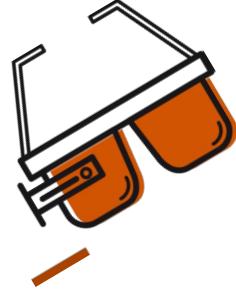
Google Translate supports over **100 languages** at various levels and as of **May 2017**, serves over **500 million people daily** and supports **Word Lens-based augmented reality translations for 30 languages**.

Google Neural Machine Translation (GNMT) is a [neural machine translation](#) (NMT) system developed by Google and introduced in November 2016

Augmented Reality (AR) science-fiction **concept** to a science-based **reality**.

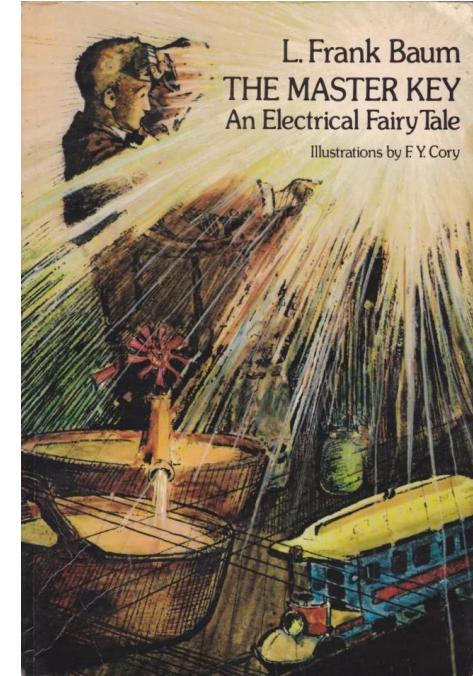


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"It consists of this **pair of spectacles**. While you wear them **every one** you meet will be **marked** upon the forehead with a letter **indicating his or her character**."

Want to know more about AR History?

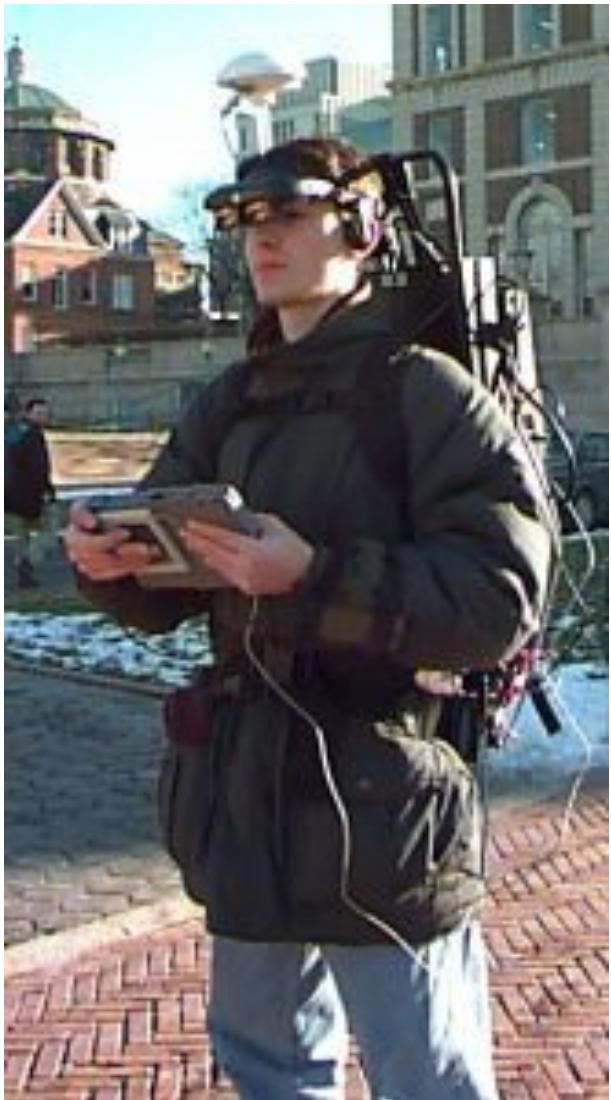


This character marker has been viewed retrospectively as an early foreshadowing of features analogous to those obtainable in augmented reality devices.

Lyman Frank Baum (May 15, 1856 – May 6, 1919) was an American author chiefly famous for his children's books, particularly The Wonderful Wizard of Oz and its sequels.



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Mobile Backpack augmented reality, *The Touring Machine*, developed at Columbia University starting in **1996**, was the first mobile augmented reality system (MARS) that did graphical augmented reality.

It combined:

- **head-mounted display,**
- **handheld tablet display, and a**
- **backpack with computer, GPS, and Internet connection.**

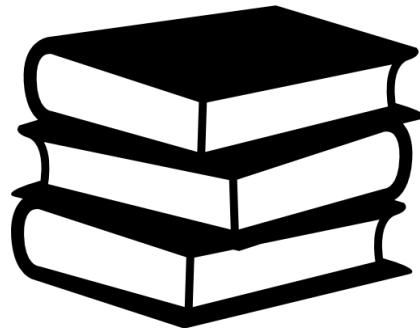
Feiner, S., MacIntyre, B., Höllerer, T., & Webster, A. A touring machine: Prototyping 3D mobile augmented reality systems for exploring the urban environment, Proceedings First IEEE International Symposium on Wearable Computers (ISWC '97), 1997, pp 74–81. Cambridge, MA.

http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=629922

<https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=629922>

Augmented Reality (AR)

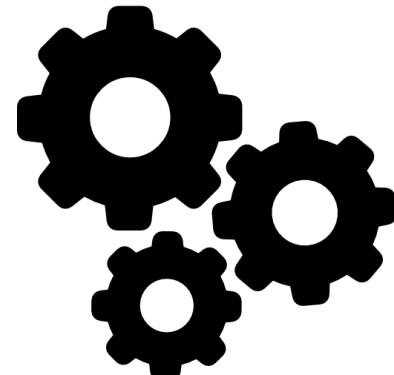
Definition



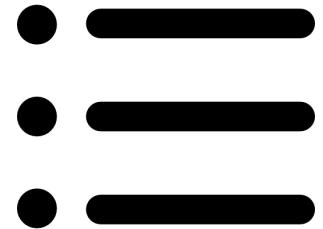
Making Sense



How it Works

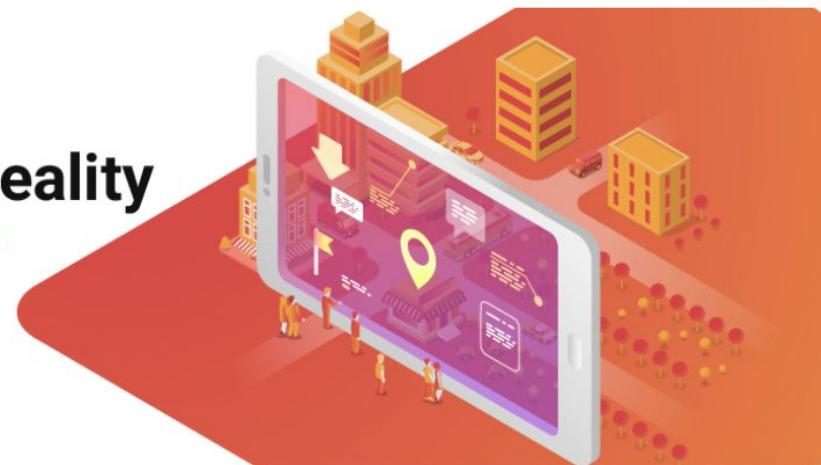


Types



Click on the pictures to access more information, then “Go Back”

Augmented Reality
RealityTechnologies.com



Mixed Reality (MR)

<https://www.media.mit.edu/projects/inertia/overview/>



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More Examples!

<https://er.educause.edu/blogs/2018/8/using-augmented-reality-to-promote-making-with-understanding>

Augmented Reality & Education

Why?

- Interactive learning
- Portable and less expensive materials: cellphones, tablets
- Foster intellectual curiosity
- Enrich ways of telling a story
- Visit different times: past/present/future, scales: micro & macro universes
- Increase sensory experiences

TOOLBOX

SCIENCE GOES VIRTUAL

Virtual—and augmented-reality tools allow researchers to view and share data as never before. But so far, they remain largely the tools of early adopters.



BY DAVID MATTHEWS

As I put on a virtual-reality (VR) headset, the outside world disappears. A cell fills my visual field, and as I turn my neck, I can move from side to side. I stick my head inside to explore its internal structures. Using hand controllers, I dissect the cell layer by layer, excavating with a flick of the wrist to uncover the specialized structures buried beneath the surface.

Looking at a cell in VR is “as close as you can get to touching” such a microscopic structure, says Sebastian Korral, product manager for VR at Arvato, a life-sciences software company in Munich, Germany, that developed this particular VR viewing tool, CellView!, and who went to arrange an interview with me. VR isn’t new, but interest in the technology has boomed since 2016, when gamers and a handful of scientists produced several high-quality, relatively inexpensive commercial VR headsets.

Technology that uses a see-through visor or smartphone screen to layer objects on top of real surroundings.

Some scientists see VR and AR as more intuitive to scientific communication than the viewing complex 3D structures. Others have sought cheap, smartphone-based headsets, which use a smartphone screen as the goggles, to increase public understanding of science. And some have developed their own VR and AR mobile apps.

VR and AR remain niche tools for scientific research. Yet some researchers say that the

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Augmented Reality & Education

Use Cases

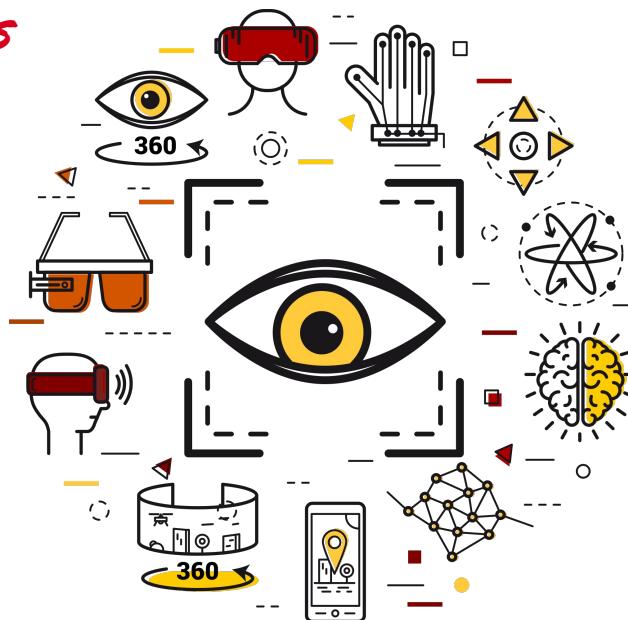
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TOURS

HISTORY
Heritage sites and
pieces, museums

DESIGN

3D MODELING IN SCIENCE
Biology/Anatomy/Chemistry/Math

STORYTELLING



LANGUAGE

DOCUMENTATION
Equipment Manuals

ART

Drawing,
galleries,
exhibitions

Activity Plan for Today



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Explore

*Augmented Reality
Applications in Education.*

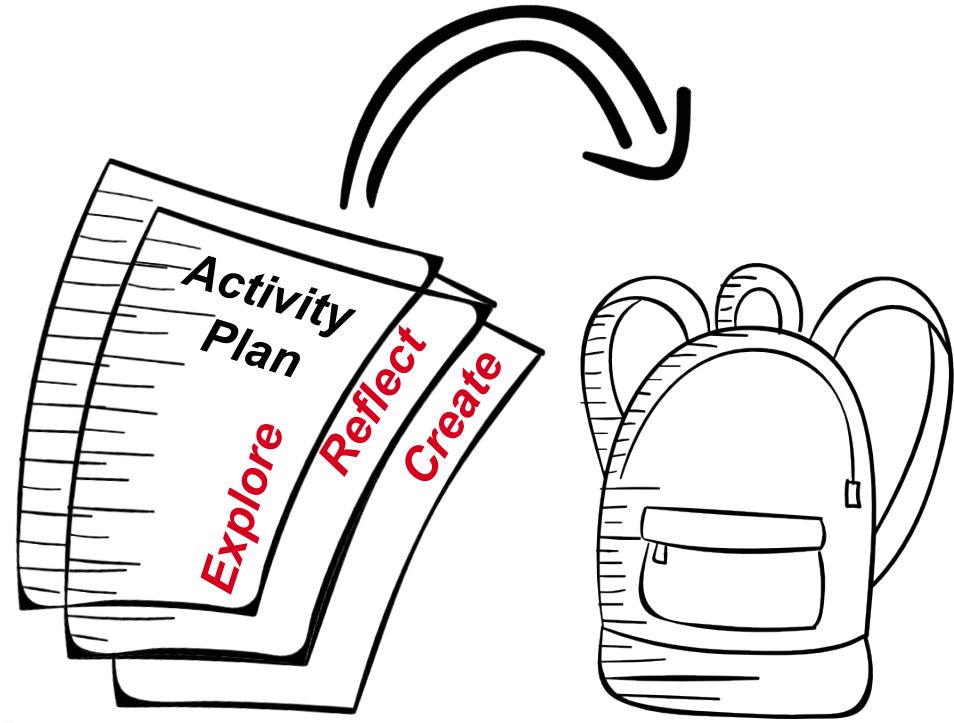
Reflect

*How to use Augmented Reality
in your classroom.*

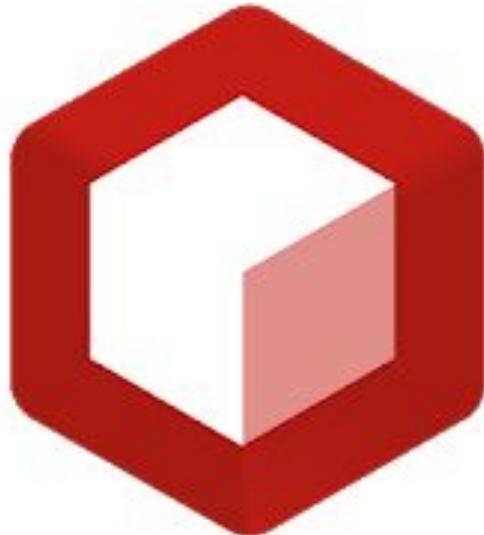
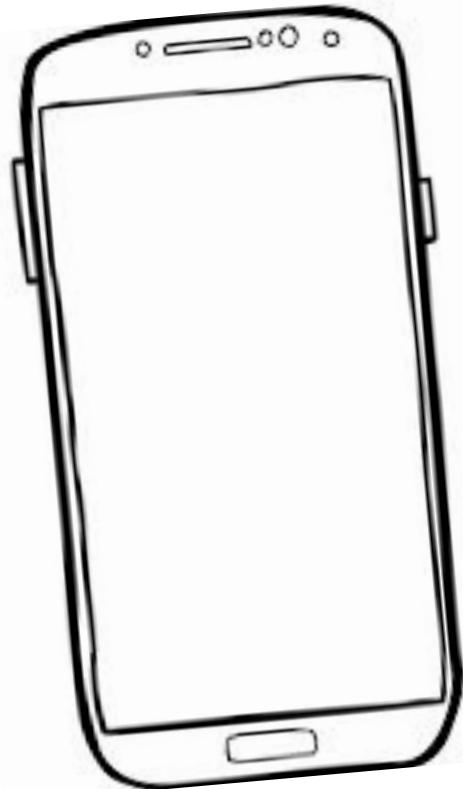
Create

*Augmented Reality resources
using a cellphone App and
web-based tools.*

OPTIONAL



Working Tools



 AUGMENT

Leverage the most advanced augmented reality viewer supporting ARKit & ARCore

<https://developers.google.com/ar/discover/supported-devices>

Explore



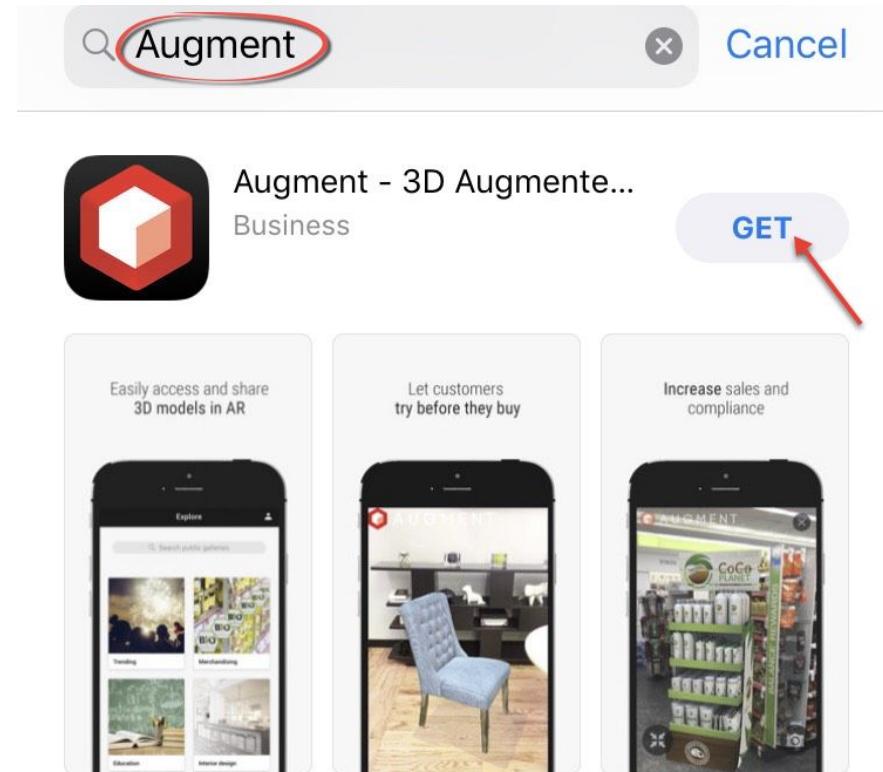
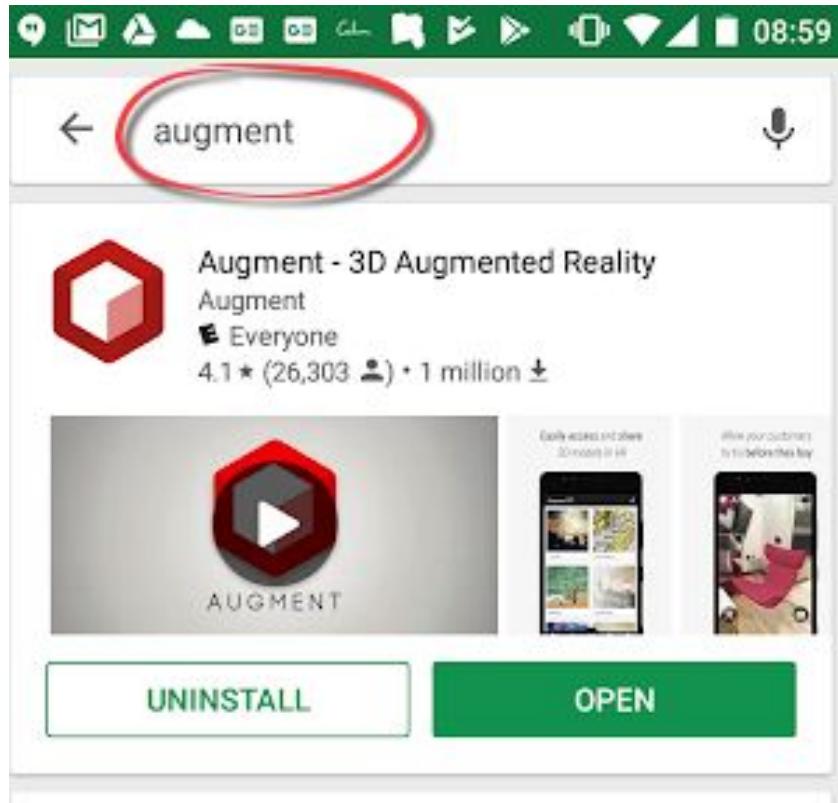
Let's experience some examples!



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Explore





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AUGMENT



Augment Apps

View your 3D models in AR
on your smartphone or
tablet for iOS & Android



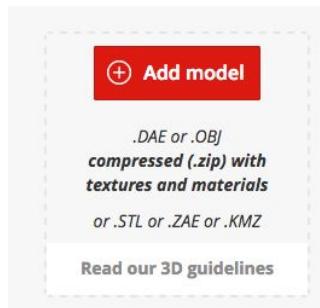
Augment Desktop

Preview & configure
your 3D models before
viewing them in AR

<https://www.augment.com/technology/augment-desktop/>

Augment Manager

Manage & share your 3D



<https://bbp.epfl.ch/nexus/cell-atlas/>

<https://help.augment.com/en/articles/2640646-3d-model-guidelines>

AUGMENT

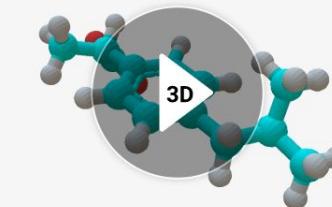
MY MODELS
All models 43
Unclassified 43
Create a folder

MY TRACKERS
MY ACCOUNT

LEARN & HELP CENTER

Log out

ibuprofens by llperiss



Edit

Scan to view in AR:



Sharing:



Copy link



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1-Open the App



2- Select a Model

AUGMENT

Welcome!

Start visualizing 3D models
in augmented reality

Explore Public Galleries

Already have an account? [Login](#)

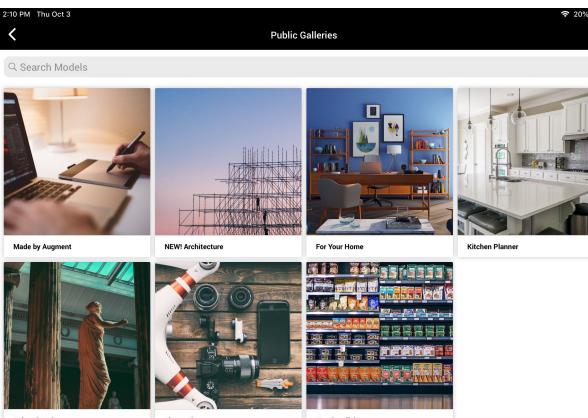
2:10 PM Thu Oct 3

Public Galleries

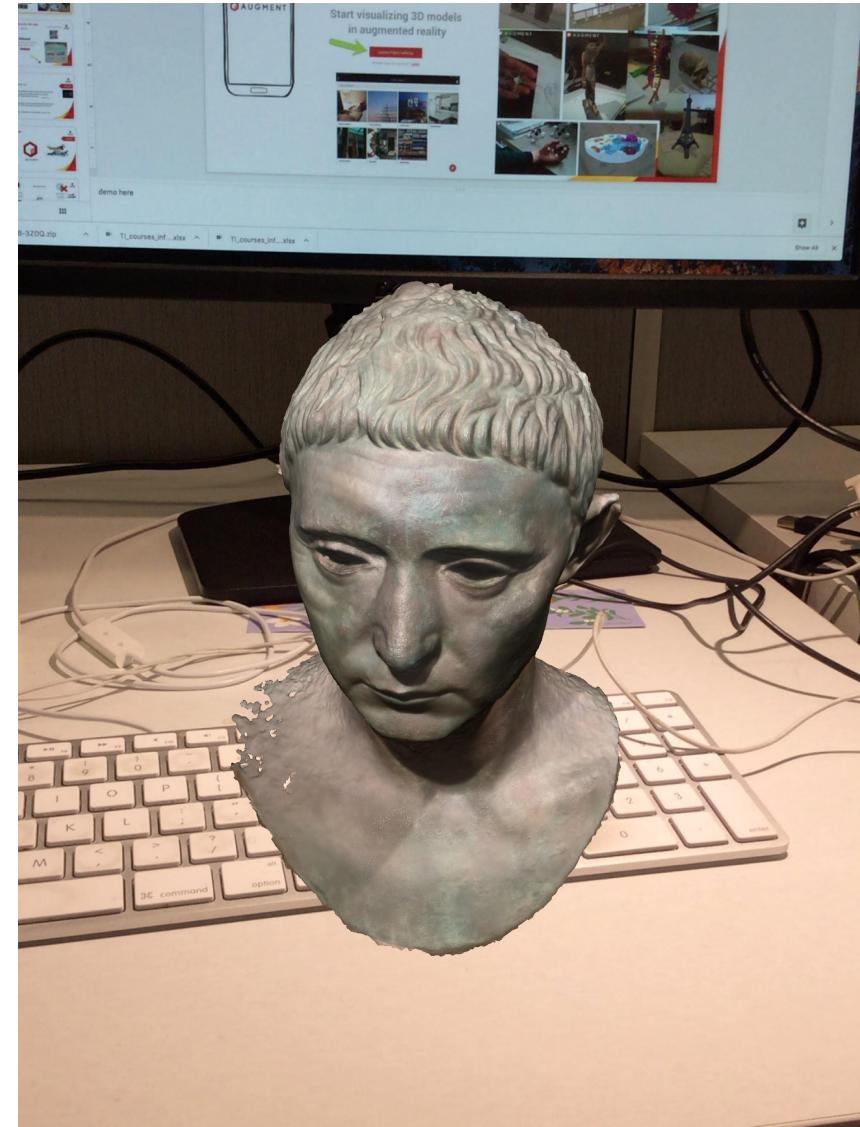
Search Models

Made by Augment NEW! Architecture For Your Home Kitchen Planner

Cultural Heritage Electronics Merchandising



3-Learn, Discover, Enjoy, Capture





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1-Open the App



2- Scan the QR code



3-Learn, Discover, Enjoy

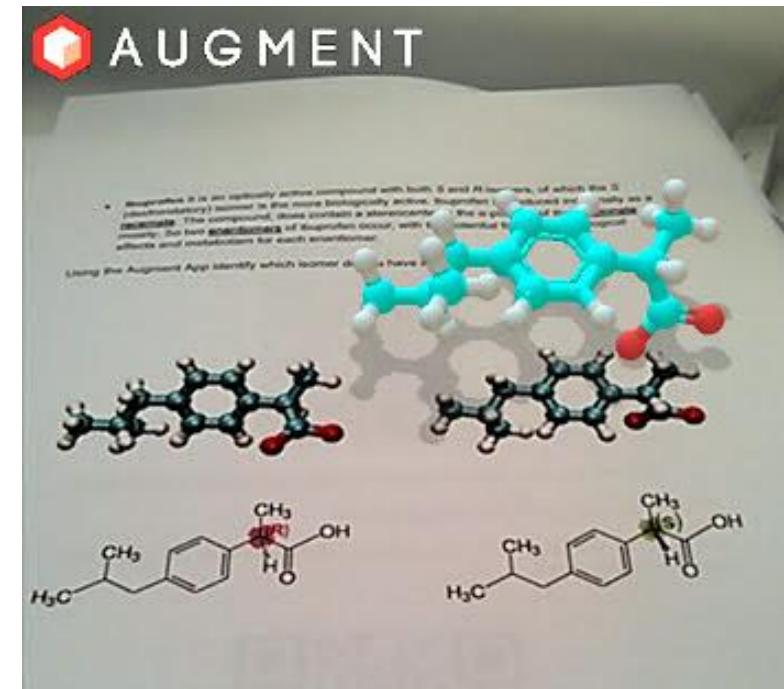
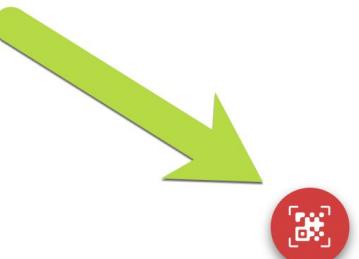


Welcome!

Start visualizing 3D models
in augmented reality

[Explore Public Galleries](#)

Already have an account? [Login](#)



Instructions:

- Choose a subject area
- Engage in the activities using the Augment App and think about how Augmented Reality (AR) can be used to enhance your Teaching and Learning.
- Where applicable, use the available physical models and objects and think about how they compare to the AR tool.
- Use the focus questions at each station to guide your reflection.



Explore

Augmented Reality & Education

Why?

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How would you use AR in your own classroom?



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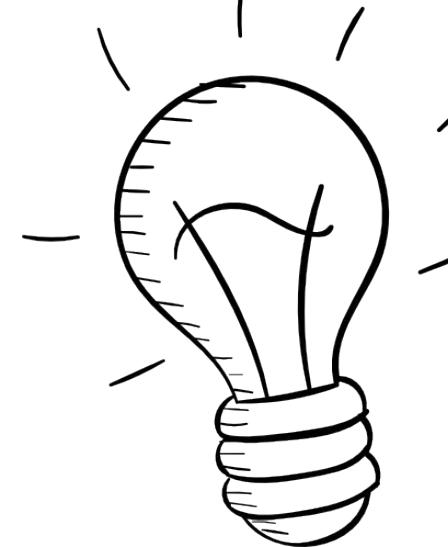
Reflect





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Have an Idea and need help?



Taylor Institute for Teaching and Learning:

<https://taylorinstitute.ucalgary.ca/>

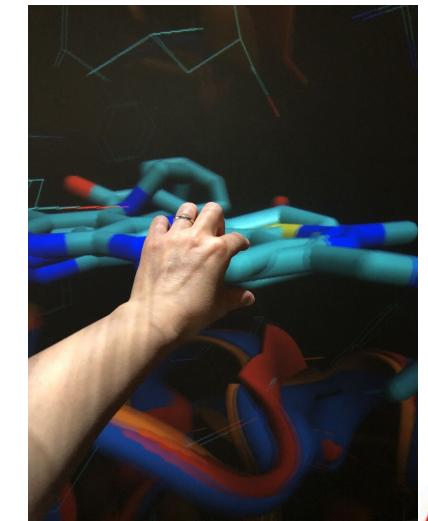
laura.perissinotti@ucalgary.ca

LabNext Makerspace at TFDL:

<https://library.ucalgary.ca/labnext>

CCIT Collaboration Centre:

<http://www.collaborationcentre.ca/>





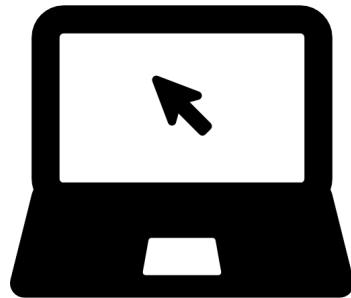
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Working Tools

OPTIONAL



AUGMENT



Create

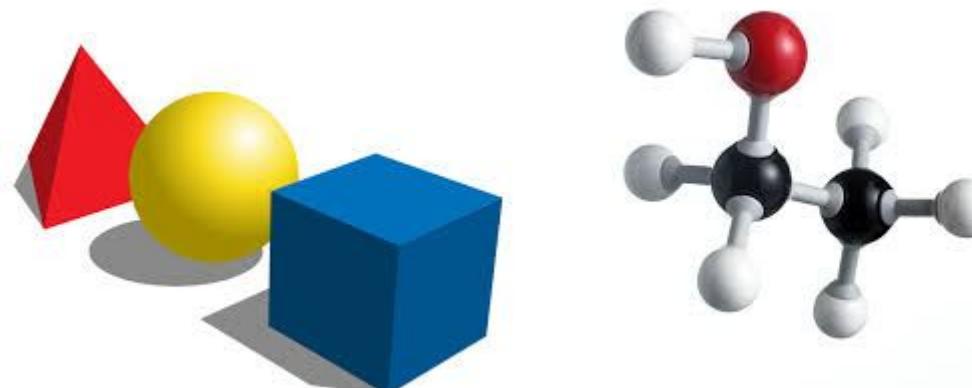
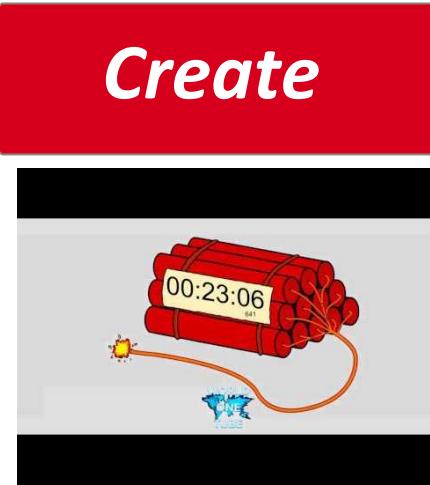
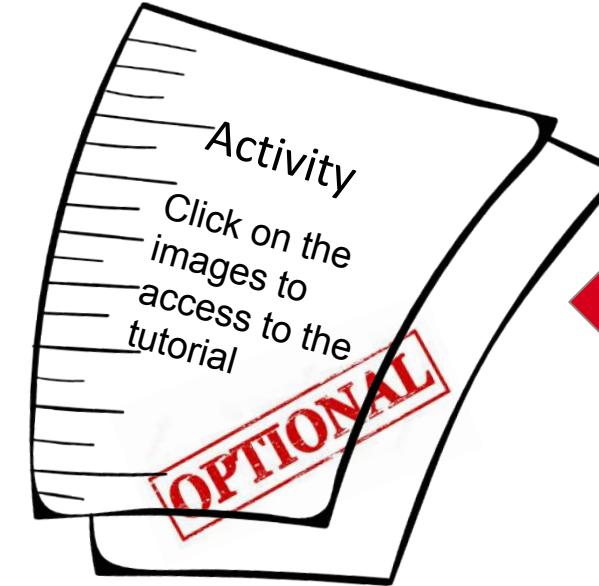
Create your Own Resource

1- *Create* 3D Object

2- Upload file object

3- Share your creation

4- Play & Learn with AR!



Resources

3D Modelling for Beginners:

Tinkercad: <https://www.tinkercad.com>

SketchUp: <https://www.sketchup.com>

molview: <http://molview.org>

Reality Convert: <http://www.realityconvert.com>

Advanced 3D Modelling:

3D Modelling for Engineers: AutoDesk Inventor, CATIA, IronCAD, Rhinoceros, PTC Creo Parametric, Solid Edge, SolidWorks, NX.

3D Modeling for Artists & Scientists: Blender, ZBrush, Maya, Pymol, VMD, Chimera.

3D Model repositories:

<https://sketchfab.com>

<https://artsandculture.google.com/project/cyark>

<https://poly.google.com>

<https://turbosquid.com/Search/3D-Models/free/blend>

<https://blendernation.com/category/art/repositories>

<https://3dprint.nih.gov>

Some tips about file formats:

<https://help.augment.com/en/articles/2640646-3d-model-guidelines>

<https://www.stratasysdirect.com/resources/tutorials/how-to-prepare-stl-files>

Apps & Tools Development:

<https://unity3d.com/>

<https://www.vuforia.com/>

Augmented Reality & Education

Use Cases

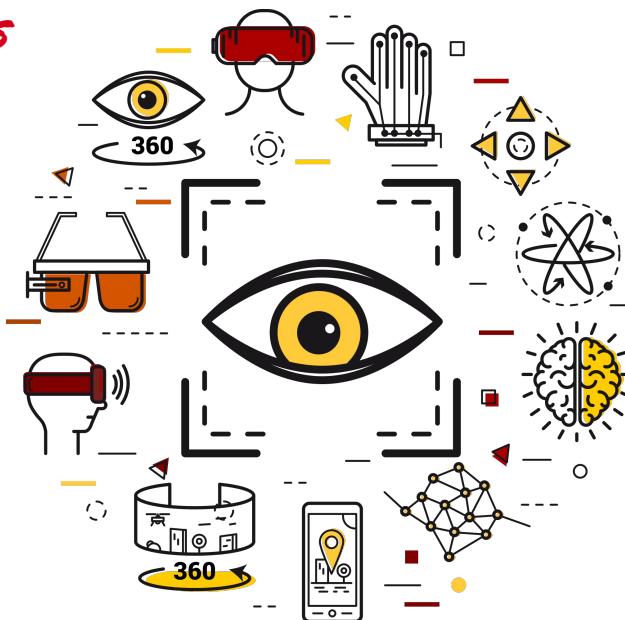
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TOURS

HISTORY
Heritage sites and
pieces, museums

DESIGN

3D MODELING IN SCIENCE
Biology/Anatomy/Chemistry/Math

STORYTELLING



LANGUAGE

DOCUMENTATION
Equipment Manuals

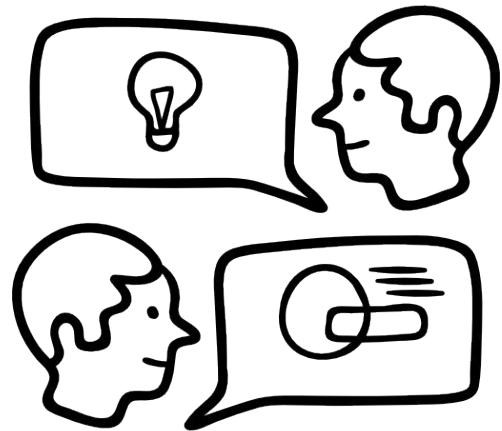
ART

Drawing,
galleries,
exhibitions

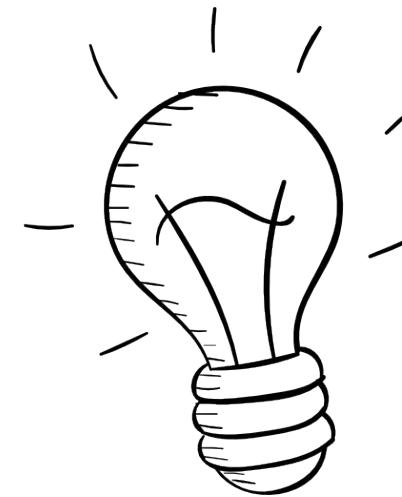
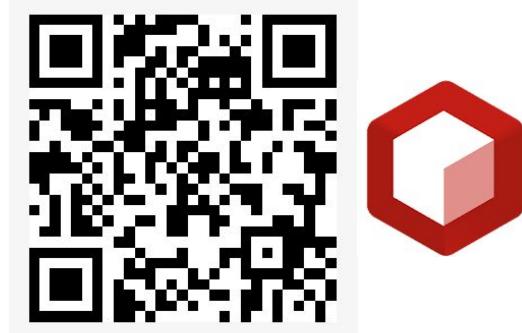


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Experiment



Share



be Creative



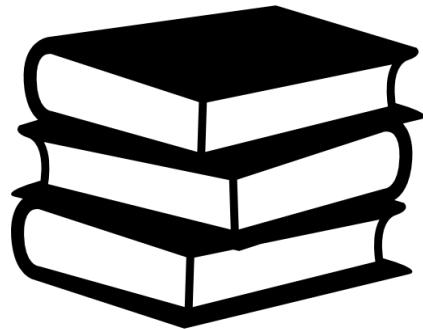
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Augmented Reality (AR)

Go Back

Definition



Technology that *superimposes a computer-generated image* on a *user's view* of the real world, thus providing an *enhanced version of reality* by adding information: graphics, sounds, and touch feedback.





Augmented Reality (AR)

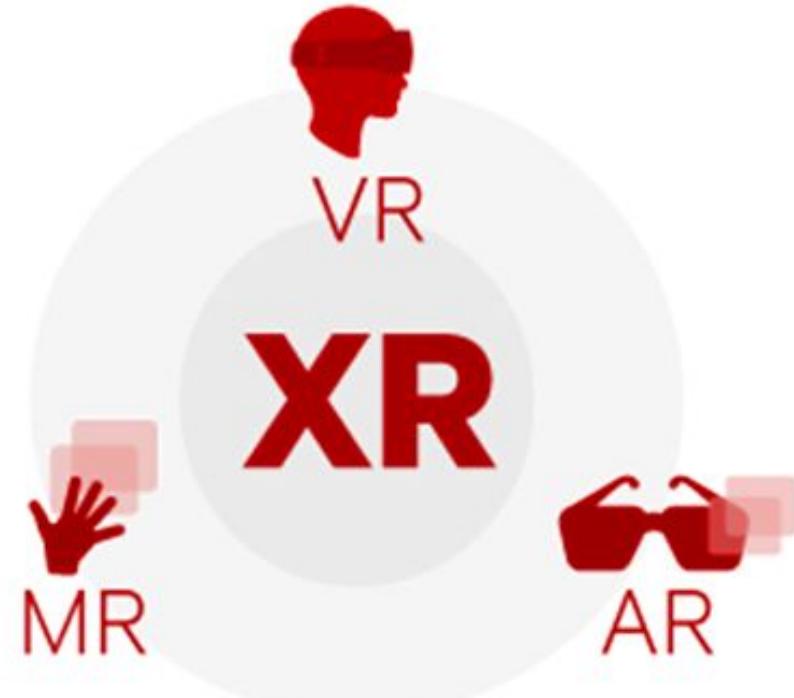
Go Back



Making Sense



- Augmented is *augment* → *to add or enhance something*.
- Provides cognitive support for difficult tasks



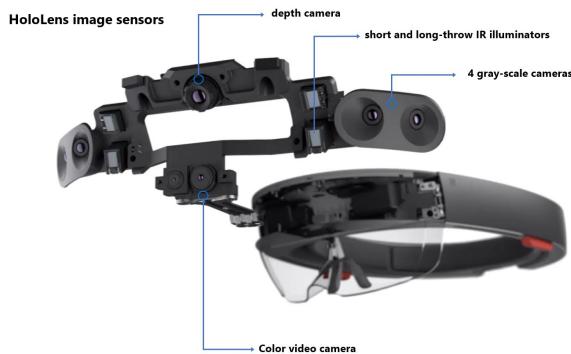
Milgram, P., Takemura, H., Utsumi, A., & Kishino, F. (1994). Augmented reality: A class of displays on the reality–virtuality continuum. In Proceedings of Telemanipulator and Telepresence Technologies (pp. 282–292). Boston, MA.



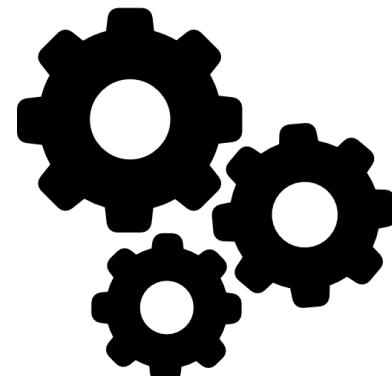
Augmented Reality (AR)

Go Back

- Overlaying projected images on top of a pair of see-through goggles or glasses, smartphones cameras.
- Augmented Reality devices are often self-contained → do not need a cable or desktop computer to function



How it Works





Go Back

AR Hardware

Mobile Devices



SDKs



ARCore

Smart Glasses



Immersive Head Mounted Displays



Web Based AR

Desktop Mobile



<https://mobidev.biz/blog/augmented-reality-development-guide>

Go Back

Michael Abrash, chief scientist at Oculus: “*We know what we really want: AR glasses (...)
Instead of carrying stylish smartphones everywhere, we'll be
wearing stylish glasses (...) These glasses will offer AR, VR, and
everything in between, and we'll wear them all day and we'll use
them in every aspect of our lives.*”

Augmented reality saw its record growth in 2018. Commercial support for AR is positioned to be strong, with big tech names like **Microsoft, Amazon, Apple, Facebook and Google** making serious commitments.

<https://mobidev.biz/blog/augmented-reality-future-trends-2018-2020>

Augmented Reality (AR)

<https://developers.google.com/ar/discover/supported-devices>

Go Back

- Marker/Image Based AR → Camera+Visual marker
- 3D object Detector Based AR → Camera+scan recognition/machine vision
- Placement → places 3D objects/ projections into the environment.
- Location Based AR → uses a GPS, digital compass, velocity meter, or accelerometer which is embedded in the device to provide data based on your location.

Types

- —————
- —————
- —————

Click on the red icons to see the examples, then “Go Back”

Augmented Reality (AR)

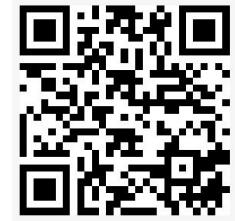
Go Back

- Marker/Image Based AR → Camera+Visual marker



Types

- 
- 
- 



Going further and creating your own App



Indigenous Storytelling using AR

<https://www.kickstarter.com/projects/1064194723/indigenous-storytelling-comes-to-lifeindigital>





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Students Build AR Storytelling App for Vancouver Chinatown Foundation

Apr 04, 2018 By Crissy Campbell



News

- > CDM
- > IDEA
- > Alum
- > Studen
- > Facul
- > Event
- > Digi



Go Back

Augmented Reality (AR)

Go Back

- 3D object Detector Based AR →
Camera+scan recognition/machine vision



Augmented Reality (AR)

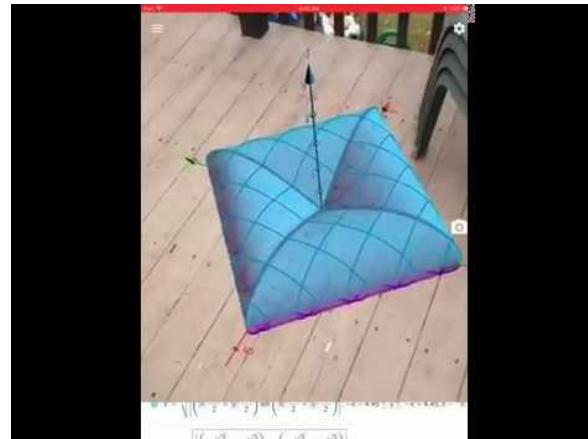
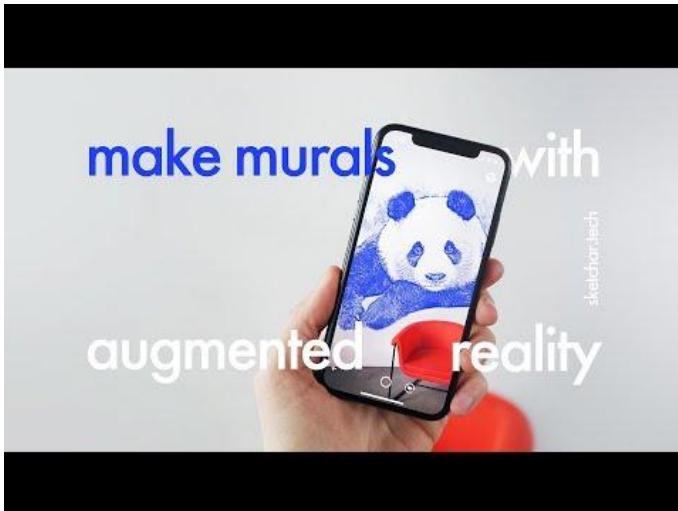
Go Back



Types

- 
- 
- 

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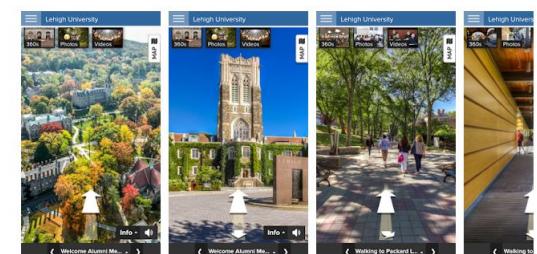
<https://www.geogebra.org/ar>

Augmented Reality (AR)

Go Back



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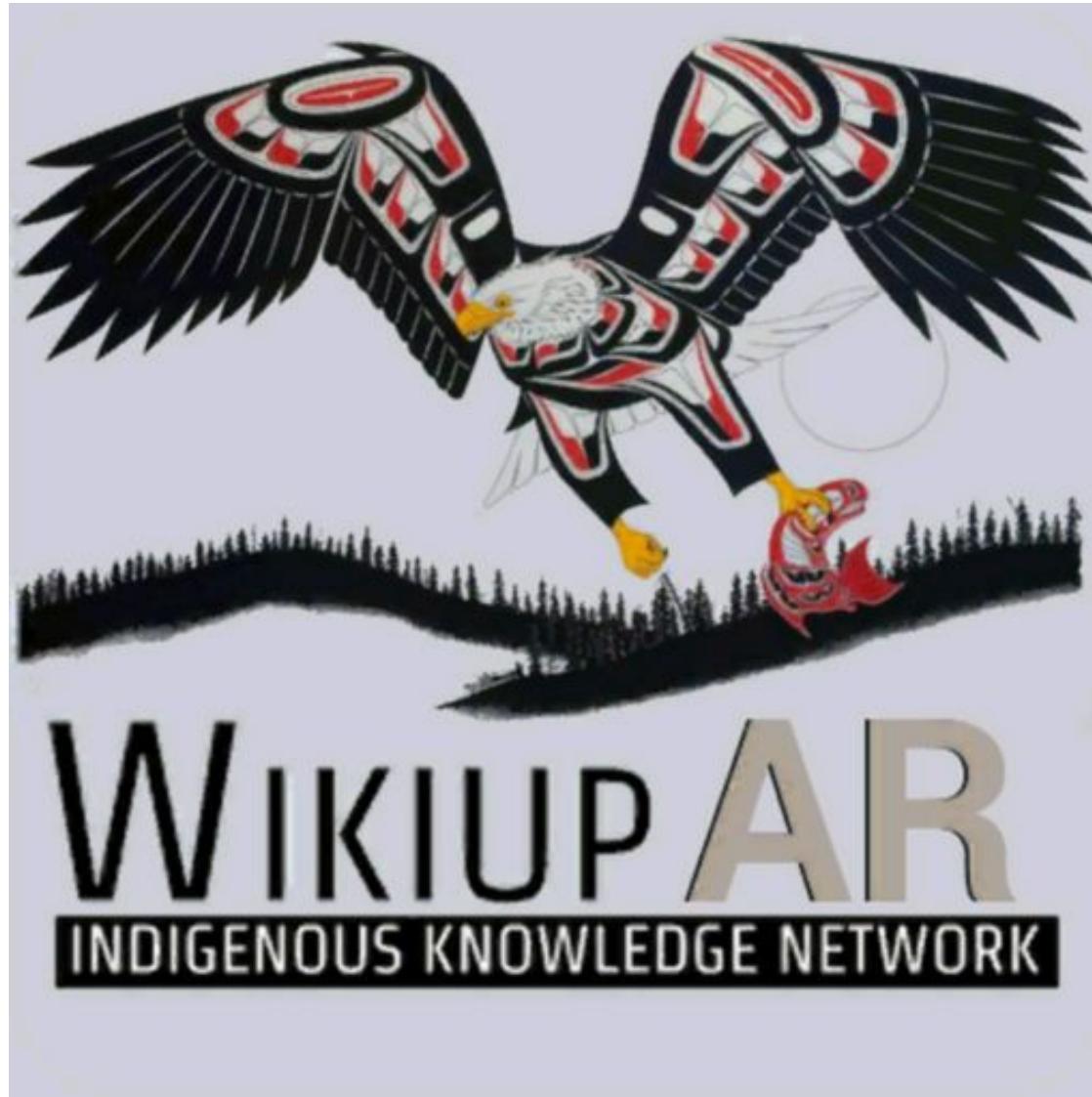
Types

-
-
-





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[Using AR to Enhance Narratives of History and Places](#)

"We're hoping to interconnect Canada and unlock Canada through stories and legends"

"create something that is sustainable"



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