THE UNIVERSITY OF QUEENSLAND'S SCHOOL OF ARCHITECTURE VISUALISATION LAB DOCUMENTATION

Checklist of 4.0 Hardware and Software

Hardware = green, software = blue

4.1 360o THEATRE

- ☑ Igloo (Only quick summary and the official link)

4.2 3D SCANNING

- ☑ Photogrammetry (Only a note)
- ☑ ZEB GO Laser Scanner
- ☑ Leica BLK2GO
- ☑ Leica P16
- ☑ AutoDesk ReCap
- ☑ Leica 360 Software (Waiting for a license to get own screenshots)
- ☐ GeoSlam (WIP)
- ☐ CloudCompare (WIP)

4.3 AUGMENTED REALITY

- ☑ Hololens 2
- ☑ Fologram

4.4 ROBOTICS

- ☐ UR10 I(Co-Lab)
- ☑ Kuka Structures Lab (Contact details only)

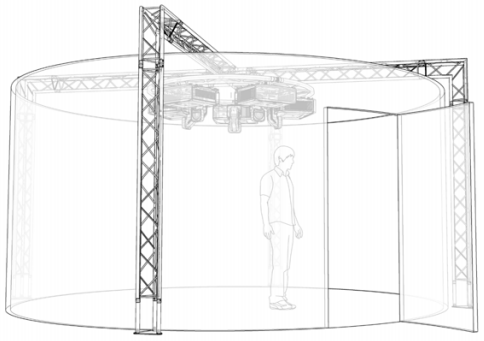
4.5 VIRTUAL REALITY

- ☑ HTC Vive (Steam)
- ☑ Oculus Rift S
- ☑ Oculus Quest 1
- ☑ Steam (for VR)

4.0 Hardware and Software

4.1 360º THEATRE

Igloo



Quick Summary

An Igloo immersive space are built using an Igloo Vision Media Player, which holds the software that can turn any room into an immersive shared VR experience. It takes any digital content and puts it in an immersive space. It is like stepping inside a giant VR headset with an entire group.

Igloo Vision

4.2 3D SCANNING

Photogrammetry

> A lack of hardware - must provide own camera

ZEB GO Laser Scanner - Completed by Kelton

Quick Summary

The ZEB Go Handheld 3D Scanner is a lightweight and portable LiDAR (Light Detection and Range) point cloud scanner. It uses a rotating and spinning laser that shoots hundreds of laser beams reflecting back to the ZEB Go and calculates how long the beam took to return to the scanner. This is how the 3D point cloud scan is made.

Access

The scanner is available via bookings and you must have completed the induction training before using it.

Booing and Training Link (need to be linked)

Use Case

Use the ZEB Go if you are scanning somewhere **remote**, wanting a **portable scanner and scanning smaller areas that aren't as accurate.**

Transparent/Mirrored surfaces will be captured.

Scanning Parameters

Distance	30m
Accuracy	10-30mm
Raw Data File Size	100mb/minute
Points per second	43,000
Colour	Yes (with ZEB Cam)

The Kit

To create a scan with the ZEB Go you will need the following items:

(image with our equipment)

- ZEB Go Scanner + battery
- Android Phone + charger
- ZEB Go main cable
- ZEB Go PC

> All of these items are housed within the hardcase carry case.

Once you are ready to process your scans please use a separate laptop to process the scans on the desktop Geoslam software.

Scanning

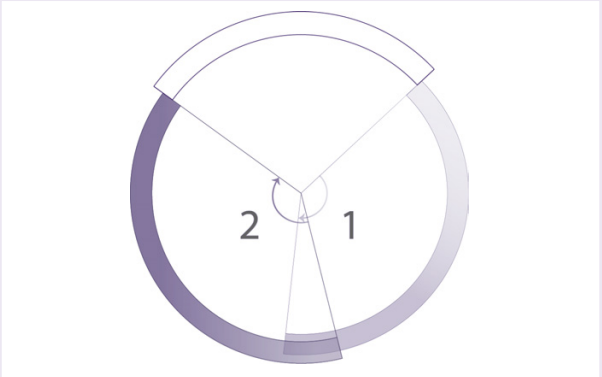
Plan ahead what and where you are going to scan. It is best to plan out how you will approach the scanning. The route you will take to create the scan, how many scans you will need and what will be happening as you are scanning.

Key Principles to understand:

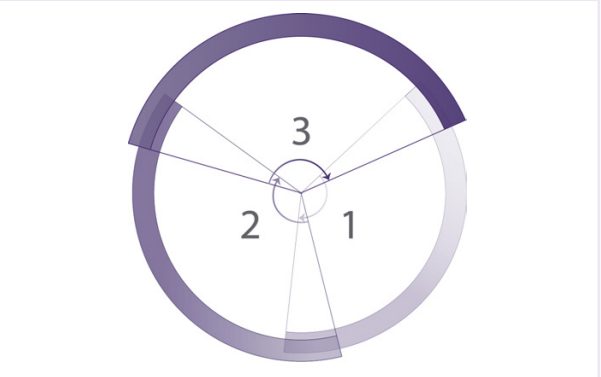
Occlusion and Overlap

Understanding that the sensors are like 'eyes', they can only see what is in front and nothing 'behind' or 'over' object. Similar to how you can move your viewpoint to look behind an object, a sensor will need to be physically moved to ensure it can capture information that is occluded beyond the objects.

Additionally, for the scans to align properly, the environment must allow for the scanner to be positioned so that each scan will have enough overlapping information. There are manual alignment tools if necessary though.



It consists of two scans with barely any overlap



Use a third scan to ensure enough overlap

Light and Vision

Regardless of the technology, whether it be the lens of the camera in Photogrammetry or the light sensor of the Artec 3D Scanner, all these technologies have sensors that receive light as information.

Light comes from light sources in the environment. The light rays bounce off objects and that is how our eyes and the sensors 'see,' forming a 2D or 3D understanding of

the image. However, not all objects behave in the same manner in relation to light and it is critical to take notes as you scan.

Reflective Objects

Reflective objects do not work well either as they fully reflect light from other objects. We understand the context of a mirror, but the technology does not recognise a mirror and it will read information 'in' the mirror as true objects in 3D space, and not a reflection on a surface.

Transparent Objects

Transparent/Translucent objects do not reflect all light rays except only for small traces. These types of objects allow light to pass through them, rendering them mostly invisible to a sensor.

> Detailed instructions are provided in the carry case.

1. Scan

Take the ZEB Go on-site to scan your environment using GeoSlam Online on the Android phone via Chrome.

2. Process

To further clean up the point cloud, open GeoSlam Online on the laptop, make sure you are connected to the local network, and download the scan as a .geo. Import the scan into the desktop version of GeoSlam for registration, floorplan extraction and exporting options.

3. Re-Charge

Before returning the ZEB Go scanner, please charge the batteries and phone with the chargers in the carry-case.

Leica BLK2GO

Quick Summary

The BLK2GO is a handheld imaging laser scanner that creates a 3D digital twin while you walk through space. It is the fastest and easiest way to scan a large building, structure or environment.

Access

The scanner is available via bookings and you must have completed the induction training before using it.

Booing and Training Link (need to be linked)

The Kit

To create a scan with the Leica BLK2GO you will need the following items:

a. Battery charger GKL821
b. AC power adapter and AC power cable
c. Transport case
d. BLK2GO with battery
e. BLK2GO box
f. Wrist strap
g. USB-C data cable
h. Table stand for BLK2GO
i. Lithium-Ion battery GEB821 (2x)
j. Maintenance plug
k. BLK2GO Quick Guide
l. USB swing card

Please find the full Leica BLK2GO User Manual available for download here, you will find a summary below.

Leica BLK2GO User Manual

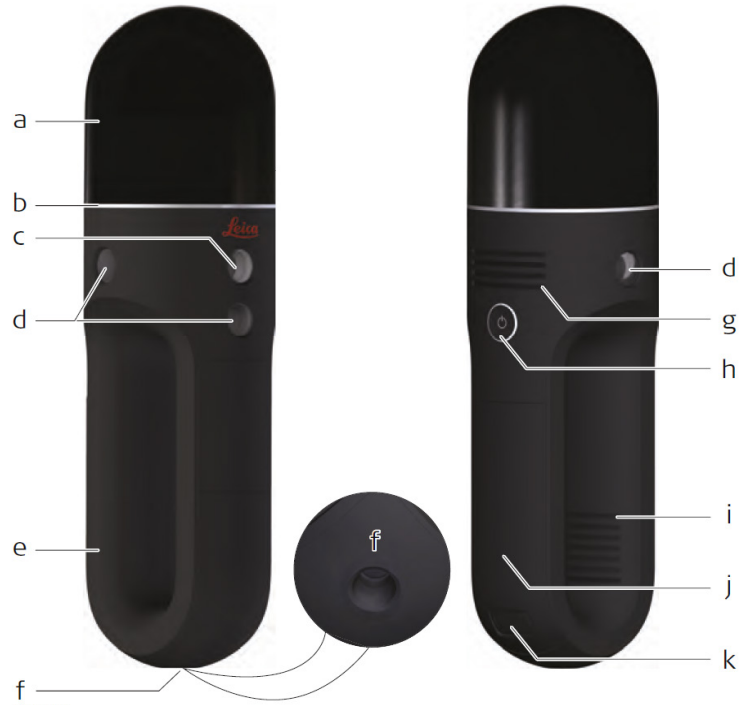
Scanning Parameters

Distance	0.5m-25m
Accuracy	±3 mm at 10 m
Internal storage	6 hours of scanning (uncompressed data) / 24 hours of scanning (compressed data)
Points per second	420,000

Colour	Yes

Scanning Setup

The User Interface



a. Dome

b. Ring-shaped LED

c. Detail camera

d. Panoramic camera

e. Handle

f. Mounting for accessories

g. Air outlet

h. Power button

i. Air inlet

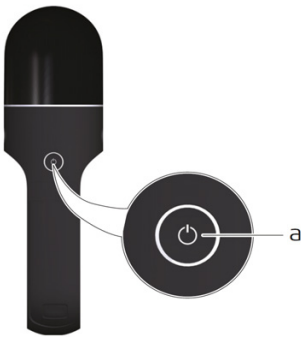
j. Battery compartment

k. The locking mechanism for the battery covers

Powering On / Powering Off

To **turn on** the scanner, press and hold the button for **< 2 sec**. The BLK2GO switches on and **the LED starts blinking yellow.**

To **turn off** the scanner, press and hold the button for **≥ 2 sec < 5 sec**. The BLK2GO switches off.



a. Power button

> ⚠ It is mandatory to follow always this procedure to shut down the instrument.
>
> Do not remove the battery from a running instrument!

Scanning

1. Press the **power button** to turn on the BLK2GO. The ring-shaped LED is **blinking yellow** to indicate that the instrument is **booting up.**
2. When the ring-shaped LED is continuous **green**, the BLK2GO is ready to start operation in **stand-alone mode** or with a **connected device**. Follow the instructions on the app to establish the connection.
3. Place the BLK2GO on the table stand and press the **power button** to start the scan. The ring-shaped LED is **blinking yellow** and the instrument is **initialising.**
4. When the ring-shaped LED starts **pulsating green**, the BLK2GO is initialised and is **recording data**. Take the BLK2GO and **start walking.**
5. While the BLK2GO is recording data, press the **power button with a quick click** to **take a picture** with the detail camera. One green blink of the ring-shaped LED indicates that the picture is successfully taken.
6. Press the **power button** to **stop recording data**. While data are being saved, the ring-shaped LED is blinking yellow. Once data have been saved, the ring-shaped LED is continuous green.

Connecting to the BLK2GO with mobile devices

BLK2GO Live app is the companion app that pairs with the BLK2GO for iOS and Android to see **live visual feedback** including **live 2D and 3D, device status and data management** from the BLK2GO while scanning.

> iOS 12.1 or higher recommended devices: iPhone series 8, X, 11, 12;
>
> Android 9 or higher recommended devices: Samsung Galaxy series S10, S20, S21.

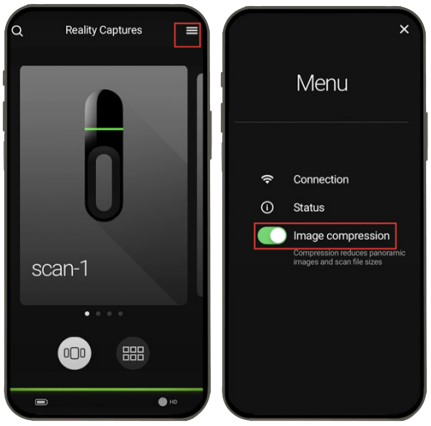
Download the BLK2GO Live app from the app store of the mobile device.

Start the BLK2GO and wait until the LED is **continuously green.**

Open the BLK2GO Live app, **tap *NEW BLK2GO*** to **scan a QR code** that comes with the BLK2GO, and then it will pair with the BLK2GO.

Pair with the BLK2GO

Before scanning, tap the **settings menu** and choose whether to turn off **image compression**; After starting scanning (press the power button of the BLK2GO to start), **the live visual feedback** will be shown on the app.



Turn image compression on or off

Live visual feedback

Data Transfer

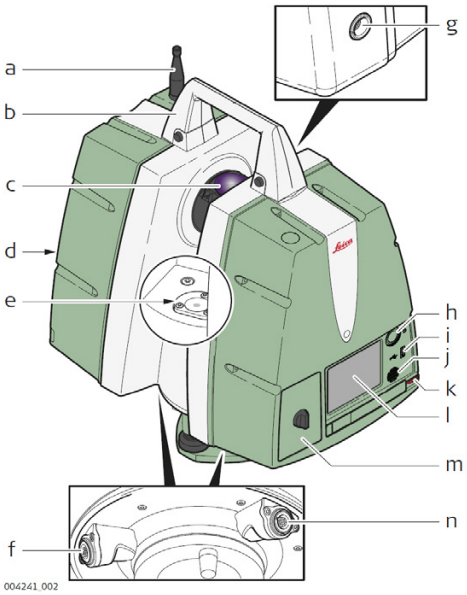
Raw data can be transferred from the BLK2GO to a computing device using a wireless and USB 3.0 connection. For detailed operation, please refer to Leica 360 Software section.

Other Resources

Please find the official video tutorial at the link below.

Intro to Scanning with BLK2GO

Leica P16



a) Antenna
b) Removable handle
c) Rotating mirror (laser and camera aperture)
d) Battery compartment B
e) Circular level
f) Socket for power supply, 5 pin female with blue colour ring
g) Socket for time synchronization, 9 pin female
h) ON/OFF button
i) USB socket
j) Loudspeaker
k) Stylus
l) Touchscreen
m) Battery compartment A
n) Ethernet socket, 8 pin female with grey colour ring

Quick Summary

The Leica ScanStation P16 features an intuitive and user-friendly touchscreen interface. The one-touch scan button and wizard-style software guarantee an easy workflow and enable a fast data check in the field. Combined with WLAN remote control, the Leica ScanStation P16 can be operated by any handheld device.

Access

The scanner is available via bookings and you must have completed the induction training before using it.

Booing and Training Link (need to be linked)

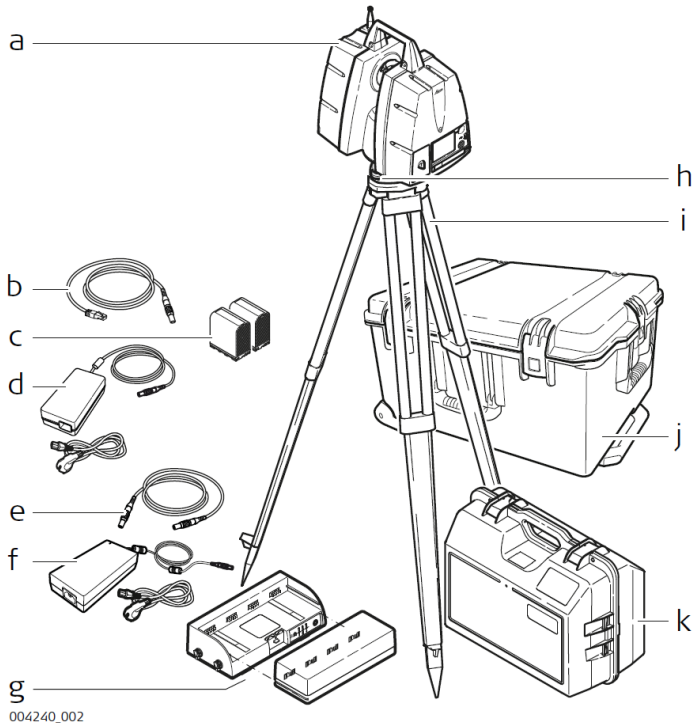
Scanning Parameters

Distance	0.4m-40m
Accuracy	3mm at 40m

Scanning field of view	Horizontal 360°, Vertical 290°
Points per second	1,000,000
Colour	Yes

The Kit

To create a scan with the Leica P16 you will need the following items:



a. ScanStation P16

b. GEV228 Ethernet cable

c. GEB242 internal batteries

d. GKL123 AC power adapter

e. GEV259 power cable

f. GEV225 AC power supply for GKL271

g. GKL271 charging station and GEB271 battery pack

h. Tribrach

i. Tripod

j. Transport container for ScanStation P16

k. Transport container for ScanStation P16 accessories

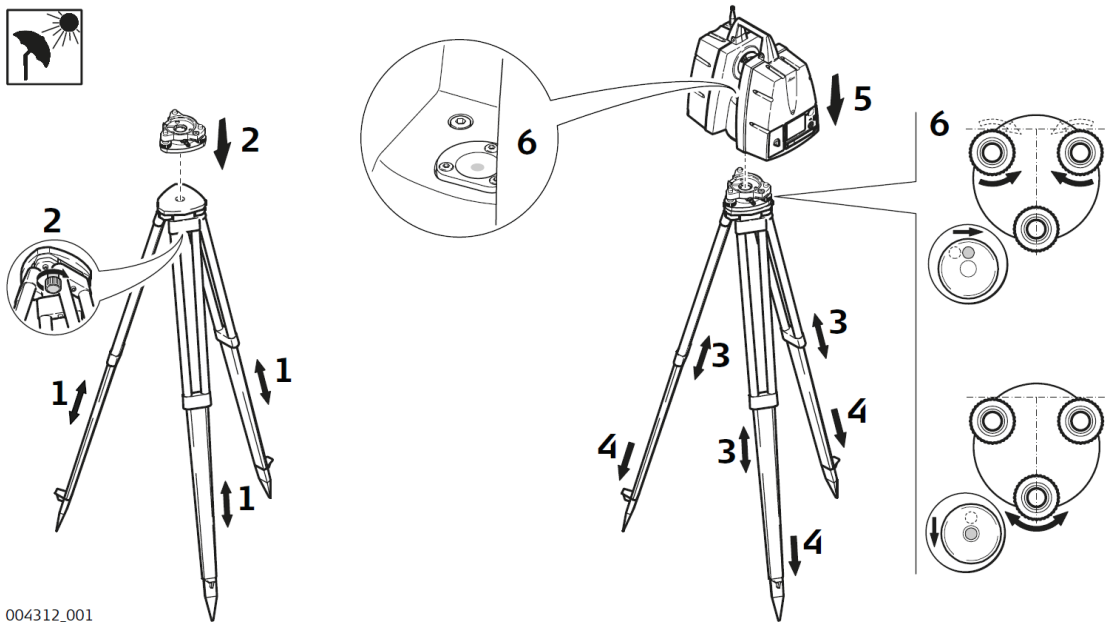
Please find the full Leica P16 documentation available for download here, you will find a summary below.

Leica ScanStation P16 User Manual

Leica ScanStation P16 System Field Manual

Scanner Setup

ScanStation P16 setup on **tripod** step-by-step:

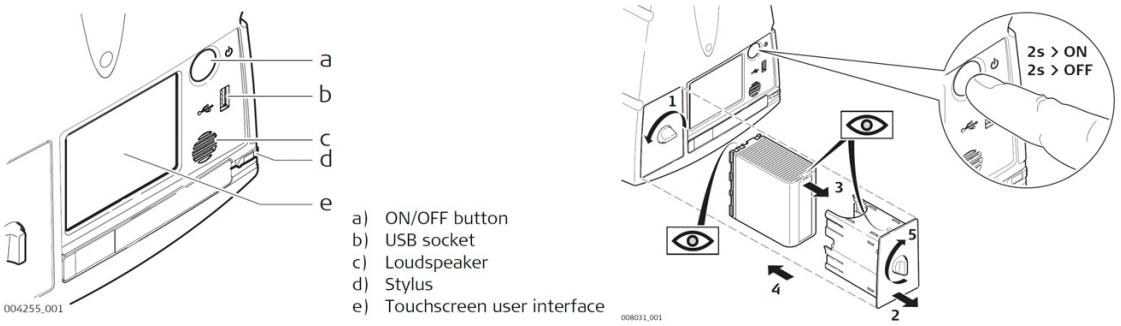


1. **Extend** the **tripod legs** to allow for a comfortable working posture. **Tighten the screws** at the bottom of the legs.
2. **Place** the tribrach on the tripod and secure it with the **central fixing screw.**
3. **Set up** the tripod so that the tripod plate is as **horizontal** as possible.
4. **Push** the **tripod legs** firmly into the **ground.**
5. **Place** the instrument on the **tribrach** and secure it with the locking knob of the tribrach.
6. **Level up** the instrument using the instrument's **circular level. Turn** two of the **foot screws** together in opposite directions. The index finger of your right hand indicates the direction in which the bubble should move. Now use the third foot screw to centre the bubble.

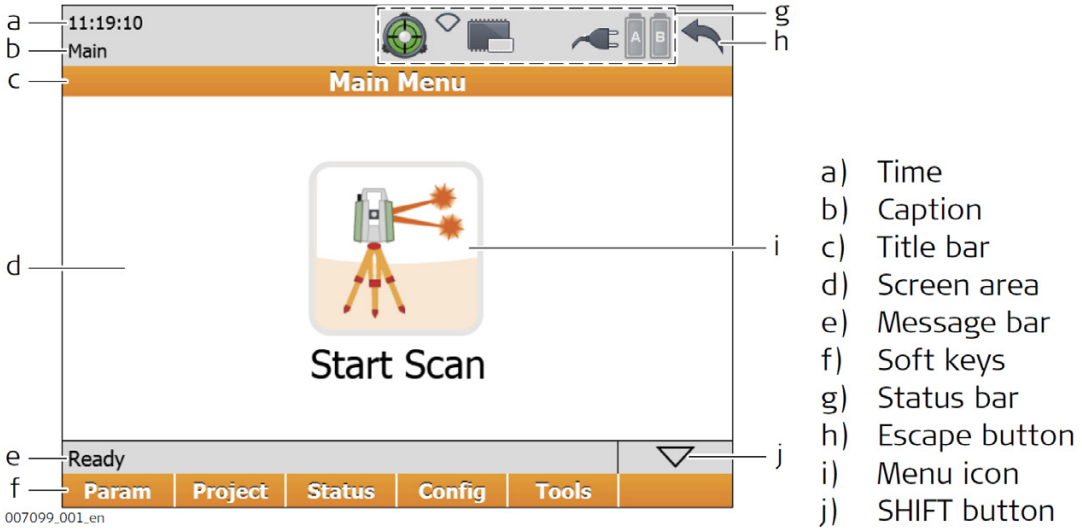
The User Interface

ON/OFF button and **USB socket** is located on the front of the **face plate.**

Press and hold the **ON/OFF button** for **2 seconds** until a beep is audible.



The **Main Menu screen** will be displayed after the system boot process. **Ready** in the message bar indicates that the instrument is ready for scanning.



Scanning

Scan

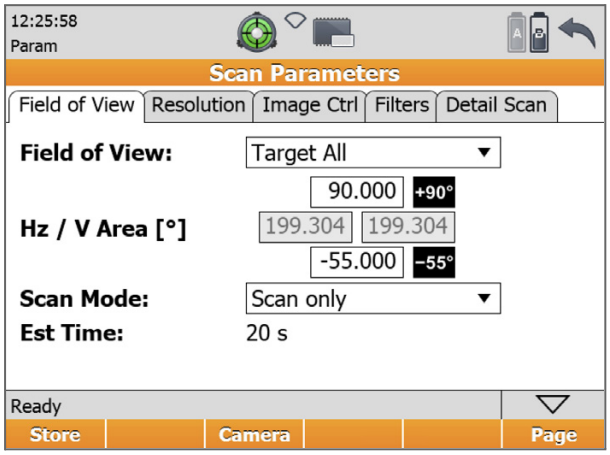
Select Main Menu, Pressing the **Start Scan** button immediately starts a scan and/or imaging process with settings as defined in **Param.**

Scan data is stored on the ScanStation P16 by projects which contain stations for each scanner position. In the **Projects menu**, a new project can be created or an existing project can be selected. The results of the scan process as started by **Start Scan** are stored in the selected project.

Scan Parameters

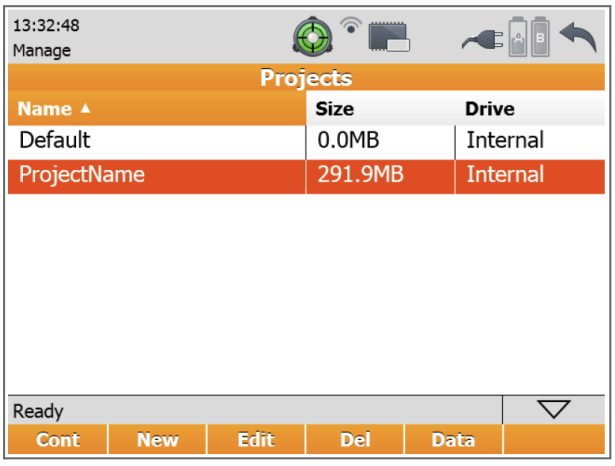
Select Main Menu, Param, Scan Parameters.

The Scan Parameters menu offers five pages for all kinds of scan and image controls: Field of View, Resolution, Image Ctrl, Filters and Detail Scan.



Project management

Select Main Menu, Project. In the Projects menu, all commands for project management are available at the bottom.

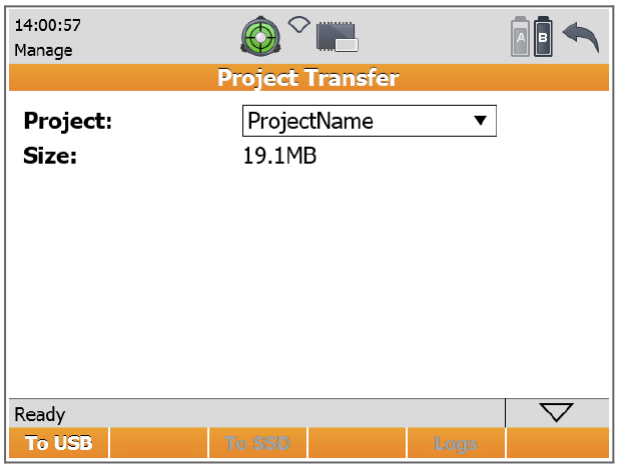


Available commands:

Command	Function
Cont	Confirm selection and return to previous screen.
New	Create new project with project name, description, name of creator and storage device.
Edit	Edit description and creator of selected project. Also show name, date and size of existing project.
Del	Selected project will be deleted after confirmation.
Data	Show data details of selected project such as station name, scan name, scan view, target ID, target type and target view.
Shift -> Trans	Transfer selected project or all projects to a USB memory storage device or to scanner's hard disk.

Data Transfer

Select **Main Menu, Tools, Transfer**. In the **Transfer**, menu projects can be transferred from the scanner's hard disc to an external USB memory storage device and vice versa.



AutoDesk ReCap

Quick Summary

Autodesk ReCap is a reality capture and 3D scanning software that helps you to create high-resolution 3D data from photographs or laser scans and use them in other CAD, BIM and 3D modelling software. Data can be captured from laser scanners or photos taken from a UAV/Drone, then automatically combined in ReCap Pro and imported into Autodesk's tools including Revit, Civil 3D, Navisworks, Infraworks and AutoCAD.

Installation

To download products, sign in to **Autodesk Account** or your **education site**. Find ReCap Pro and click View Downloads. Select the version, platform, and language and then select a download method.

For more guidance from Autodesk on download methods and locations:

Where to download products and updates

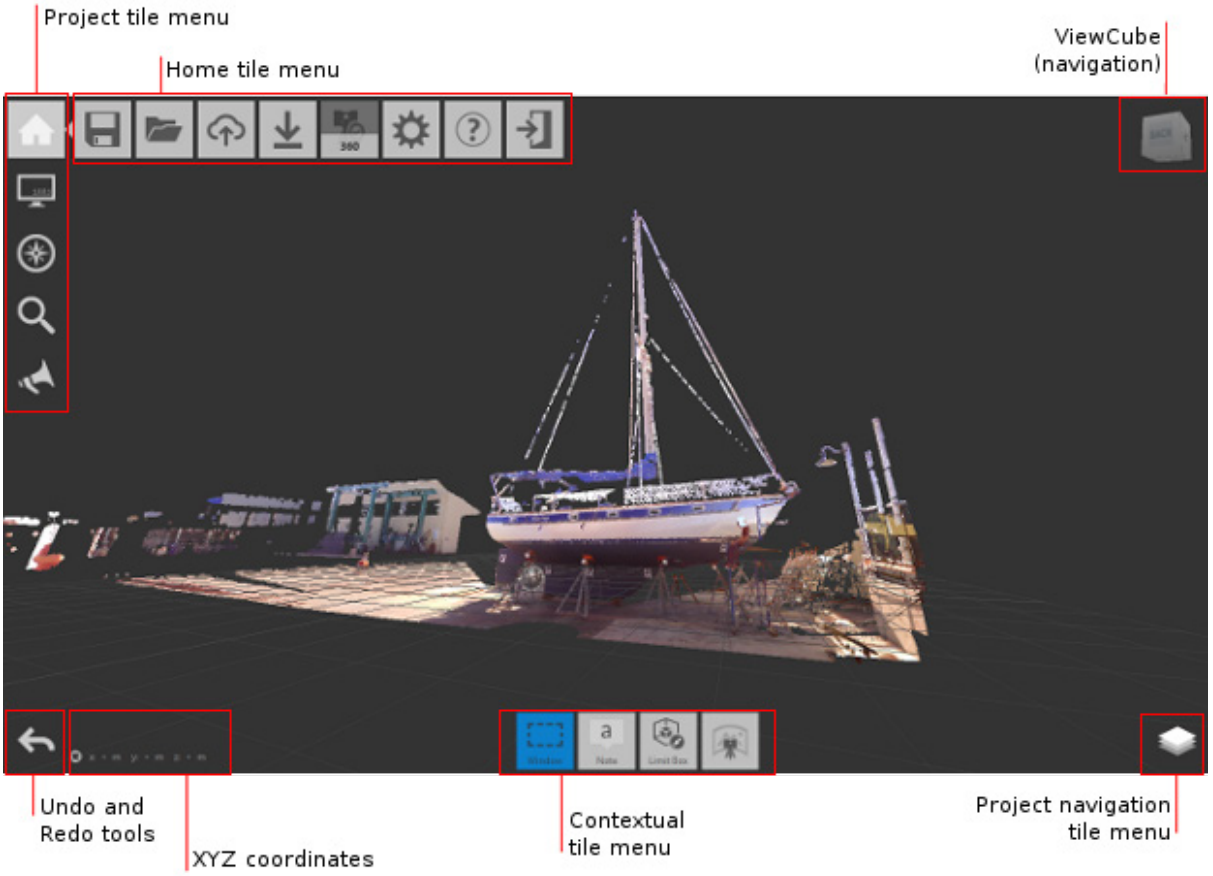
Download methods

User Interface

For an in-depth review of specific UI components, please see the **Glossary**.

The Project Screen

The Project screen is where you do most of your work with point cloud data. It is divided into several areas:



Project tools in the upper-left corner can be used for various functions:

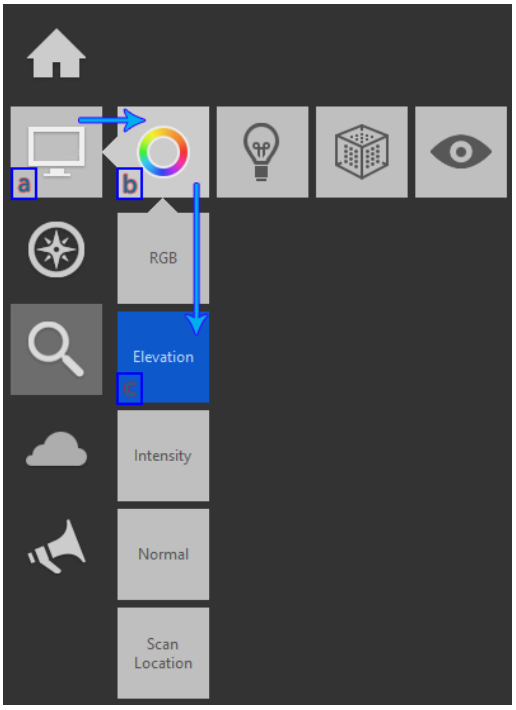
- The **Home tile menu** provides ways to work with the point cloud project as a whole.
- **The Project tile menu** analyzes and organizes components of the point cloud.
- **Undo and Redo tools** reverse previous actions that you've taken.
- **XYZ coordinates** display for the point your mouse is over.
- The **Contextual tile menu** changes to reflect current activities. For example, if you are editing a Limit Box, the toolset changes to display tools related to Limit Boxes.
- The **Project Navigation tile menu** provides access to tools such as Pan, Zoom, and Orbit. This menu is most useful to those with a single-button mouse. Flyout navigation tips on these tiles provide information about navigating with a three-button mouse.

- **ViewCube** provides a quick way to change the orientation of 3D views.

The Tile Menus

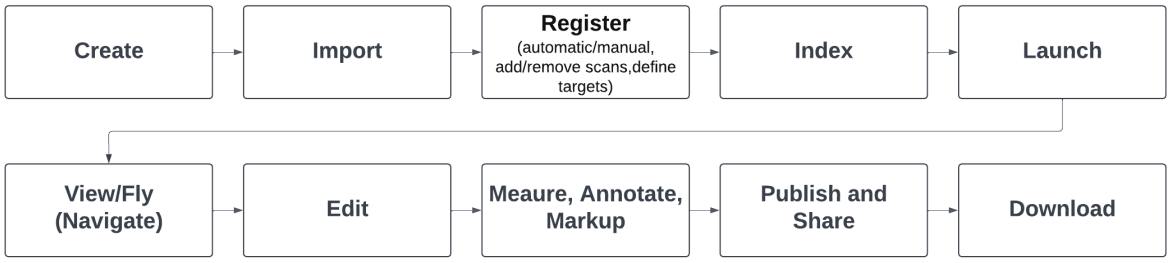
A majority of ReCap's interface is executed in a series of nested menus. These menus provide quick access to a wide variety of ReCap's options and functionality. The example below outlines the behaviour.

Move the cursor over tile (a), then over (b), to expand the flyout menu (c).



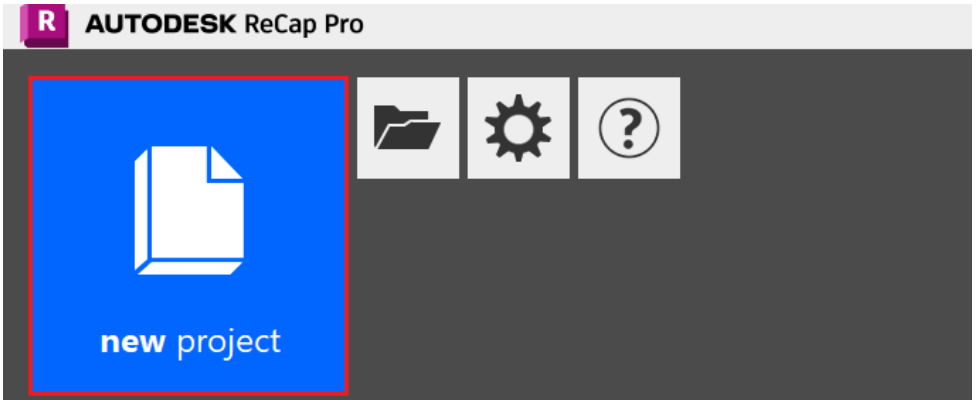
You navigate to the tools on a flyout by hovering over their "parent" tiles to expand them and then selecting the tile whose setting you want to change.

Scan Project Workflow

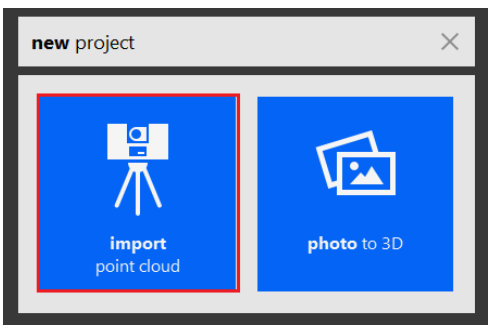


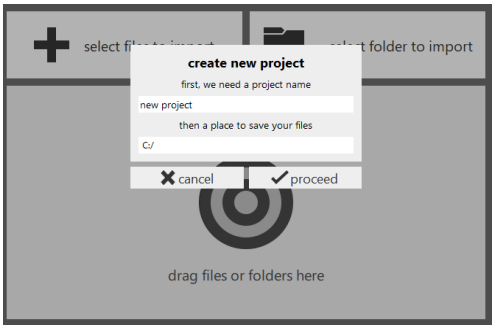
1. Create Scan Projects

To start, hit the **new project** button located on the home screen:



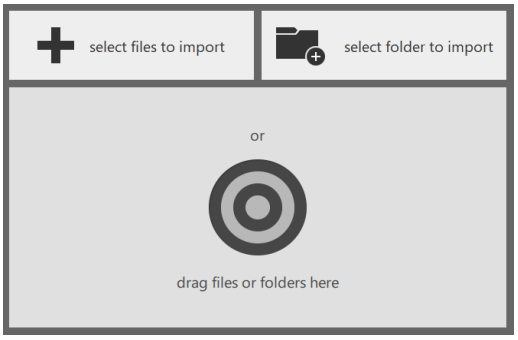
Select **import point cloud**, and then you are prompted to **name your project**, and provide **the scan files** you intend to combine into a point cloud.



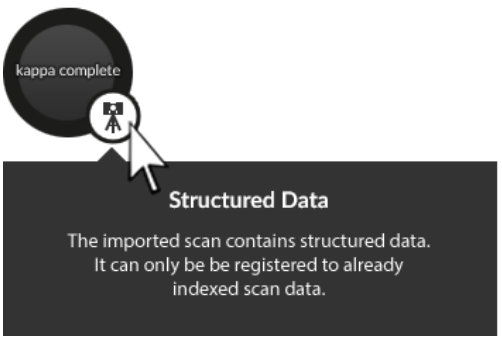


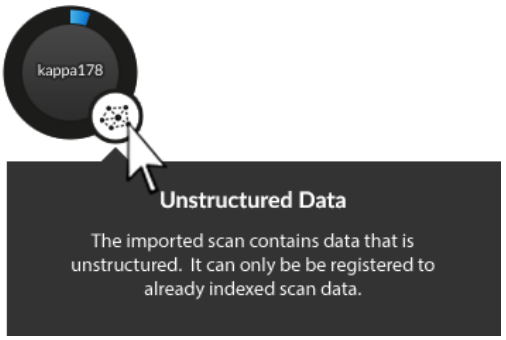
2. Importing Scans

You can elect to either **select individual files** or **folders** through the Microsoft® Windows® Explorer pop-up, or **simply drag** and **drop files** onto the target area in the centre of the screen:

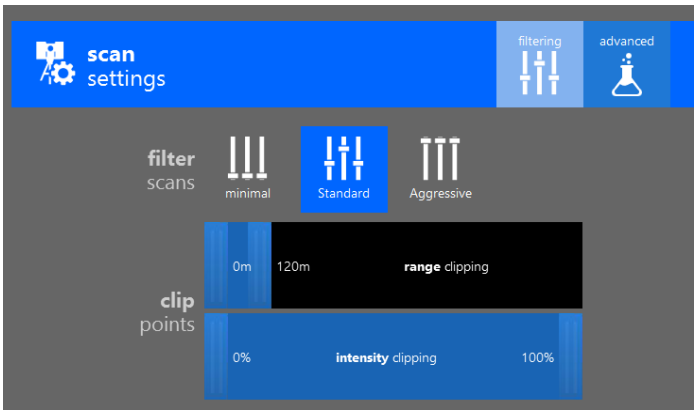


The files can be either traditional scans from a **fixed location** (structured files), scans from **multiple locations**, such as those produced by a UAV (unstructured files), or a mixture of both. The scan data type is shown by a badge on the individual scan thumbnail:





Once the desired files are selected, import options are presented. These allow you to **define several settings** that affect the result of the import.



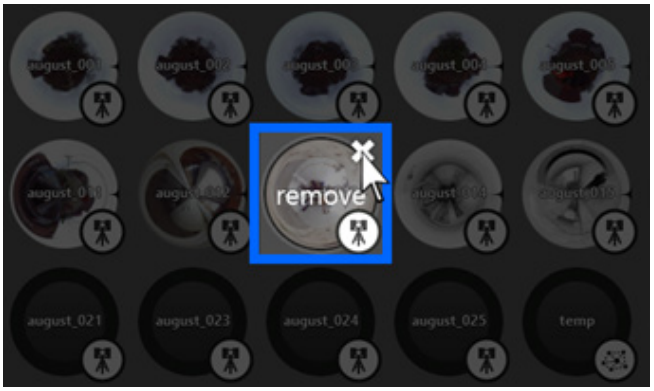
Once the settings are selected, the **import process begins automatically**. All files must be imported before **Auto Registration** begins. **Manual Registration** is available as soon as the first scan has been imported.

> ⚠ Manual registration cannot be started with unstructured data. For best results, a structured scan must be used as the basis for registration.

Import may take a few minutes, depending on your number of scans and the density of their data. The import progress is displayed on each scan's individual progress wheel:

You can **import additional files** at any time with the Add File and Add Folder buttons on the left side of the screen:

You can **remove individual files** from the list by hovering the cursor over the file and pressing the "remove/X" button that appears. It might take a few seconds for the "X" to appear after a scan has finished importing.



3. Register Scans

Please see **Register Scans** for more information from Autodesk.

Auto-Registration:

The automated process for registering scans.

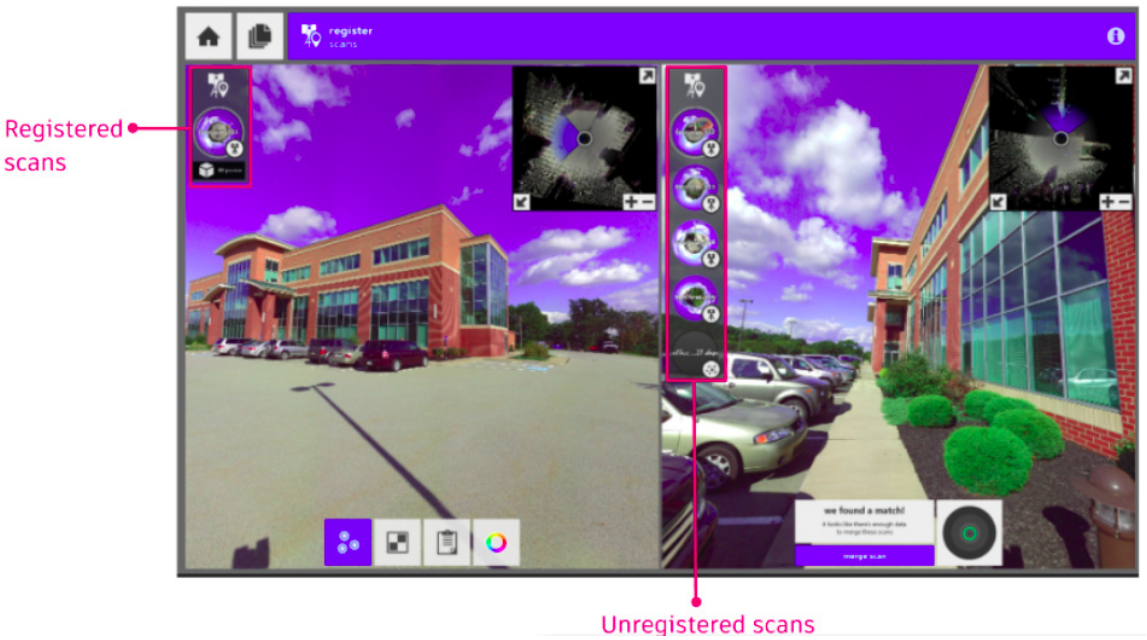
Auto-Registration becomes available once all files have started importing. Simply click the "Register Scans" button in the lower right corner of the application to begin:

Once initiated, any files yet to be imported complete and then the registration process begins. **Any pre-existing registration information is lost.** Feedback is provided for both import and registration processes, with estimates for completion as well as elapsed time:

If there are multiple groups created using automatic registration, you can use manual registration to manually register the groups together.

Manual Registration:

Manual registration can be completed through the cloud-to-cloud technique whenever Auto-Registration fails or is in place of it. The tool can be accessed during the registration process from the bottom toolbar. Manual Registration is also only available in ReCap Pro.



The left pane contains the primary scan group that you are registering. You should think of it as unregistered scans moving from the right pane and into the left pane once registered correctly. To register a scan, select a scan in each pane then place

three points in corresponding locations between the two. At least three points are required for each scan, and X, Y, and Z coordinates must be supplied for each point.

Manually register unregistered scabs after an auto-suggestion fails:

- Place three points (Green/Blue/Red) in order for matching points in both left and right scans.
- After the three matching points are placed, ReCap will show the initial registration quality with a colour indication.
- Hovering on the circular quality indicator will pop up a preview of the initial registration result. You can accept the result and then choose "merge scan" to let ReCap further refine the registration result.

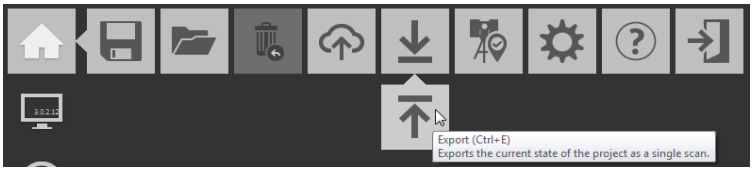
> If the result shows yellow or red colour, you can refine the initial registration by updating the placement of the matching points.
>
> You can drag to move the placement or delete the old placement and create a new placement.

- After clicking "merging scan", ReCap will refine the registration result. If the refinement result is good, the scan in the right panel will be moved to the left group automatically. Otherwise, ReCap will let you review the refinement result to choose whether to reject the result or approve the result.

4. Saving & Exporting Your Project

You are prompted to save your project when exiting the application. You also have the option of saving at any time through the Save and Save As buttons located in the main menu.

ReCap Pro also allows you to export the scanning project as a single file. This option is also accessible through the main menu:



You can export the scan in a number of different file types. These include E57 structured (complete), E57 unstructured (3D only), PTS, PCG, & RCP/RCS.

Leica 360 Software

Quick Summary

Leica Cyclone REGISTER 360 is designed to bring speed, scale and simplicity to your digital reality workflows thanks to a new visual project interface and guided workflows. New and experienced users alike will appreciate that the registration process has been streamlined while maintaining the uncompromising quality you have come to expect from Leica Geosystems' software solutions.

Please find the official user manual available here, you will find a summary below.

Leica Cyclone REGISTER 360 online user manual

Installation

Please download the setup files of the Cyclone REGISTER 360 or Cyclone REGISTER 360 (BLK Edition) via the links below.

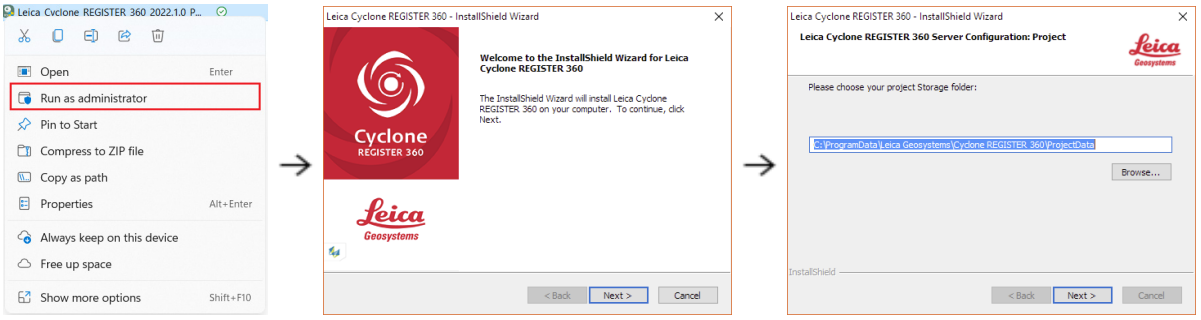
Cyclone REGISTER 360 Setup File

Cyclone REGISTER 360 (BLK Edition) Setup File

> The Cyclone REGISTER 360 (BLK Edition) make the most of your BLK360 and BLK2GO data with automatic registration, precise visual alignment, easy cleanup, and multiple visualization and export options.

Steps of installation

1. Right-click on the Cyclone REGISTER 360 (BLK Edition) Setup File and select "**Run as administrator**".
2. Follow the directions in the InstallShield Wizard.
3. When prompted, choose your Project Storage location.
4. Complete the installation by selecting **“Finish”**.



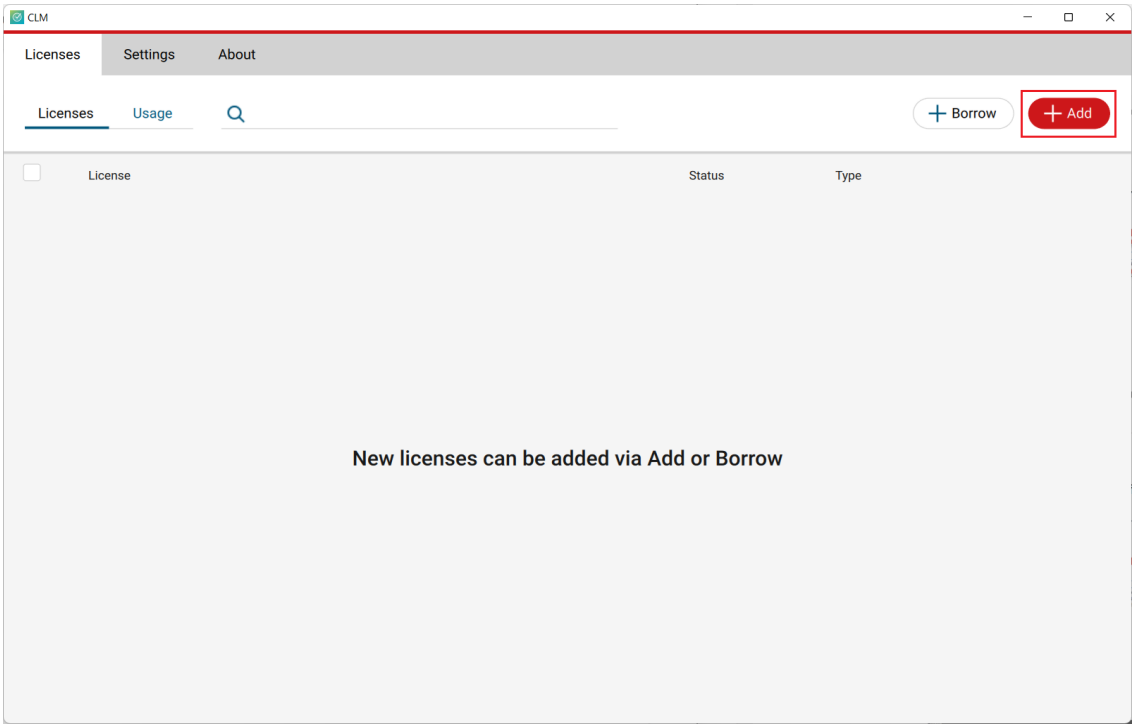
> ⚠ The storage folder for Cyclone REGISTER 360 should NOT be the same folder as the JetStream Storage folder if JetStream is installed on the same computer.

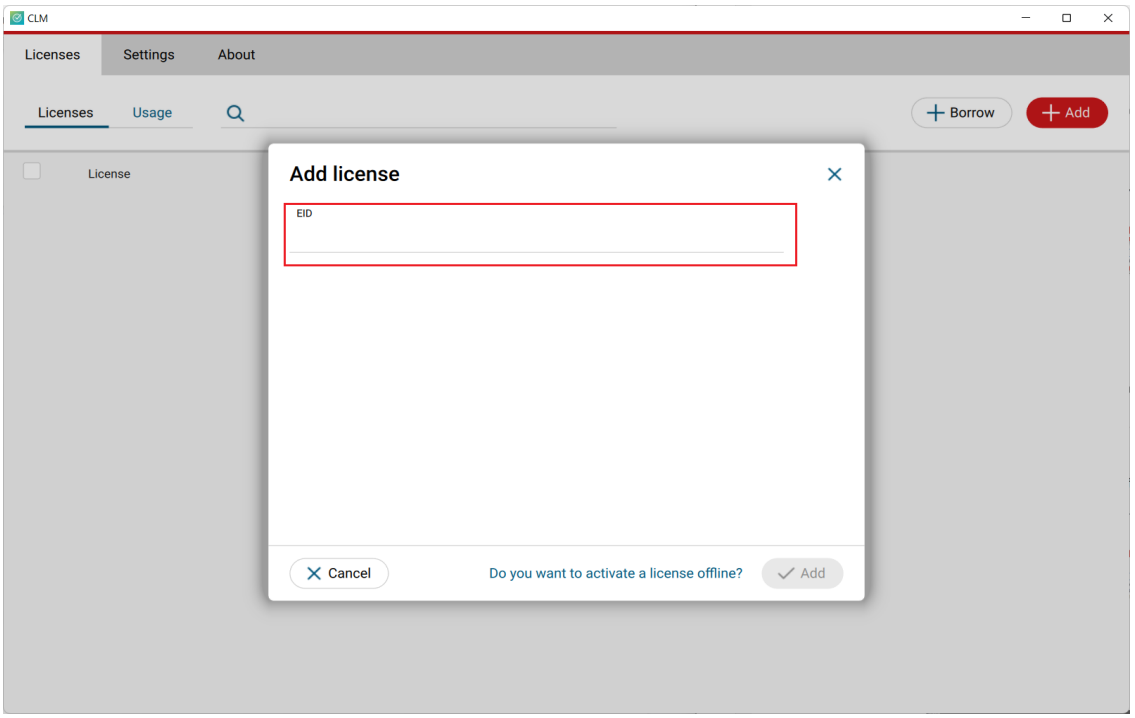
Licensing Setup

> ⚠ You must have an Internet connection to enable your license. If you do not, please review the “Leica Cyclone and CloudWorx Client License Management System” document that goes over setting up an Entitlement ID (i.e., license) offline.

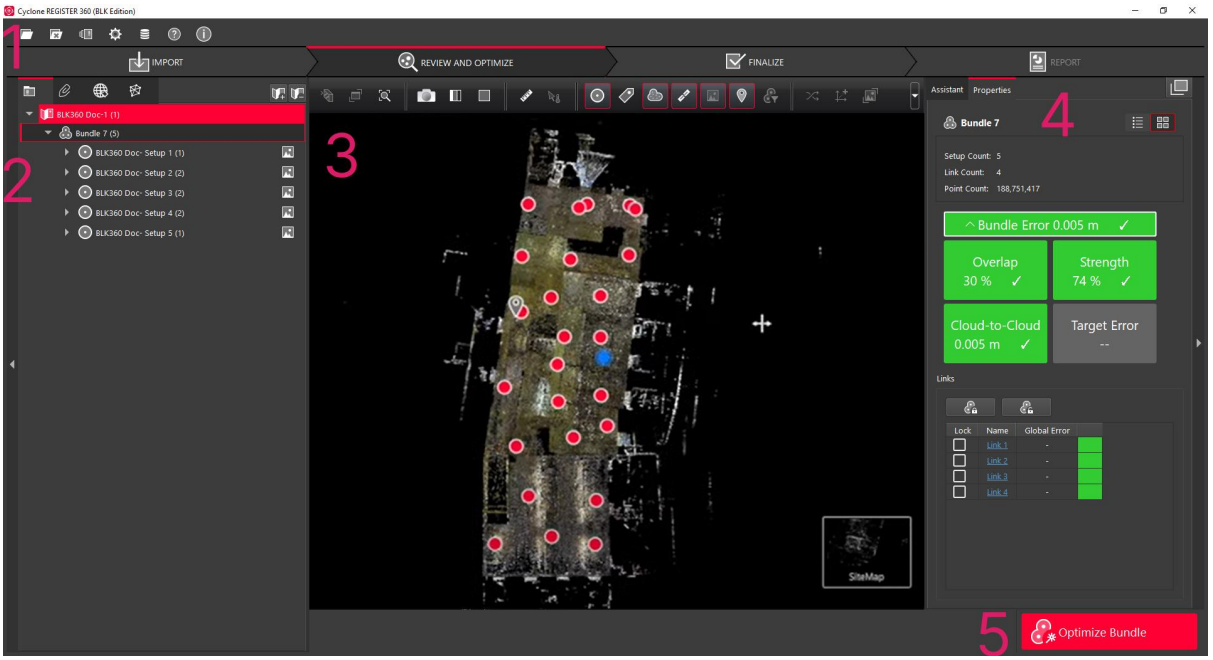
Once you have installed Cyclone, open the **Client License Manager** for Floating Licenses, located here: Start Menu\Programs\Leica Geosystems\CLM License Manager New.

Choose the "**Add**" option, then enter your **Entitlement IDs** (EID) in the open field.





User Interface



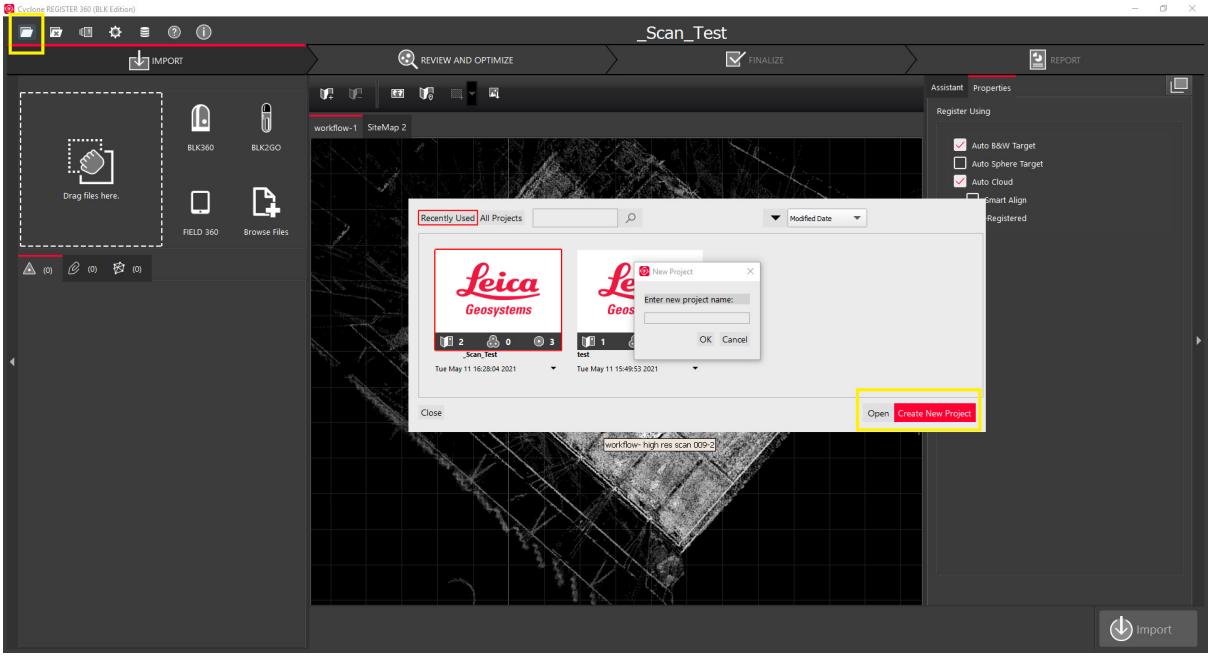
1. The **top menu** has your standard File > Open/Save and Preferences/Settings. Right beneath it is the **Workflow Menu.**
2. The left menu is generally used as an overview of your data, use this menu to view/select individual **Setups, Bundles and Links.**
3. The **3D Viewport** shows a preview of the point cloud that can be navigated. Any further processing will also be done here.
4. The right menu is generally used for the **Assistant** and **Properties** panels.

   The **Assistant** panel has extra controls and options when going through the workflow, while the **Properties** panel relays information.
5. This giant **red button** moves your project to the **next stage** of the workflow.

Scan Project Workflow

1. Import

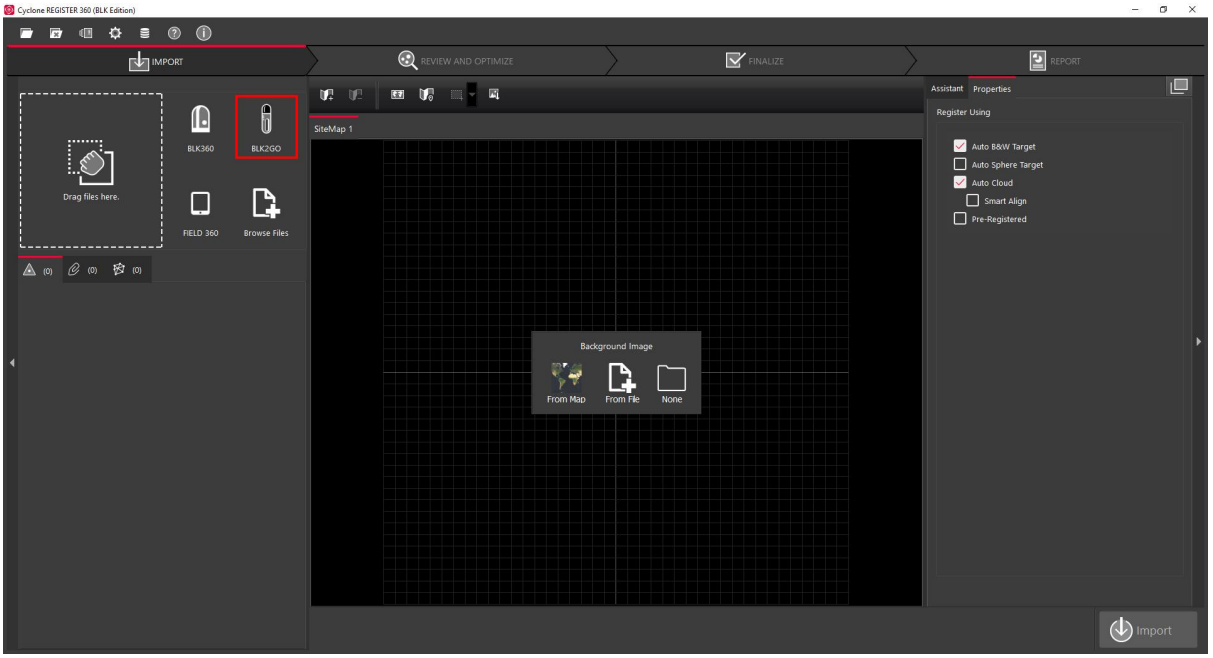
Begin by clicking the top left option to open an existing project or clicking **Create New Project**, enter a project name and click **OK.**



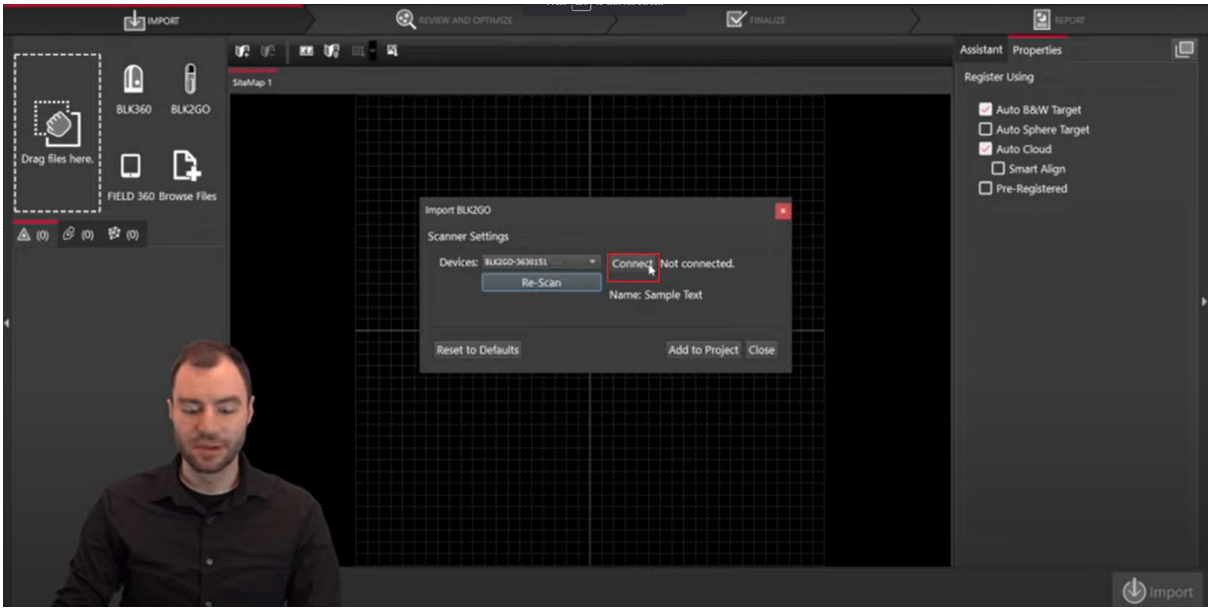
Connect BLK2GO for Wireless import

To import wirelessly, connect the computer to the BLK2GO via **Wi-Fi settings**. Enter a password that can be found on the card with the BLK2GO or on the inside of the battery.

You will notice on the left that there are a few ways to bring data into Cyclone REGISTER 360. Click the **BLK2GO Import button.**

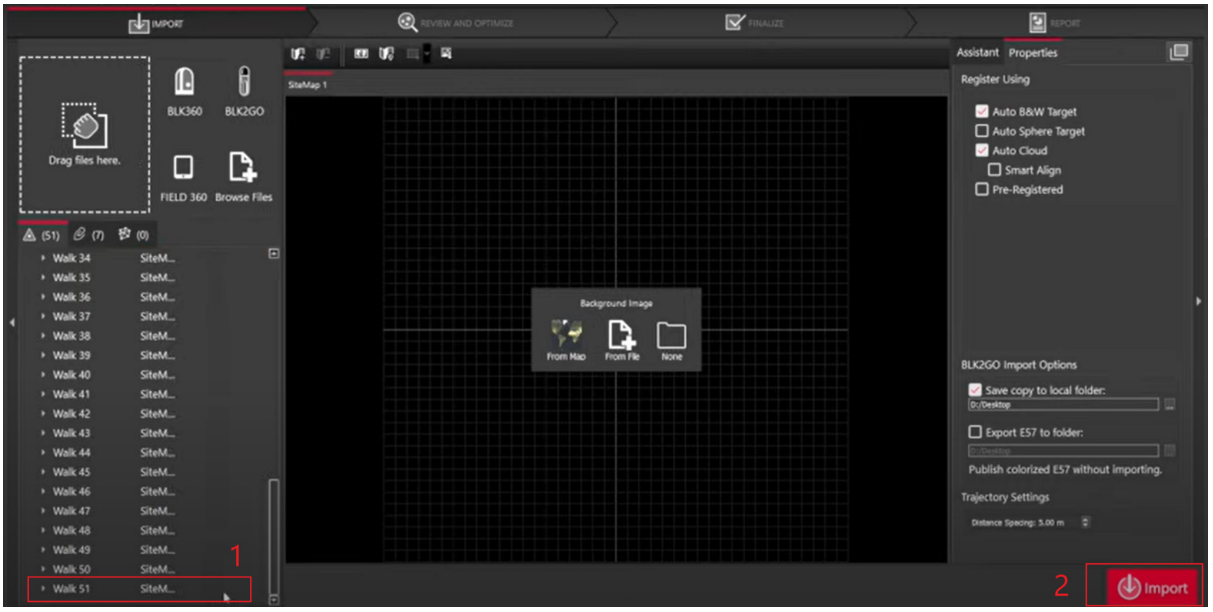


It's automatically going to find the BLK2GO, and then clicks **Connect.**



Import

Select the projects you wish to import in the left menu, and **Import** the data.



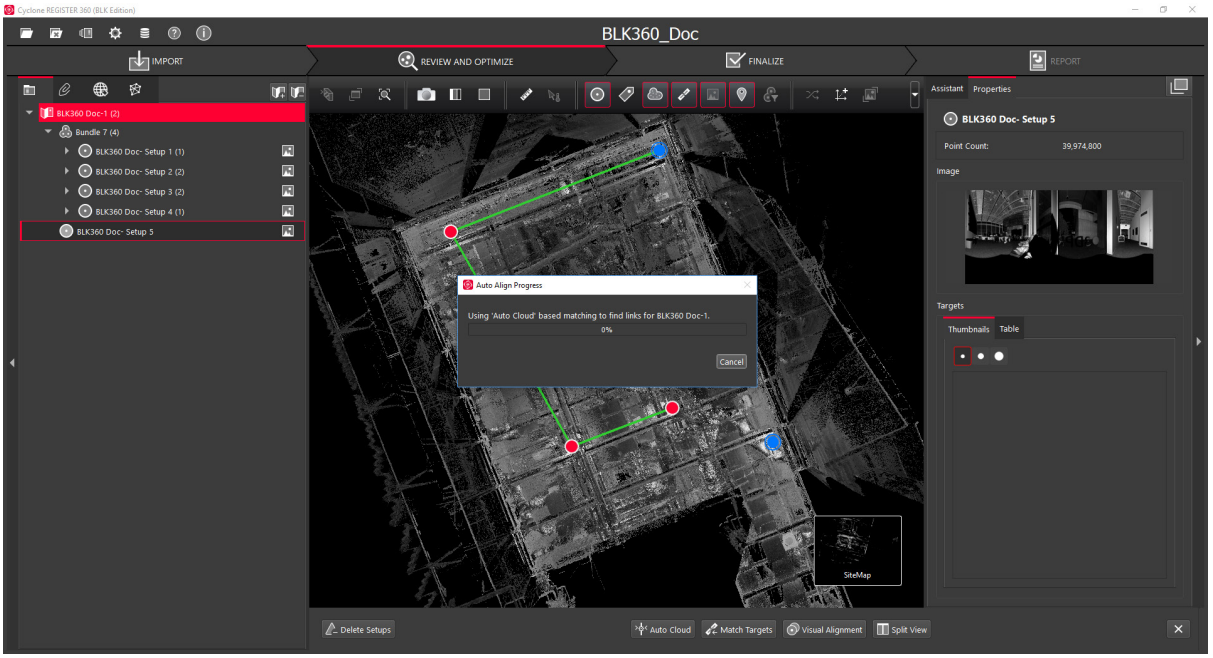
> In the right Assistant menu, there are import options including Save copy to a local folder, Export E57 to folder and trajectory settings if needed.

2. Review and Optimise

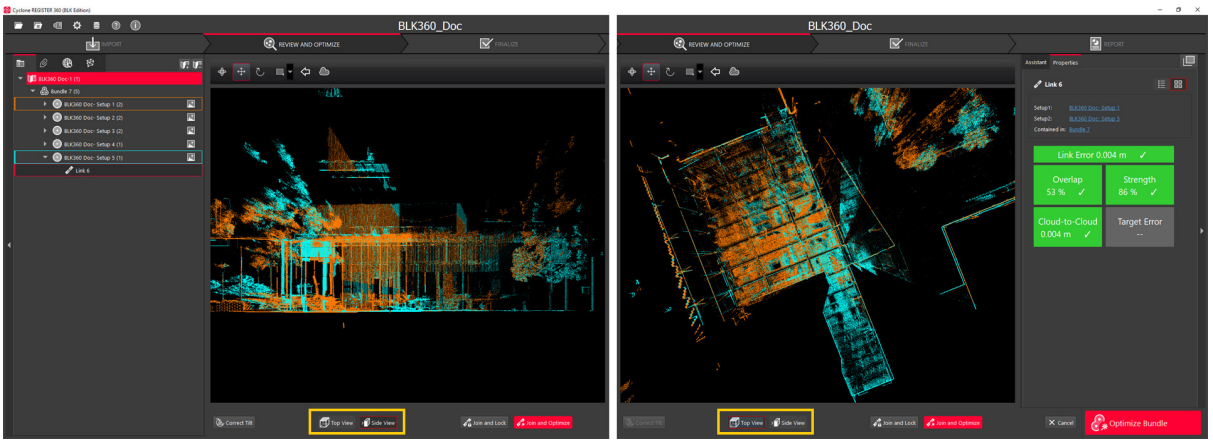
Registration

After importing the scans, select any two scans and use the functions at the bottom of the viewport to register them together and create links:

If you are confident in the scan data, you may roughly position them and use the **auto cloud**.

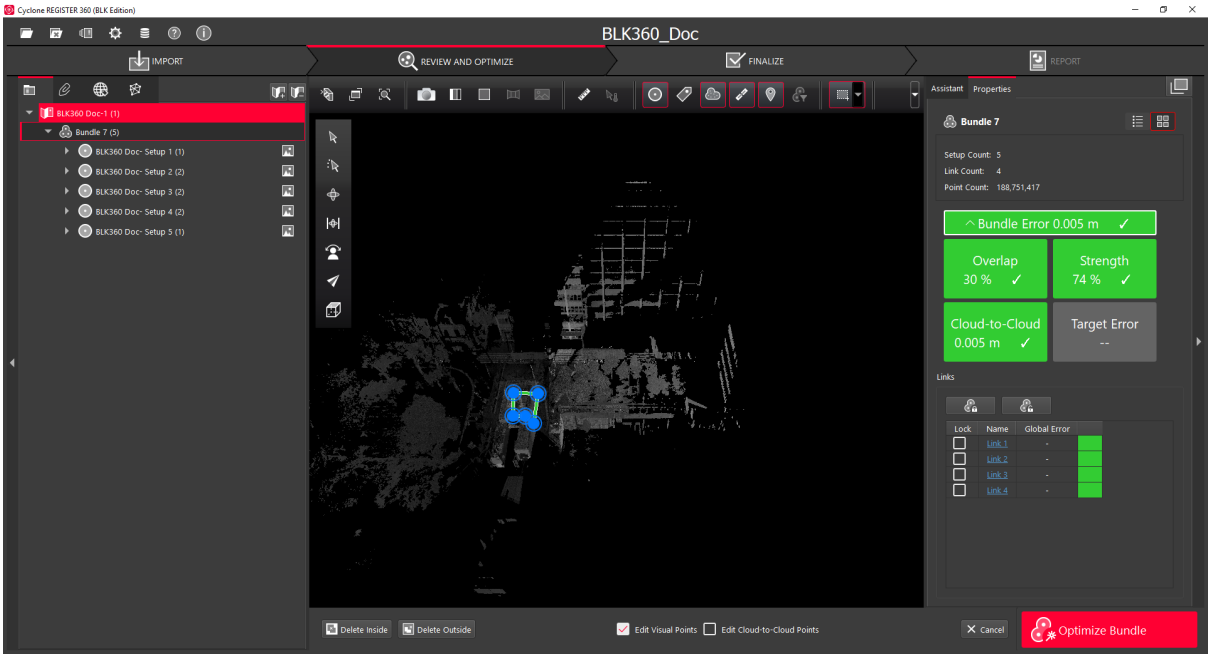


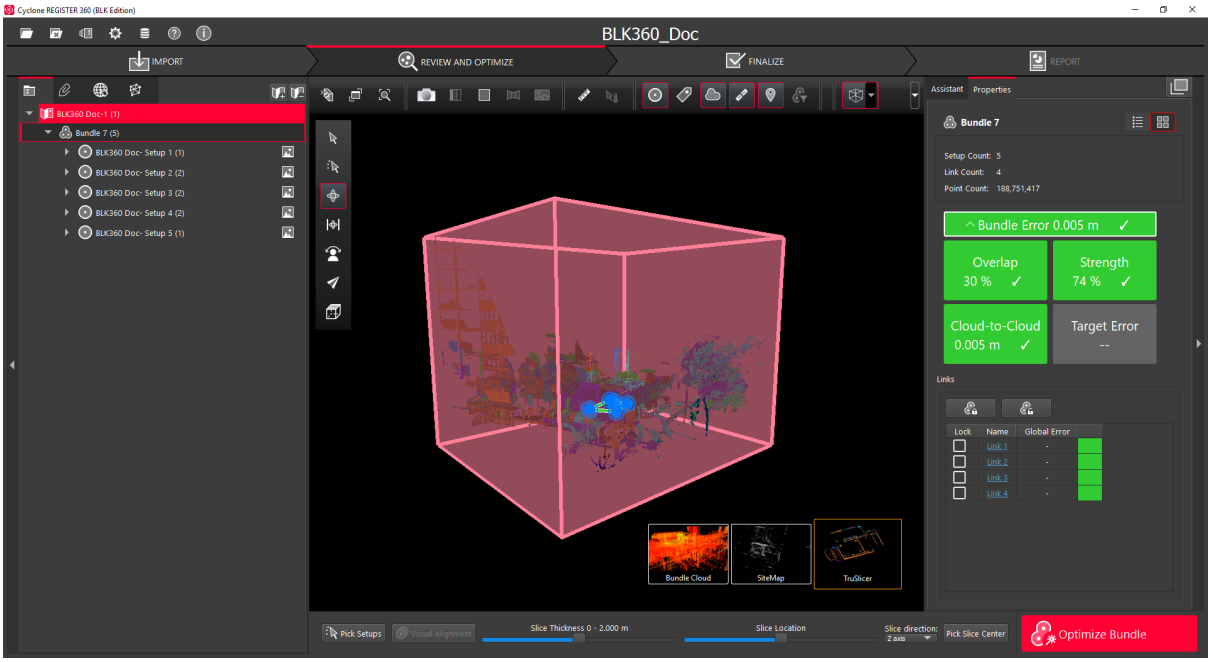
Otherwise, visual alignment can be selected for the scan and with the gumball tool, adjust the scan to align roughly with the other scan.



Clean Up Point Cloud

There is a plethora of tools located right above the 3D Viewport that allows you to clean up the dataset. Marquee selection allows you to define a region of points to remove.



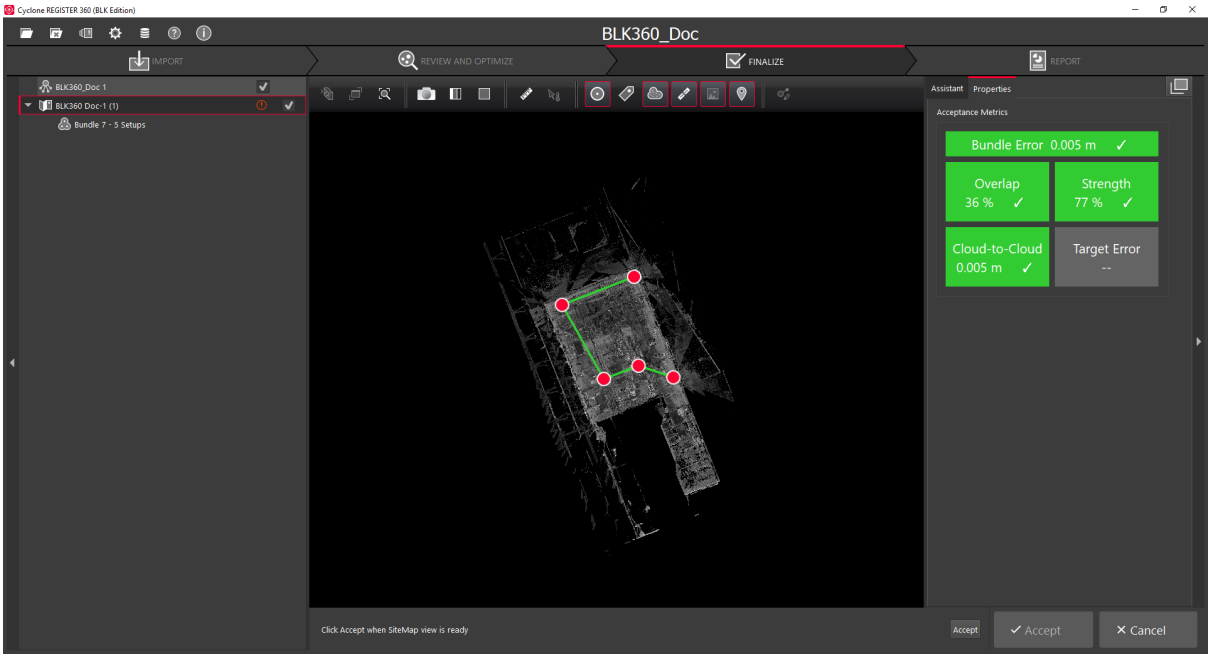


Optimise Bundle

When your data set is fully prepared, click **Optimise Bundle** to proceed to the next step.

3. Finalise

This phase presents you with the final data set. Accept the dataset to proceed to the next step.



4. Report

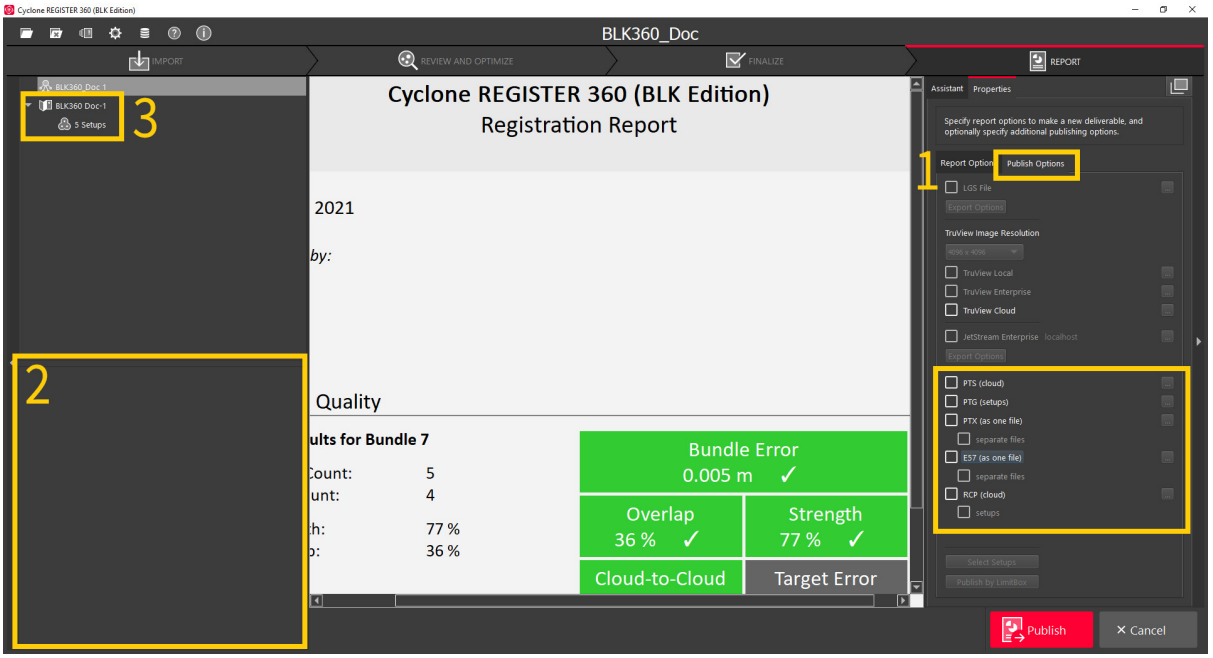
When everything has been finalised, the Report phase is used for two primary purposes; Reporting and Exporting.

> **Reporting** is used to generate a PDF that collates the Registration results; accuracy, alignment, and strength of links amongst others. This is primarily used as proof for confirming that the dataset is accurate.

> **Exporting** is for extracting all the point cloud data into an accessible and transferable format to be used in other workflows.

Exporting

To export point cloud data, use the menu on the right.



1. With the **Publish** menu selected, the bottom batch of options is the point cloud export options. The common file types are

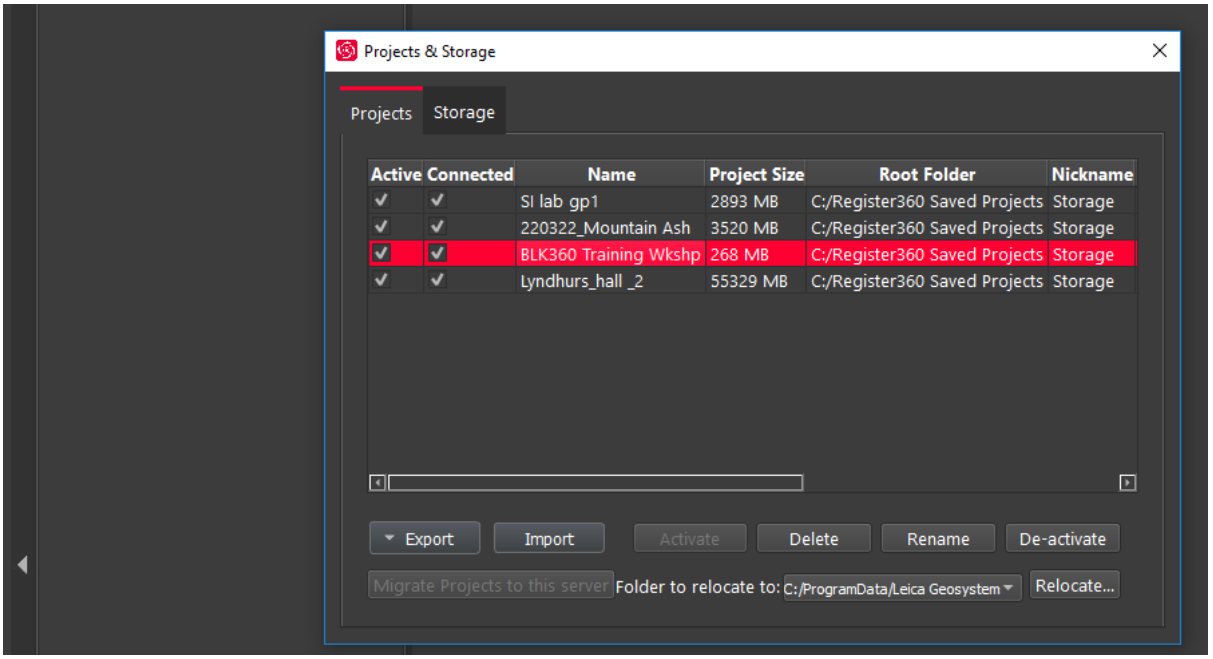
> PTS: Common raw point cloud file type with position (x, y, z) intensity, and colour (r, g, b) data for each point.
>
> E57: Common format for registered point clouds, can export as one single cloud or as separate aligned files, useful if you wish to do more processing in other software or workflows.
>
> RCP: Autodesk Recap file if you wish to use this data in Autodesk Recap.

2. A log of your exports will be kept here, this is key because the software is unable to export any set of data (point clouds and/or reports) under a name it has used previously, even if it is to a different folder.

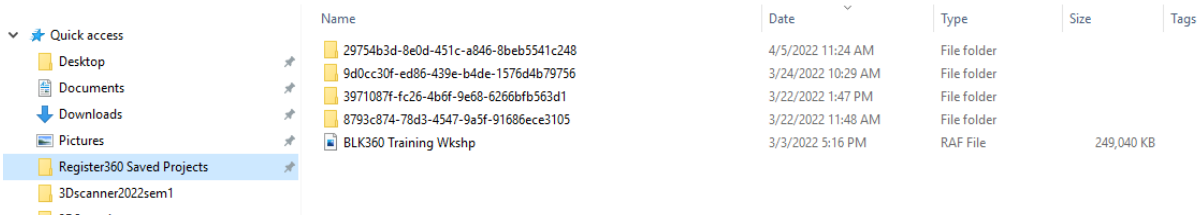
3. If you need to export the same dataset after some adjustments, you can rename it here (Right-Click or Double-Click) so as to not conflict with the export log-in.

Finish

Ensure that you have saved a copy of your data from Cyclone Register. The best way to do this is to export your project as a .raf archive file.



You can access the archive file from the 'Register 360 Saved Projects' folder.



Other Resources

Please find the official video tutorial at the link below.

Cyclone REGISTER 360 for BLK2GO Processing

GeoSlam

Quick Summary

GeoSLAM Connect is a smart software platform and comes as standard with any ZEB system. Create clean, georeferenced point clouds automatically.

It uses the SLAM algorithm (GeoSLAM Beam) alongside 3D visualisation of your data, additional processing and filtering, workflow automation tools and integration into third-party software applications. With the press of one button, your data will be automatically processed, saved in a folder of your choice, and prepared for the next step of your workflow.

Installation

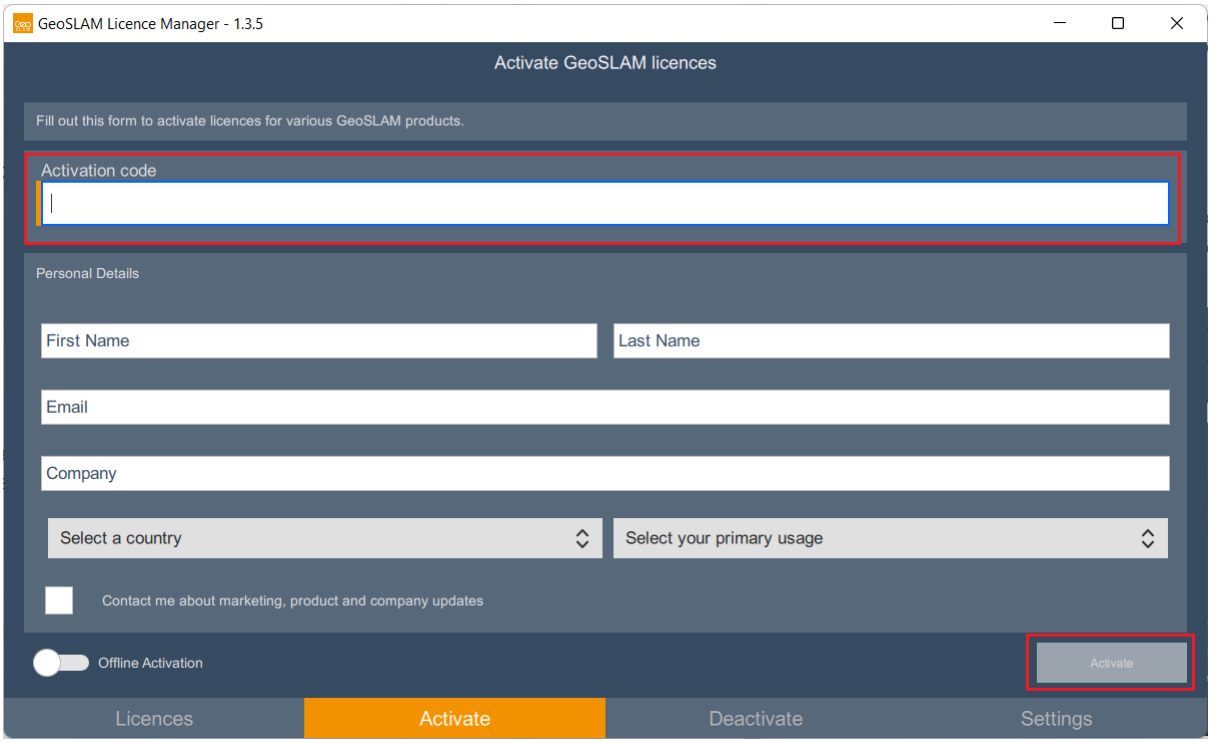
1. Install

Download the **GeoSLAM Connect software bundle** (this includes the GeoSLAM Licence Manager tool), and open the download file to **install.**

GeoSLAM Connect software bundle

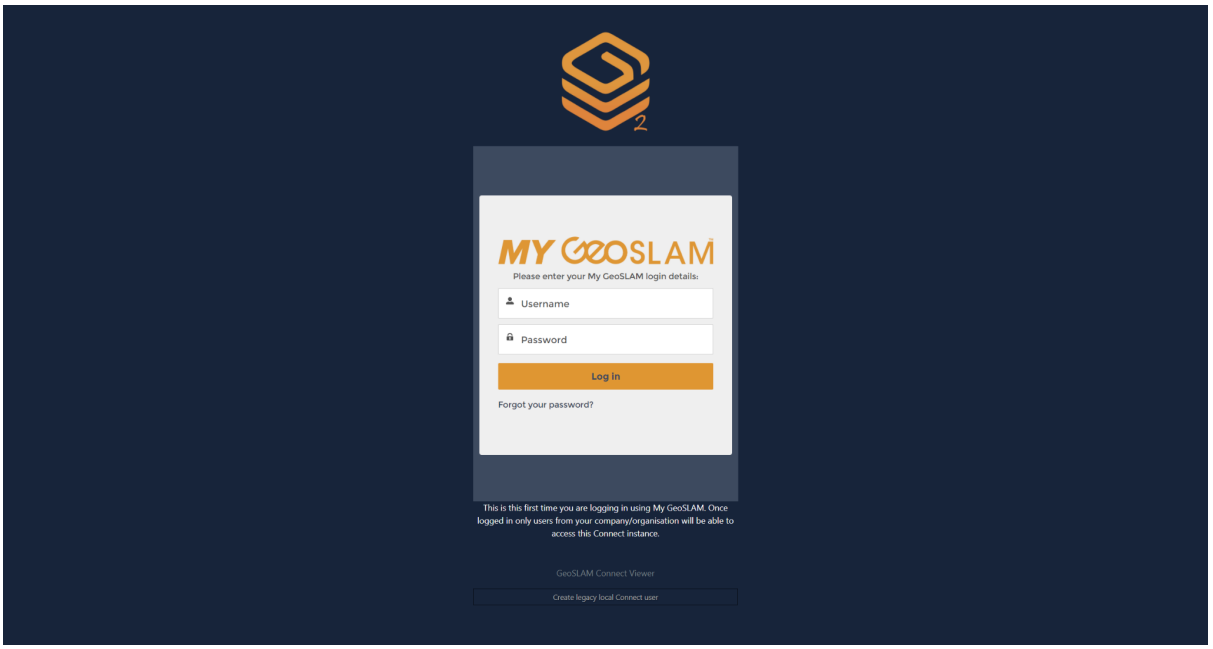
2. Activate

Open the **GeoSLAM Licence Manager** tool and activate your Connect licence using the code found on your GeoSLAM Care certificate.



3. Login

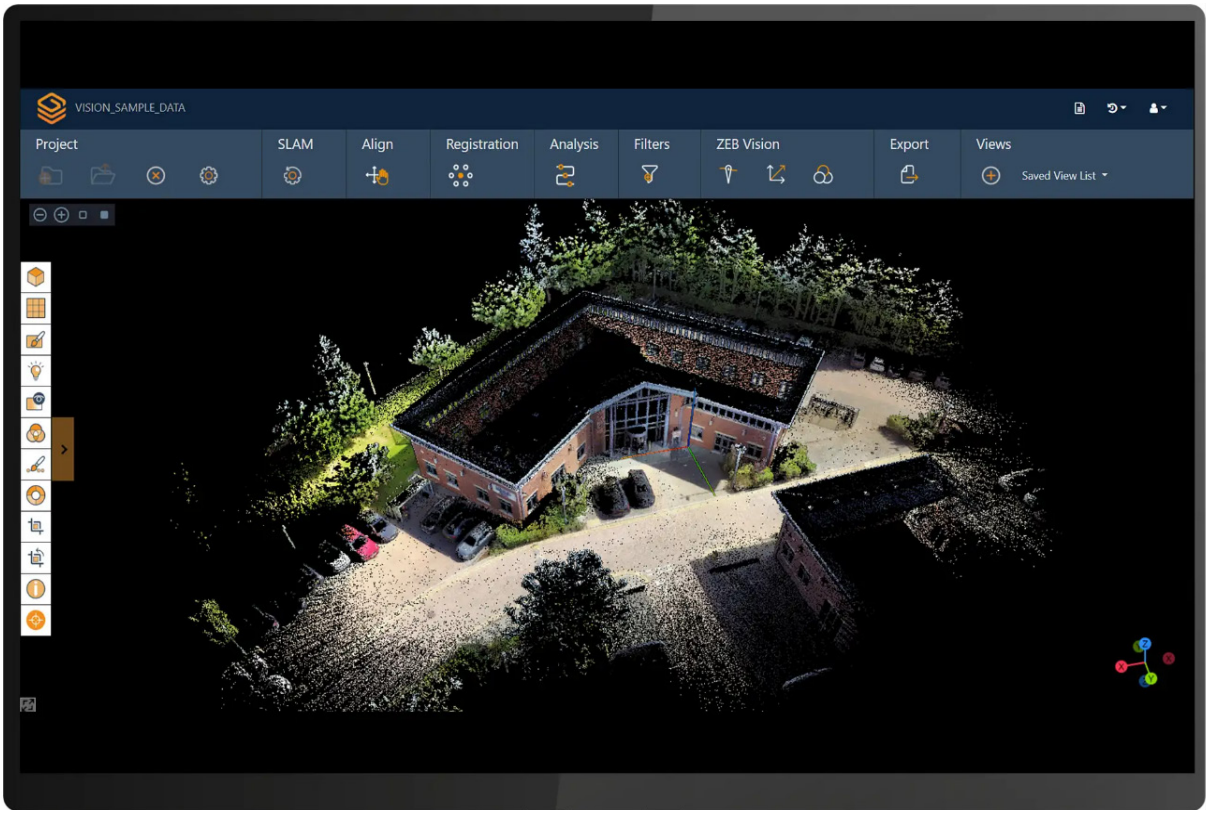
To open GeoSLAM Connect and **register** your **My GeoSLAM** account by entering the username provided by GeoSLAM (this will have been sent via email). If you haven't received a username, please contact support@geoslam.com.



4. Process

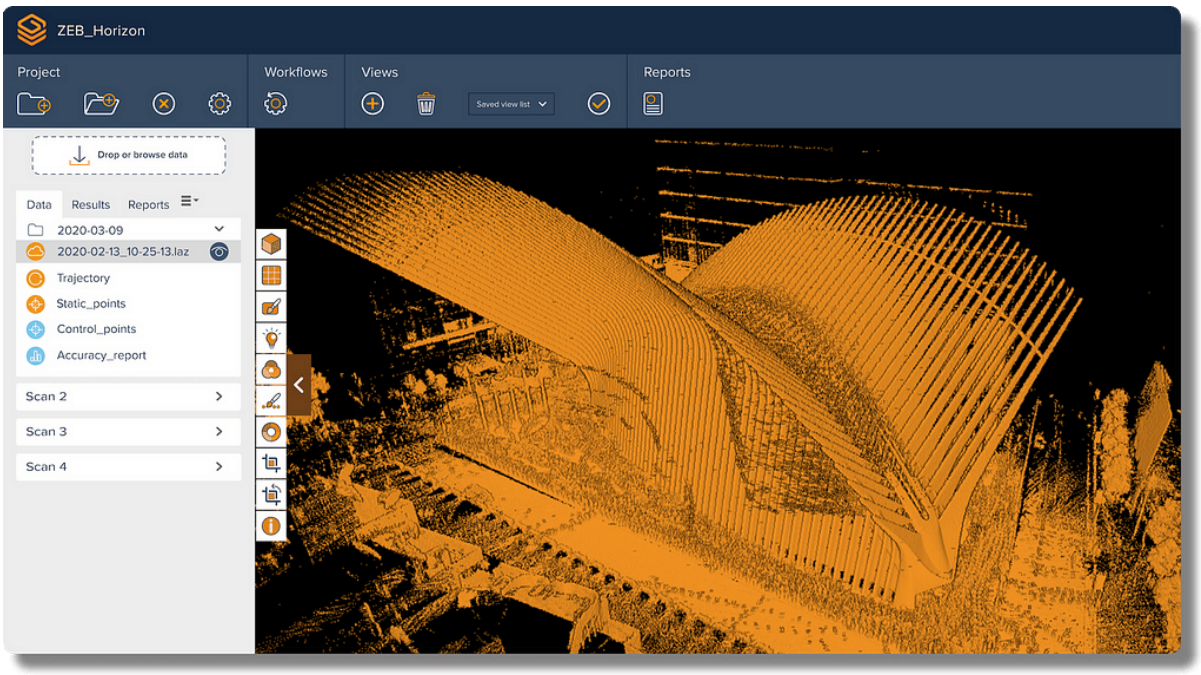
GeoSLAM Connect is now ready for you to use and you can begin to **process data** using the workflows available.

User Interface



Scan Project Workflow

Data Import



Drag and drop datasets into Connect where a pre-selected workflow will automatically begin processing. Datasets can also be browsed and selected for upload.

If you want to create floorplans.

GeoSLAM Floorplans combines hardware, advanced SLAM and analytics to give you the information you need to create accurate, rapid floorplans.

1. It starts with SLAM

SLAM (Simultaneous Localisation and Mapping) creates a digital model of a site, by using a handheld mobile scanner.

2. Capture

Using GeoSLAM's mobile mapping system, capture measurements by walking freely between rooms and floors. As you walk around a property, 43,000 invisible, harmless laser beams are emitted each second, and this is what forms a digital map.

3. Process

Plug your ZEB scanner into a computer, and we'll automatically process the data using our smart data platform, GeoSLAM Connect. We can set the file to be automatically saved to a network folder of your choice, each time a scan is completed.

4. View

See your digital capture in minutes.

5. Create

Automatic slices of each floor extracted from your 3D model, and your floorplans are ready.

6. Where next

Your floorplans can be exported and uploaded to other software, such as Floorplanner.com

Other Resources

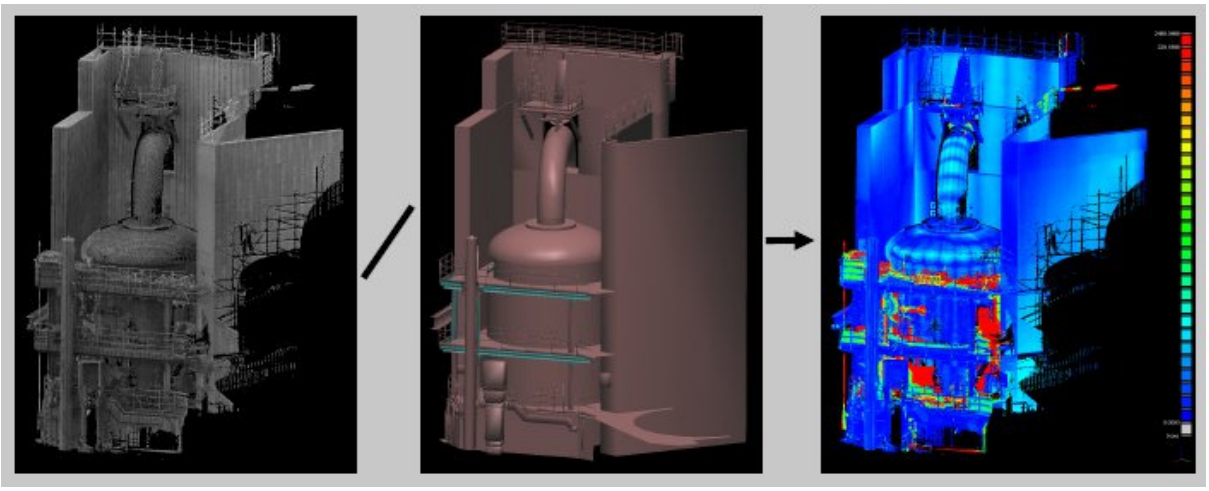
Please find an Introduction to Connect and Workflows at the link below.

Webinar GeoSLAM - An Introduction to Connect and Workflows

CloudCompare

Quick Summary

CloudCompare is a 3D point cloud (and triangular mesh) editing and processing software. It has been originally designed to perform a comparison between two dense 3D point clouds (such as the ones acquired with a laser scanner) or between a point cloud and a triangular mesh. It relies on a specific octree structure dedicated to this task. Afterwards, it has been extended to a more generic point cloud processing software, including many advanced algorithms (registration, resampling, colour/normal/scalar fields handling, statistics computation, sensor management, interactive or automatic segmentation, display enhancement, etc.).



Cloud/mesh distances computation

Installation

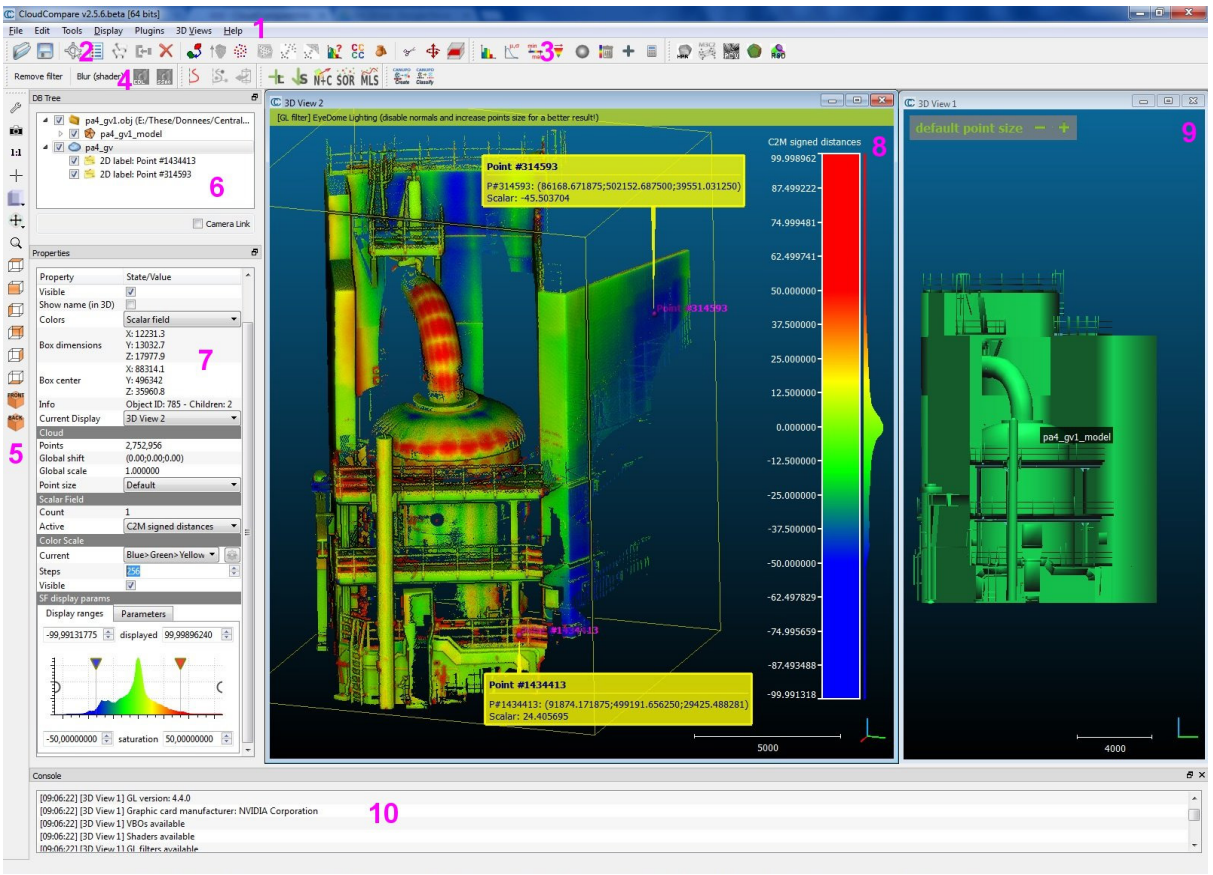
CloudCompare is Free software.

Download and Install **CloudCompare** available here, and select the version in the product tile.

CloudCompare

User interface

CloudCompare relies on **Qt** and OpenGL.



User interface snapshot

1. **Menus**
    - File (open, save, quit, etc.)
    - Edit (edit selected entities and their features - colours, normals, scalar fields, etc.)
    - Tools (segmentation, registration, projection, etc.)

    - Display (display-related options)
    - Plugins (loaded plugins)
    - 3D Views (3D views management)
    - Help (about, help, etc.)
2. **Main toolbar** (quick access to main editing and processing tools: open/save, point picking, clone, etc.)
3. **Scalar fields toolbar** (quick access to scalar fields related tools)
4. **Plugins toolbar** (quick access to currently loaded plugins - standard and OpenGL shaders)
5. **View toolbar** (quick access to display-related tools)
6. Database tree (for selection and activation of entities and their features)
7. Properties view (information on the selected entity)
8. Default 3D view
9. Another 3D view (created with 3D Views > New)
10. **Console**

Here is the first introductory tutorial video:

Introductory Video on CloudCompare

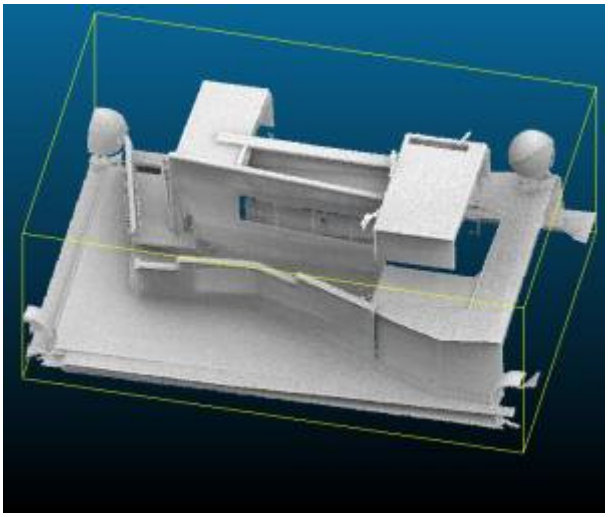
Documentation

For a (maybe not so) exhaustive list of CloudCompare functionalities check the **documentation** page (especially the **wiki**).

Plugins

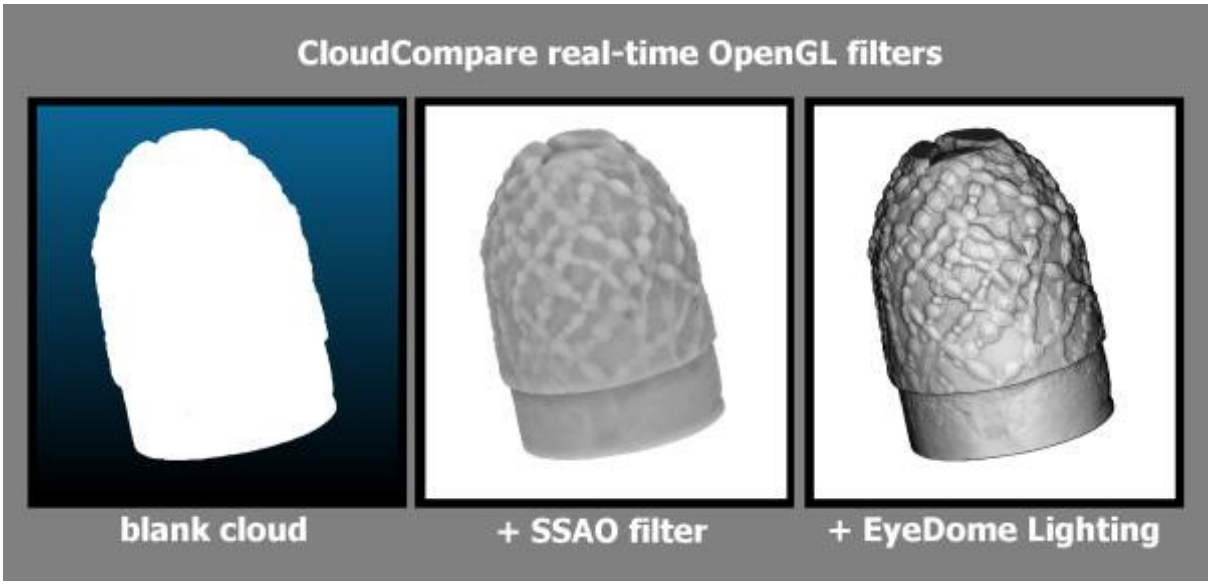
CloudCompare also supports an extension mechanism based on plugins. 2 types of plugins are available:

- Standard plugins (*algorithms*)



Ambient occlusion of a raw point cloud with the qPCV plugin

- OpenGL filters plugins (advanced shaders)



Example of real-time GL filters applied on raw point clouds

See the complete list of plugins here.

Plugins

Supported file formats

CloudCompare can load many open point cloud formats (ASCII, LAS, E57, etc.) as well as some manufacturer's formats (DP, Riegl, FARO, etc.). It can also load triangular meshes (OBJ, PLY, STL, FBX, etc.) and a few polylines or polygon formats (SHP, DXF, etc.). Some SfM formats are also supported (Bundler, Photoscan PSZ, etc.).

See the complete list of supported formats here.

Supported file formats

Other Resources

Download the "CloudCompare 2020 Developers course" material here.

CloudCompare 2020 Developers course folder

4.3 AUGMENTED REALITY

Hololens 2

Quick Summary

Microsoft HoloLens 2 is an augmented reality (AR) headset developed and manufactured by Microsoft. HoloLens 2 is the second iteration of Microsoft's revolutionary head-mounted mixed reality device. It's a device you put on your head, with a visor over your eyes, which enables a completely new way of interacting with information. It's a self-contained device, with an onboard computer and built-in Wi-Fi, which acts as a client for data on the device itself, the Azure cloud, or the web in general.

Access

The HoloLens 2 is available via bookings and you must have completed the induction training before using it.

Booing and Training Link (need to be linked)

The Kit

The HoloLens 2 kit will include the following items, please check that all items are present in the kit upon borrowing and returning.

- Hololens 2

- Power supply + USB C cable
- Carrying case

Please find the full Microsoft documentation here, you will find a summary below.

Getting around HoloLens 2

HoloLens 2 hardware

> ⚠ The HoloLens 2 is part magnetic. Do not place magnetic-sensitive products, like credit cards and magnetic storage media near the HoloLens 2. Otherwise, corruption may appear in the data stored on the HoloLens 2

User Interface

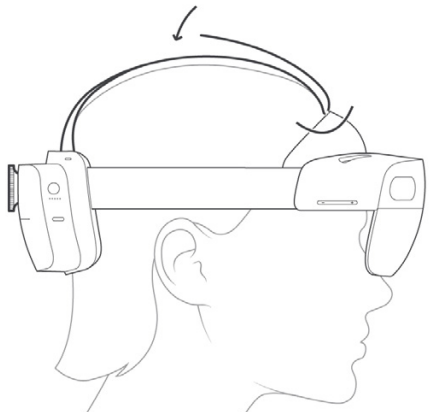
Power and USB-C (power/data) are located on the back.

Volume and Brightness rockers are located on either side of the front of the device.

Fitting the Hololens

> ⚠ Do not take your glasses off.

Place the Hololens 2 on your head, you may use **the adjustment wheel** on the back to adjust the tightness. You may also need to loosen or tighten **the velcro strap** on the top.

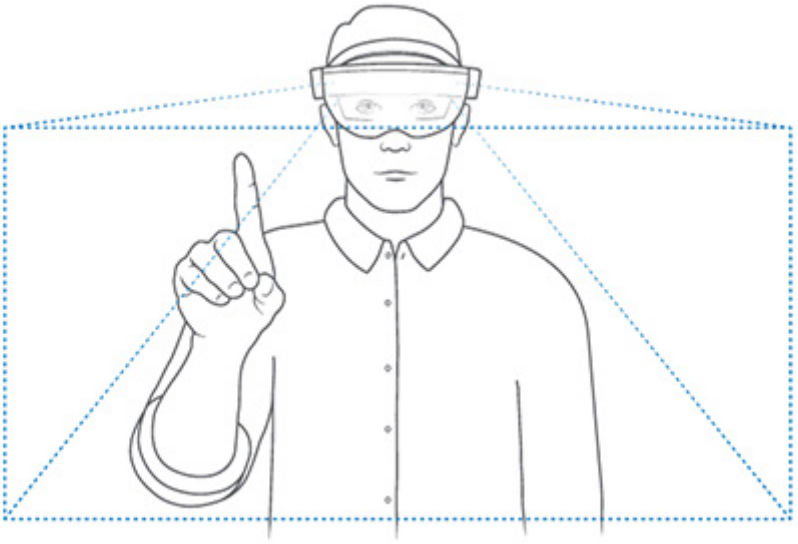


> It may take some time to get used to the field of view of the Hololens 2. You may need to make multiple adjustments to ensure you can see the whole extent of the Fologramms.

Interaction

Interactive Area

The Hololens uses your hands to navigate and interact with its content. There is limited space around the front of the device that is tracked.



This will take a while to get used to but if you are struggling, if the Hololens can see your hand and gestures, it will register.

Near Interaction

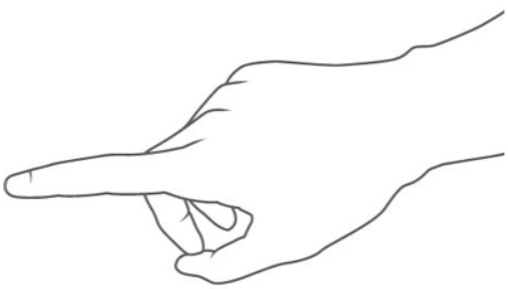
To interact with elements nearby, you can simply use your hands. When you get near an element, a small white ring at the top of your index finger acts as a cursor.

- You may then **tap** or **scroll** like you would a touch interface.
- You can **grab** elements by pinching your thumb and index finger.

Far Interaction

To interact with elements that are far away, you are assisted by a different type of cursor; the hand ray.

This is a white ray that extends from around your palm. Use the Air Tap gesture to interact in this way.



Air Tap: Quickly pinch and release your index finger to your thumb.

> You can leave your fingers pinched together to **air scroll** and **air grab**.

Signing On

> The devices should be pre-loaded and already signed in with accounts, set up correctly and with access to the main applications.

Start Menu

The **Start gesture** opens the **Start menu**. **Hold out your hand** and face your **palm** towards yourself. **Tap the Icon on your wrist**.

Start gesture

To **close** the Start menu, do the Start gesture when the Start menu is open. You can also look at the Start menu and say "Close".

Calibration

The calibration can be found in the settings application.

Managing Applications

As you open more and more holograms and applications, you will see these as windows or objects in your space.

Note that these function like any other computer/tablet, they will remain open as you last left them. Simply **tap** or **air tap** them to re-engage with them.

Moving/Resizing

You can **grab** or **air grab** any of these elements by the title bar or one of the corners to manipulate its context.

Closing

You can close elements by **tapping** or **air tapping** on the 'x'.

Do so regularly on unused elements to ensure maximum performance.

Streaming & Recording

Download the **Microsoft HoloLens application**, this will allow you to connect to the device through Wi-fi for streaming, and to extract any recordings or photos taken with the device:

Microsoft HoloLens application - Microsoft Store

Add a device to begin - the application will guide you through the process. Ensure that both devices are on the same network.

When prompted for login details, you may create a new account just for accessing this device portal. The PIN required will be displayed on the Hololens 2.

Fologram

Overview

Fologram is designed as a plugin that streams data from Rhino and Grasshopper to a Hololens or mobile device.

Please find Fologram's documentation via the link below to start learning.

Fologram Knowledge base

> The following will begin with the **Fologram for Hololens** device, and then read the workflow about **Fologram for Rhino** and **Fologram for Grasshopper**.

Fologram for Hololens

Setup

> Ensure your Rhino/GH machine and Hololens are on the same wi-fi network.

Launch the Application

Launch the **Fologram application** through the **Start Menu**.

Connect to Rhino/Grasshopper

Upon launching, you will be immediately prompted to scan a QR code to connect to a Rhino session. Look at the QR code generated in Rhino. Refer to the latter section of **Fologram for Rhino** for more details.

Model Placement/Snapping

Upon successful connection to Rhino, Fologram will be prompted to set the **origin point** of the holographic scene. This is tied to the origin point of the Rhino scene.

The Hololens intermittently scans and maps a very rough 3D representation of your immediate environment. This allows you to roughly snap to surfaces. For the most part, this is perfectly acceptable.

The Fologram Menu gives you further manipulation if required.

Navigation and Interaction

Fologram only uses **air tapping** for interaction.

Fologram Menu

Tap and hold to bring up the **Fologram Menu**.

This menu gives you access to the following functions:

Menu Function	Description
Snap to QR Codes	For precise model placement, this is the way to go. Generate and print QR codes to use as snapping through Fologram in Rhino.
Parameters	Control any sliders, toggles or buttons synced through Grasshopper.
Layers	Linked to Rhino layers, use this to toggle locks and visibility.
Edit	Allows for the coarse transformation of the scene based on the origin point.

	Allowing for moving, rotating and scaling.
Models	Load or save a model. These models are stored on the Hololens itself so a Rhino connection is not needed. Note that Grasshopper elements are not saved in any way.
Settings	Host a variety of useful functions and display settings. Restart can be found here to restart the application. A variety of display settings can also be found here, such as toggling shadows, sizes of elements, etc.

Fologram for Rhino

Overview

Fologram for Rhino allows you to view any geometry in your Rhino viewport in mixed reality using the HoloLens.

Please find the Official tutorials here.

> **Tutorials of Fologram for Rhino & Grasshopper**

Installing Fologram

> Fologram for Rhino is designed to run using the latest service release of Rhino 5 or Rhino 6 and may not support all older releases of Rhino.

You can **download** and **install** Fologram from the Fologram website below.

> **Fologram**

Connecting to Fologram

> ⚠ You must ensure that all your devices (mobile, laptop, hololens) are on the same wifi network.

HoloLens must be connected to a Wifi network in order for Fologram to work. Connect to your Wifi network or UniWireless if you are on campus.

1. Launch the **Settings app** on **Home Screen**
2. Open **Network and Internet** page
3. Select your desired network and log in. (ensure all connections are in the same network)

Opening Fologram in Rhino

1. Ensure you have the most up-to-date plugins for **Rhino3D** and **Grasshopper.**
2. Close Rhino if it is already open.
3. Locate FologramForRhino.rhi file and launch the installer.
4. Install the package and re-launch Rhino.
5. Click on the **Fologram** button or type “fologram” in the command bar.
6. Click on “Add Device” to display the **QR code required** for connection.

Streaming your Models

Check out Fologram's article on this topic here:

Streaming models from Rhino

Fologram will detect and synchronize any change in your Rhino document with the mixed reality model on the HoloLens. To stream your own models to the headset you can open a new model or import your models into an existing document running Fologram.

> ⚠ Ensure the Rhino C-Plane is neutral (X-right, Y-forward, Z-up)

Scale and Position

1. Most architectural models are on a real-world scale. Be sure that the 0,0,0 point of your model is at a point that makes your model easy to place in mixed reality e.g. at the corner of your building.
2. Very large models can be difficult to place as you may be behind or inside parts of your model.
3. Consider setting a scale factor using the Fologram scale tool (under the blue 'Add Device' button in the plugin window) before placing models at 1:1 in mixed reality.

Detail

1. The HoloLens runs a mobile chipset and is not optimized for very detailed models with high poly counts.
2. Fologram will synchronize your Rhino document using Rhino's default render mesh settings for all NURBs geometry. This can create very large meshes from surfaces with high curvature, especially piped curves.
3. Consider manually meshing NURBs geometry before streaming. Aim for <1m polygons.

Setting up a Model for mixed reality

If you are experiencing issues with frame rates, synchronization times or disappearing geometry on the HoloLens you may want to consider setting up your Rhino scene for

optimal performance in mixed reality. This includes customized meshing of NURBs geometry, decimating mesh geometry, and checking geometry normals and materials.

Fologram's article covers preparing your Rhino models for mixed reality very well. You can check it out here:

> **Preparing your Rhino models for mixed reality**

Solutions for display curves

By default, Fologram does not display curves from Rhino into the Hololens. There are some workaround solutions for this which are discussed in the video below.

> **Dealing with curves and polycounts**

Fologram for Grasshopper

You can use the full power of grasshopper with Fologram, this enables you to control scripts through Fologram, set up interactive scenes for fabrication workflows or for quick design prototyping.

Please find the Official tutorials here.

> **Tutorials of Fologram for Rhino & Grasshopper**

Installing Fologram for Grasshopper

Fologram for Grasshopper comes packaged with Fologram for Rhino and will be installed during setup.

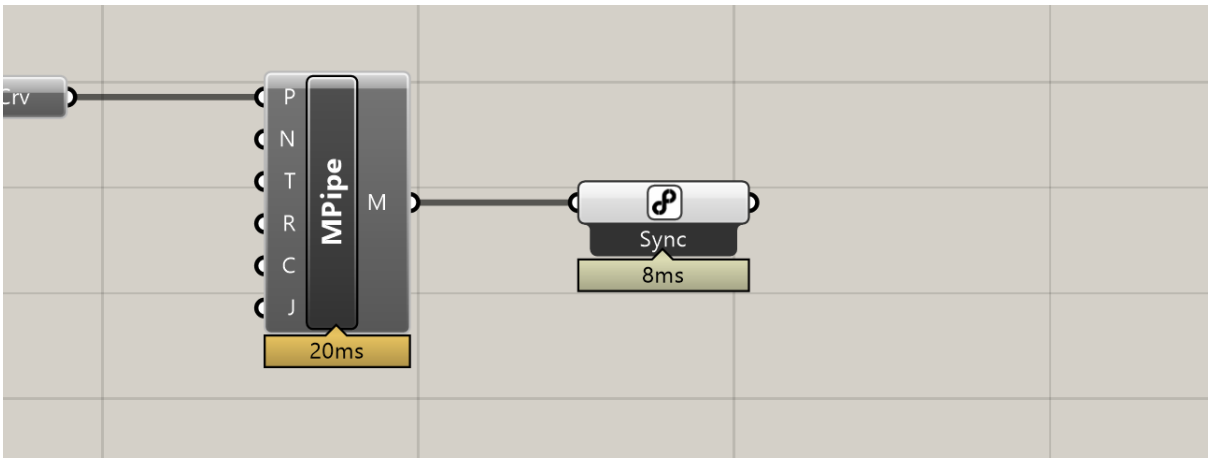
To launch Fologram for Grasshopper, type the **Grasshopper** command in Rhino to launch Grasshopper. **The Fologram for Grasshopper components will appear in a toolbar called Fologram.**

> Fologram for Rhino needs to be running and connected to a device to work with Fologram for Grasshopper.

Fologram for Grasshopper

Fologram for Grasshopper allows you to stream select meshes to the Fologram device (Hololens 2 or tablet/mobile).

The basic workflow is to use the Sync components to stream data.



"Sync Object" is a general component for syncing all types of gh elements.

Fologram Components

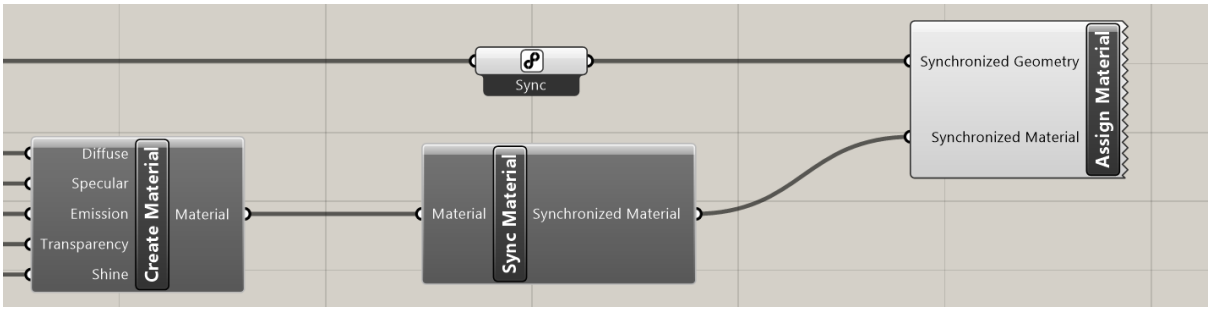
Sync

The primary set of components, allowing for data streaming to your Fologram enabled device.

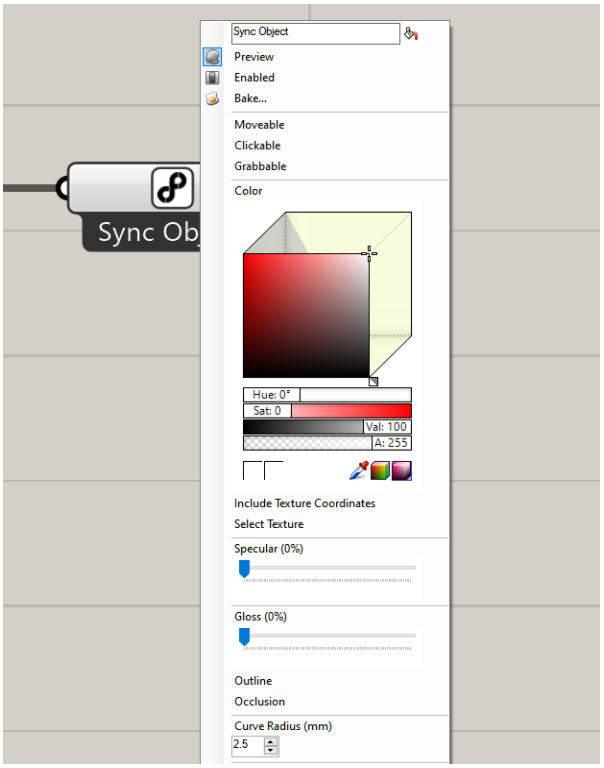
Syncing Objects

"Sync Object" is the main sync component, allowing you to send a variety of grasshopper data, but mainly surfaces, breps and meshes.

This can be used in conjunction with **“Assign Material”** or **“Assign Transform”** and the relevant sync components to further manipulate those aspects of the synced objects.

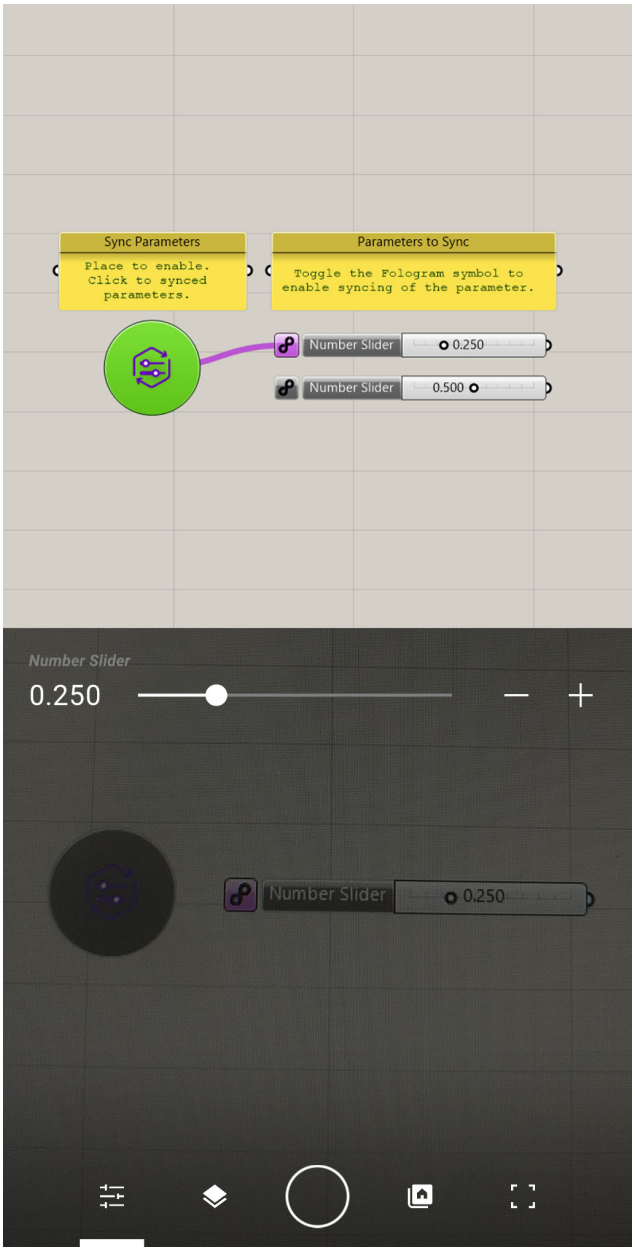


Right-click the **“Sync Object”** component to access further interactivity (Moveable, Clickable, Grabbable) and display options. For curves, you can set a radius here to preview them as meshes.



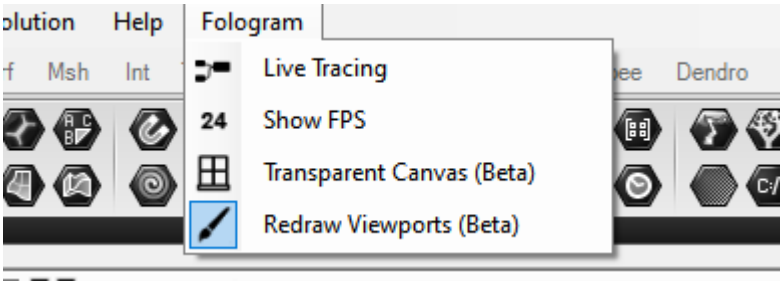
Syncing Parameters

“Sync Parameter” is used for enabling the control in Fologram's grasshopper menu, allowing you to change parameters within Fologram itself. **“Parameter Change”** provides a way to see which device made a change.



Fologram Menu

This menu has some useful general functionality:



Live Tracing shows how the data is flowing through the script

Show FPS shows the framerate of the Rhino scene

Transparent Canvas allows you to see through the Grasshopper Canvas to Rhino

Redraw Viewports will update the Rhino viewport, this is on by default but you may turn it off to improve performance if you are primarily using Grasshopper for Fologram.

4.4 ROBOTICS

UR10 I(Co-Lab)

Kuka Structures Lab

> The Kuka robot in the Structures Lab is available, please contact Dr Fred Fialho Leandro Alves Teixeira by email at **f.frederico@uq.edu.au**

4.5 VIRTUAL REALITY

HTC Vive (Steam)

Quick Summary

The HTC Vive implements "room-scale" virtual reality, whereby a user can walk freely around a play area rather than be constrained to a stationary position. The controllers and headset use a positional tracking system known as "Lighthouse"; multiple external base station units (also referred to as "lighthouses") are installed in the play area, which each contain an array of LED lights and two infrared lasers.

> You will need a **VR-capable computer** with an HDMI output if the kit does not include one.

Access

The HTC Vive is available via bookings and you must have completed the induction training before using it.

Booing and Training Link (need to be linked)

The Kit

The HTC Vive kit will include the following items, please check that all items are present in the kit upon borrowing and returning.

- 1 x HTC Vive VR Headset, w/ fixed HDMI, USB, Audio
- 2 x HTC Vive Controllers
- 2 x Base Station sensor
- 1 x Micro USB
- 1 x Linkbox
- 3 x Power Adapter
- 1 x Sync Cable

Please find the HTC Vive User Guide here.

Leica BLK2GO User Manual

Setup

Space Considerations

The scanner is available via bookings and you must have completed the induction training before using it.

Ensure that there is adequate space for VR.

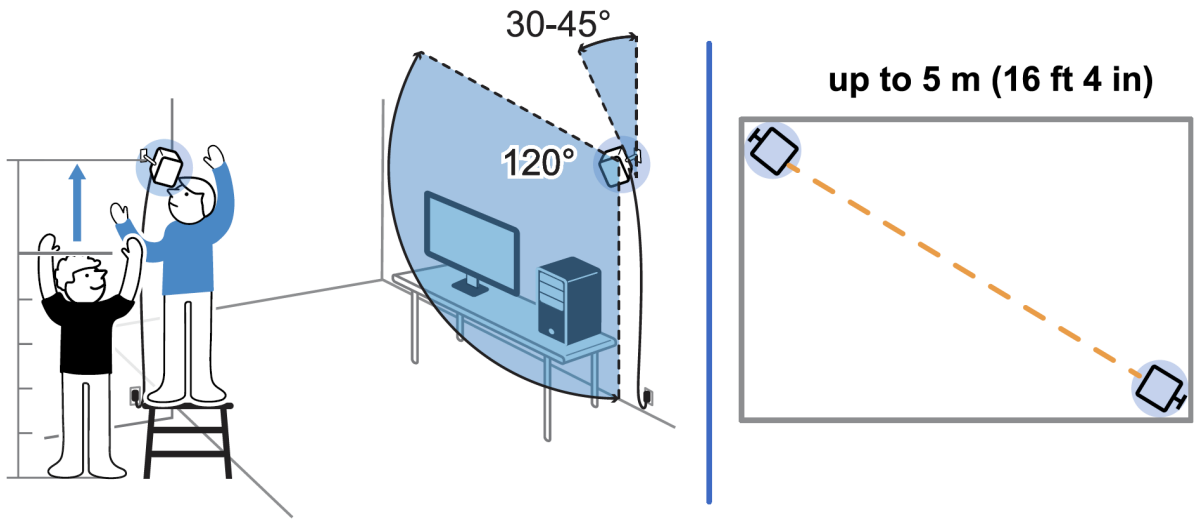
- For Standing-Only experiences, enough standing and arm room are enough.
- For Room-Scale experiences, a **minimum area of 2m x 1.5m** is required.

Ensure the space is clear of all potential tripping hazards.

Base Station Sensor Setup

VR works best when base stations are opposite, and can see each other all the time, and the headset and controllers have at least one base station in view of them.

The viewing angle is 120 degrees in all directions, ensure adequate coverage by tilting the sensors 30-45 degrees towards the ground.



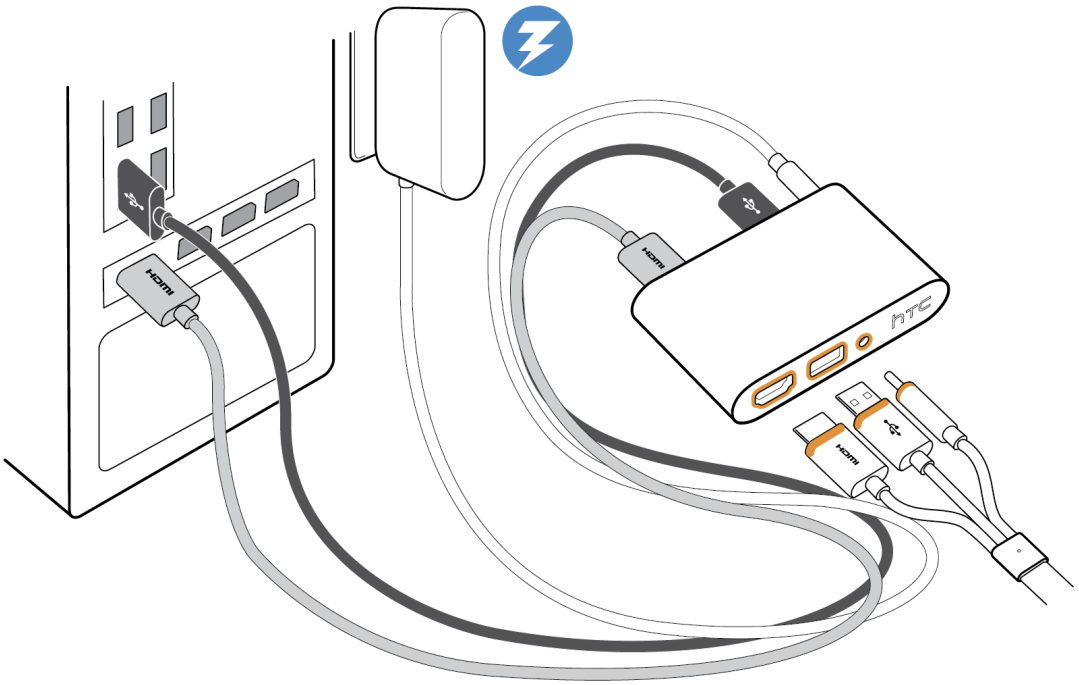
HTC Vive Official Setup Diagram

Hardware Setup

Headset

The headset needs to be connected to the link box, note the orange trim to denote the appropriate connection side.

The link box then requires USB and display (HDMI or DP) to your machine and power.

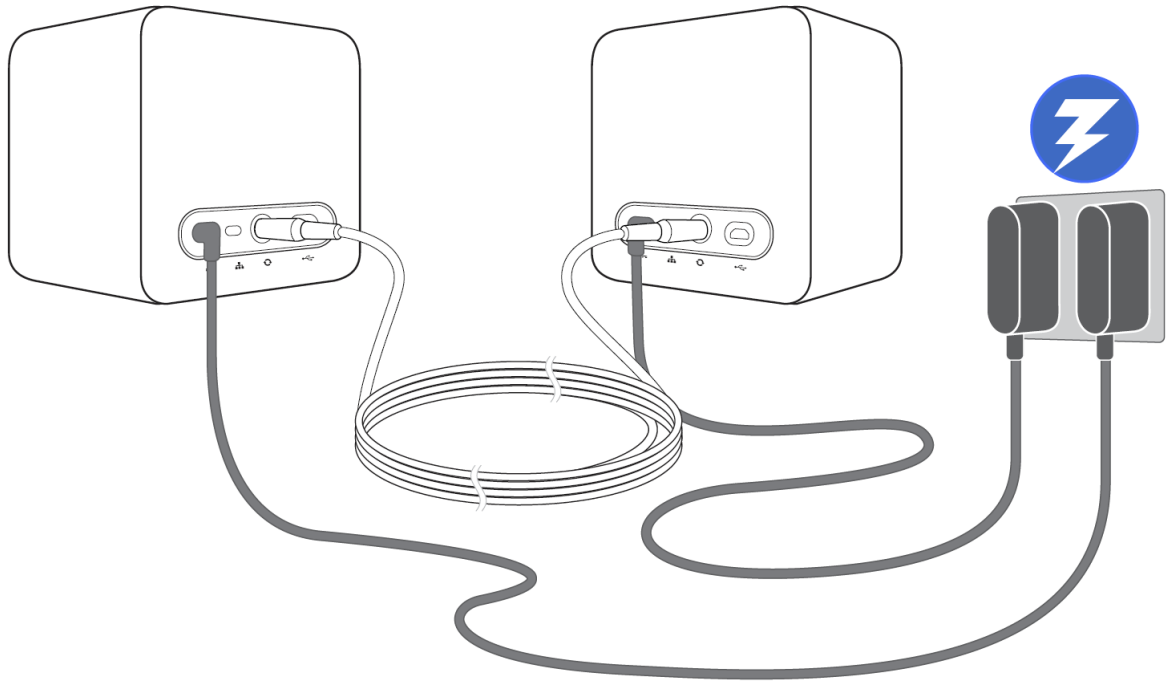


Base stations to power

Connect each base station to power.

The Sync cable may be used between each base station sensor as a potential fix for sensor-related issues, but we recommend that they be disconnected to start.

- If you are using only 1 (be wary of limited tracking): set the sensor to mode **B** using the mode button at the back.
- **(Standard)** If you are using 2 sensors **without** the Sync cable, set one to **B** and one to **C.**
- If you are using 2 sensors **with** the Sync cable, set one to **B** and one to **A.**



Software Setup

1. Download and Install **VivePort** is available here:

Set Up Your VIVE

2. Download and Install **Steam** is available here:

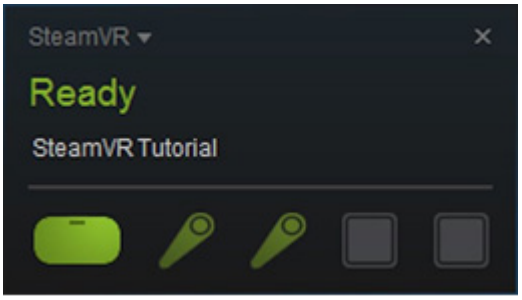
STEAM

3. Download and Install **SteamVR**, please refer to the latter section of **Steam (for VR)** for more details.

4. **Link the Controllers**: Once the Controllers are turned on, they should automatically pair with the headset. **To manually pair the controllers**, launch the **SteamVR** app. Go to `SteamVR ▼ > Devices > Pair Controller` and follow the on-screen instructions.

5. The SteamVR Status Window, will open and green lights will indicate the technology is connected and ready to go. Base sensors must be able to see (1) each other, and (2) the headset and controllers, to connect successfully.

   In the image below, the headset and both controllers are connected, whilst the base stations are not.



SteamVR Status Window

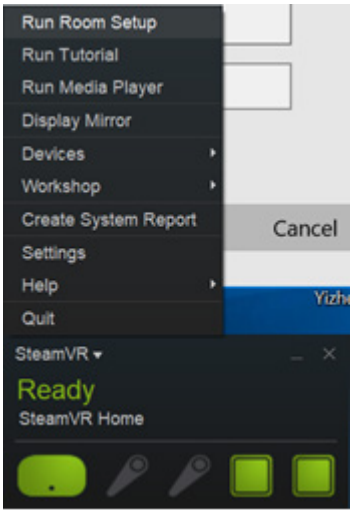
6. Turn on the controllers with the button just above the Vive logo This is the **menu button:**

The Menu Button

7. Launch SteamVR run room set-up:

   `SteamVR ▼ > Run Room Setup`

8. Follow the directions provided by the program to calibrate space and controllers.



SteamVR Room Set-Up

9. Steam VR should now be ready to go

Oculus Rift S (Steam)

Quick Summary

Oculus Rift S is a successor to the original Oculus Rift CV1 model, with noted changes including a new "inside-out" positional tracking system with cameras embedded inside the headset unit (similar to its sister device, the Oculus Quest), a higher-resolution display, and a new "halo" head strap.

Oculus Rift S documentation is a great place to start with learning.

Getting started with Rift S

Access

The Oculus Rift S is available via bookings and you must have completed the induction training before using it.

Booing and Training Link (need to be linked)

The Kit

The Oculus Rift S kit will include the following items, please check that all items are present in the kit upon borrowing and returning.

- 1x Headset Oculus Rift S
- 1x Headset cable (5 meter)

- 2x Touch controllers
- 2x AA Battery
- DisplayPort to DisplayPort adapter

> If the original cable does not fit, take out the DisplayPort to DisplayPort adapter and connect it to the Displayport in the PC.

Setup

For the Video Tutorial click the link below.

Oculus Rift S Basics Tutorial Part 01: Device Setup

> ⚠ Before you get started, make sure that your Rift S and PC firmware and software are **up to date**.

Install the Oculus app on your PC

To use your Oculus Rift S, you'll need to download the Oculus Desktop app on your Windows PC. Before you install the Oculus Desktop app, check to make sure that your hard drive has at least 9.29 GB of free disk space.

To download and install the Oculus desktop app on your computer:

1. Go to the **app download** page, and find the download link for Oculus Rift S or click the link below to download.

OculusSetup

2. Find your product and click **Download software**. The Oculus app will begin downloading to your computer.
3. Open the Oculus Setup app from the Downloads folder on your computer and click **Get started**.
4. Read and agree to the Terms and Conditions to continue.
5. Select the drive you want to install the Oculus app to by clicking the drop-down menu under **Location**.
6. Click **Install now**. When the installation is complete, log in to or create your account.

> If you want to change the install location of the Oculus app once it's installed, you'll need to uninstall and reinstall the Oculus app and assign the new drive during the setup screen.

Learn how to manage and save Oculus PC apps in different locations on your computer via the link below.

manage and save Oculus PC apps in different locations

Plug in your headset

Your Oculus Rift S uses USB 3.0 and DisplayPort connectors to connect to your computer. We've listed the different options that you can and can't use to connect your Rift S below:

Supported Connections

- DisplayPort Connection: You can connect your Oculus Rift S to any DisplayPort port that is directly connected to a discrete GPU.
- Mini DisplayPort Connection: You can connect your Oculus Rift S to any Mini DisplayPort port that is directly connected to a discrete GPU using the mDP⟶DP adapter included with your Rift S.

Adjust headset fit and feel

Put on your headset and make sure it fits comfortably.

1. Adjust the velcro top strap until the Rift S sits comfortably on your head.
2. Rotate the fit wheel to adjust the tightness of the halo band.
3. If you’re wearing glasses, put the headset on from the front first.
4. Press the depth adjustment button on the bottom of the headset to adjust the lenses in or out for more clarity and a comfortable fit over the glasses.

Set up guardian

> ⚠ Before using Rift S, make sure you have enough space around you. Move anything away that you might bump into or trip over. We recommend a play area of at least 3 feet x 3 feet, and 6.5 feet x 6.5 feet for room scale.

Guardian is a built-in safety feature that lets you set up boundaries in VR that appear when you get too close to the edge of your play area.

If you're setting up Guardian for the first time, follow the instructions that you see in your headset. You can also watch the videos below for an overview of setting up Guardian.

For the setup video of Guardian clicks the link below.

Oculus Quest Basics Tutorial Part 02: Play Area Setup

Enable Unknown Sources

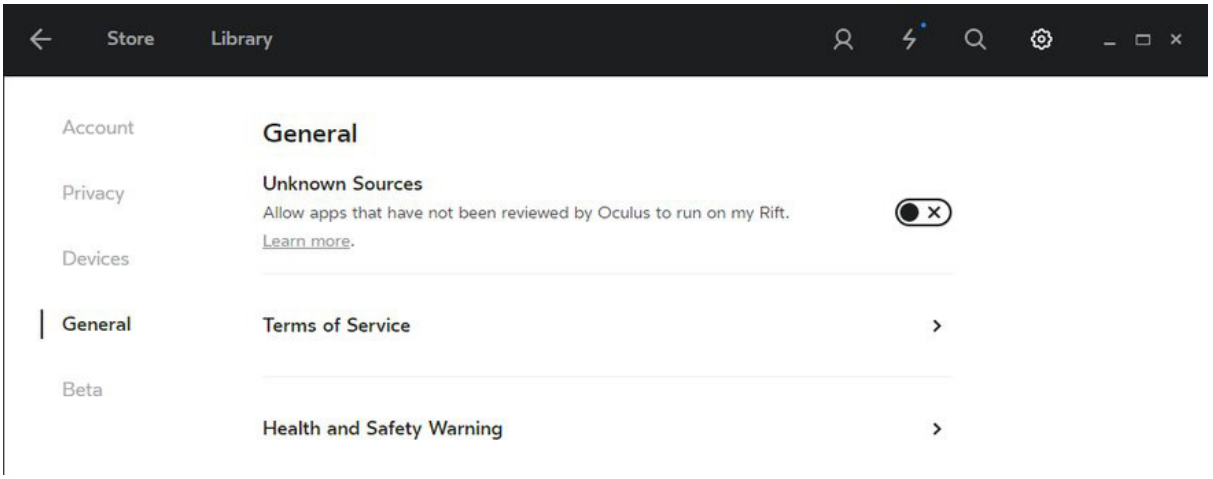
> ⚠ This part is crucial for Oculus Rift SteamVR connectivity.

Take your headset off and turn your attention to the Oculus desktop app.

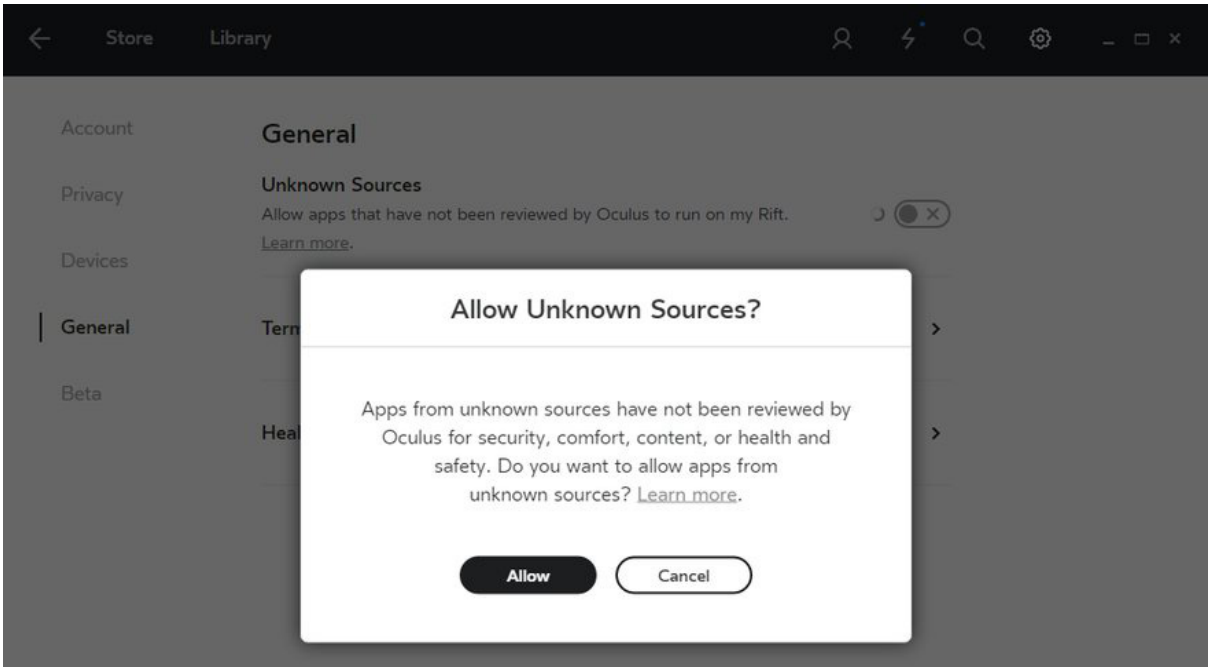
SteamVR supports the Oculus Rift. When using the Rift with SteamVR, use the Back button on an Xbox controller to bring up and dismiss the SteamVR Dashboard.

To enable this, follow the instructions below.

1. Start the Oculus App on your computer and select the gear icon in the upper right.
2. Select **Settings**.
3. Select **General** on the left.
4. Find the **Unknown Sources** toggle and click it so a check appears instead of an X.



5. You will need to confirm this selection before it is enabled.



6. Once enabled, you will be able to run SteamVR with the Oculus Rift.
7. When using the Rift with SteamVR, use the Back button on an Xbox controller to bring up and dismiss the SteamVR Dashboard.

Download and Install SteamVR

You can do that by going to your:

Launch Steam (**install it from here if you haven't already**). If you aren't automatically prompted with a pop-up to install SteamVR, go to **Library > Tools** and install **SteamVR** from the list.

Try Out Oculus Rift S With SteamVR

1. Once SteamVR is installed, you'll see a VR icon at the top right of the Steam window (near the minimize and maximize buttons). Click this to launch SteamVR.
2. Put on Oculus Rift.

Troubleshoot Oculus Rift S

Useful links for troubleshooting Oculus Rift S:

Troubleshoot Rift S

Fix a Problem with your Oculus Product

Oculus Quest 1

Quick Summary

The Oculus Quest 1 is a virtual reality (VR) headset developed by Oculus, It is a standalone device that can run games and software wirelessly under an Android-based operating system.

Access

The Oculus Quest 1 is available via bookings.

Booing Link (need to be linked)

The Kit

The Oculus Quest 1 kit will include the following items, please check that all items are present in the kit upon borrowing and returning.

- 1x Oculus Quest 1
- 2x Touch controllers
- 1x USB 3.0 type C cable
- 1x 15 W Power Adapter
- 1x Spacer for glasses

⚠ **Be careful of the real world.** While in VR you can only see the virtual world and can't see real-world obstacles. Take some time to clear out any chairs and desks from the blue play area.

⚠ **Keep Lenses Away from Direct Sunlight.** Sunlight can cause permanent damage to the lenses, therefore please keep the headset away from windows and don't use it outside.

Before the start

Please **install** the **"Oculus app"** on your mobile device. This is necessary to install the device. Take your phone and download the Oculus here.

Download on the App Store **Meta Quest**

GET IT ON Google Play **Oculus**

User Interface

Setup

Wearing the Headset

1. Press the **power button** on the right side of the Oculus Quest Headset. After pressing it, the button should emit a white light.

> If the button emits a red light, it needs to be charged using the charging cable.

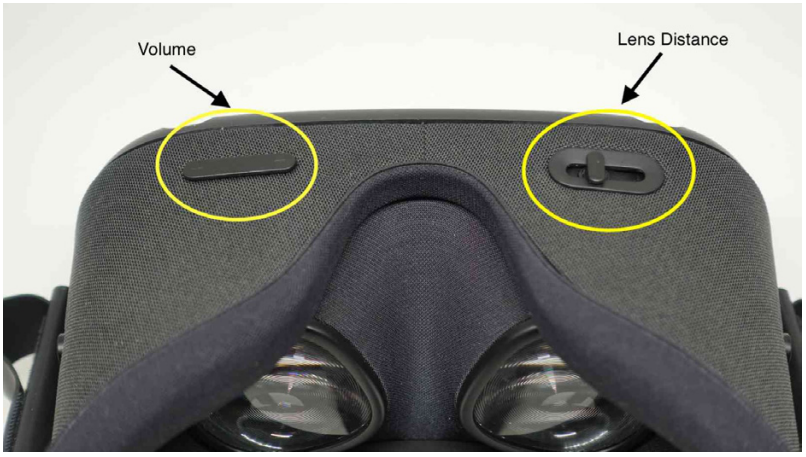
2. Before putting on the headset, adjust the **Velcro straps** on the sides of the headset. Pull the straps to make the headset tighter and push it back to make it looser. The straps are shown with arrows.

> Make sure that the straps aren't too tight. The headset should fit comfortably and not apply too much pressure on your face and head.

3. To put on the headset, push the straps up and place the headset on your eyes. Use your left hand to put the straps down on your head.

> If you're wearing glasses, put on the headset from the front first.

4. To change the volume and adjust vision, please see the picture below for the volume and lens distance button.



Setting up the VR space

For the Video Tutorial click the link below.

Oculus Quest Basics Tutorial: Play Area Setup

1. When the **Oculus turns on** and after a few seconds of loading, you should see a black-and-white version of your surroundings. **Grab** the **two remote controls** now.
2. A window will pop up shortly, directing you to **create a series of boundaries** using the remote controllers. After creating your boundaries, a blue fence will appear around you representing the limits of your playable area.
3. You will then be led to **the main menu** of the Oculus Quest where you can navigate to many applications. You can select anything on the menu by clicking on the trigger button on the back of either remote control using your forefinger.

Controllers

You can use your controller to interact with apps and games, using the buttons on your controller to do the following:

- **Trigger, A** and **X buttons**: Press to select things.
- **B** and **Y**: Press to go back to the previous screen or menu.
- **Oculus button**: Press to go back to Oculus Home or press and hold to reset your controller orientation.
- **Grip button**: Press to grab objects or make a fist when using your virtual hands.

- **Menu button**: Press the menu button from Oculus Home to bring up the menu.
- Press any button to wake the controller after you turn on your headset.

> Individual apps may include their own tutorials for how to use the buttons on your Oculus Touch controllers in each VR experience.

Connect to the WIFI

The Oculus Quest needs to be connected to a Wi-Fi network to use and access most features and content.

1. Click on **'Settings'** in the taskbar.
2. Click on **'Wi-Fi'**.
3. Choose the Wi-Fi you want to connect with and select it.
4. Enter the **password** of the selected Wi-Fi and click connect

Other Resources

Please find the video tutorial at the link below.

Oculus Quest Basics Tutorial

Steam (for VR)

Overview

SteamVR is the name of the service and development kit that allows for virtual reality using the system. SteamVR supports the Valve Index, **HTC Vive**, **Oculus Rift**, Windows Mixed Reality headsets, and others.

Installation

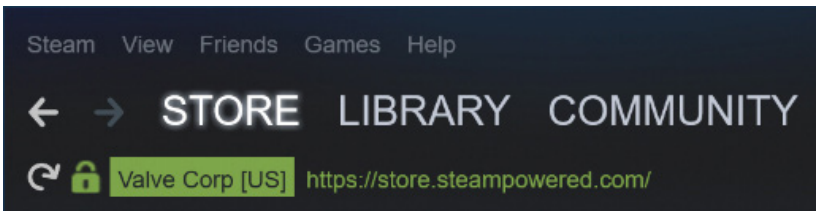
1. **Download** and **Install** Steam: available here:

> STEAM

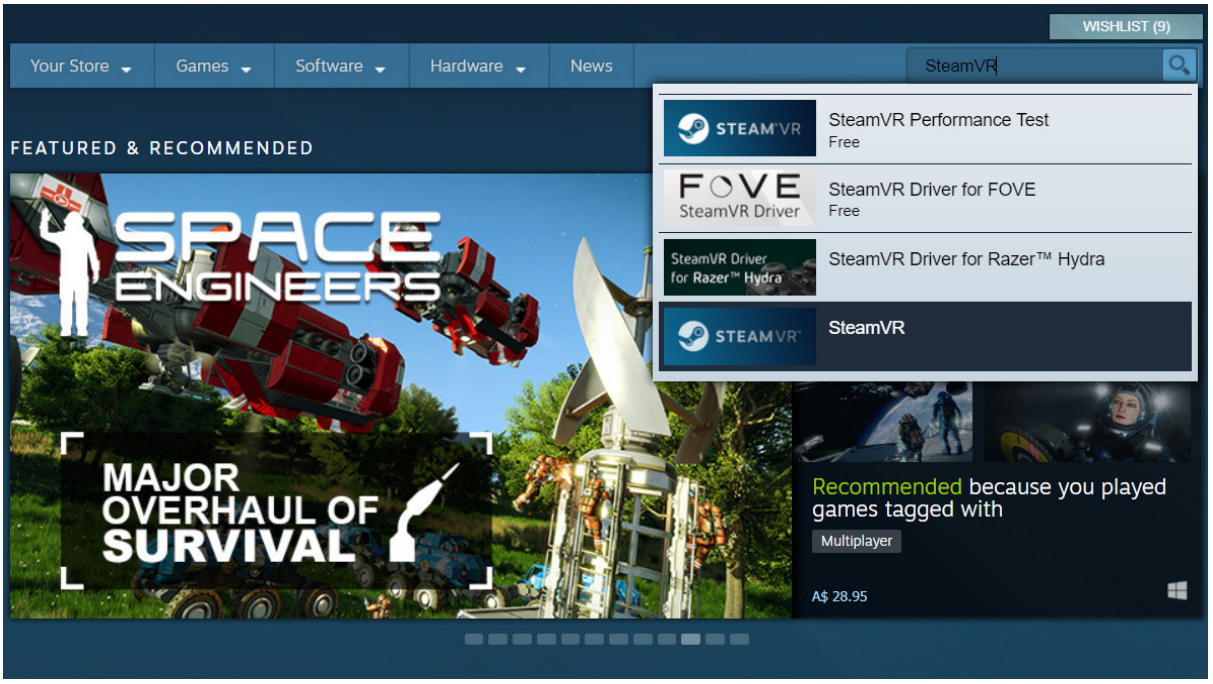
- Install **Steam**
  - Go to store.steampowered.com/about
  - **Create an account** or **sign in**
  - **Download** and **Install Steam** for Windows.
- Install **SteamVR**
  - Plug in your headset, then launch Steam
  - You will be prompted to install SteamVR, click install
- **Restart** your PC

2. **Login** into Steam.

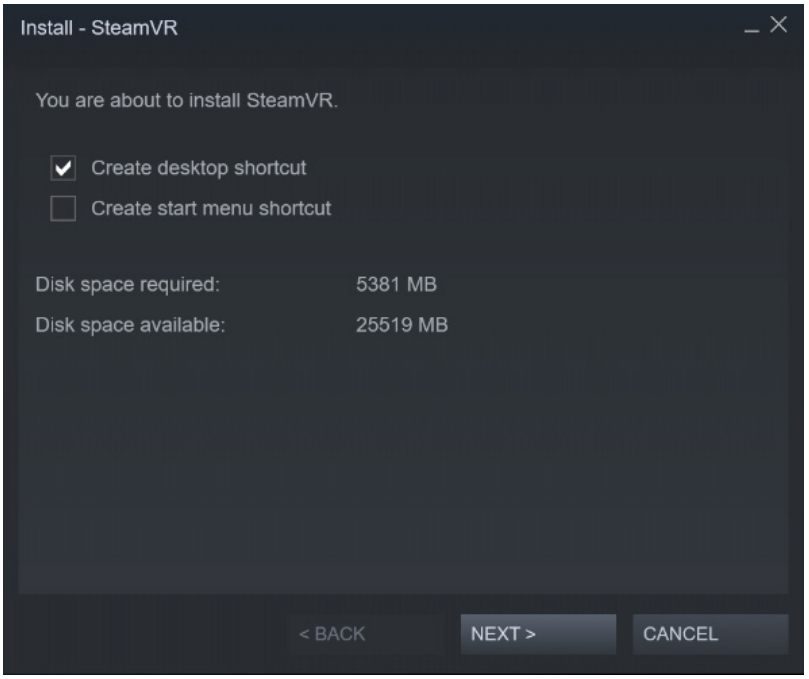
3. Access the Steam **Store** via the link in the top left corner.



4. Search for **SteamVR**



5. Click on the **install link** and follow the instructions



6. Once downloaded and installed, SteamVR is good to go!