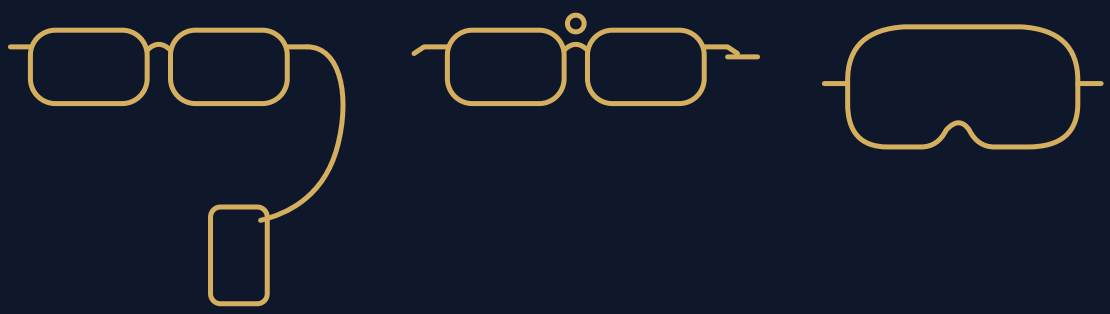
AREngine
by AR Works

SETUP GUIDE

Set up AREngine on your glasses or headset

A step-by-step guide for teachers, students and testers. It covers display glasses that plug into a phone, Android glasses with their own camera, and headsets.



Display glasses | Camera glasses | Headsets

Experimental. AREngine on glasses and headsets is new, and testers are trying it on their devices now. Your device report helps us make it work on yours.

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1 Before you start

> **Please read this first**
>
> AREngine on glasses and headsets is **experimental**. So far one tester has run it, on XREAL One Pro glasses with phones on Android 12 and the newest Android. If something does not work, please send a device report (page 12): it is how we make AREngine work on your device.

Which kind of device do you have?

A

Display glasses that plug into a phone

They show a big screen in front of your eyes. Your phone does the work.

XREAL One, One Pro and 1S; XREAL Air, Air 2, Air 2 Pro and Air 2 Ultra; Nreal Light; VITURE; Rokid Max; RayNeo Air

Install on your phone: **Install on phones and Android glasses - AREngine.apk**

Page 4

B

Android glasses with their own camera

A small computer and a camera are built into the glasses. No phone is needed.

INMO Air 3, Rokid Glasses, RayNeo X3 Pro, Vuzix Blade 2

Install on the glasses: **Install on phones and Android glasses - AREngine.apk**

Page 8

C

Headsets

A headset that tracks your head and your hands by itself.

Meta Quest 3 and 3S, Samsung Galaxy XR, XREAL Aura, PICO 4 Ultra, and other headsets with OpenXR

Install on the headset: **Install on headsets - AREngine XR.apk**

Page 10

What to expect

- **Display glasses:** you see the project in 3D. With XREAL glasses, AREngine tries to turn the view as your head turns. With other makes you get a fixed 3D view that you turn from the phone.
- **Camera glasses:** the glasses' camera follows printed pictures, the room and your hands, as a phone's camera does.
- **Headsets:** the headset follows your head and your hands. You can walk round the project.
- On display glasses and headsets no camera can see a printed picture. A project that starts on a picture is shown without it.

You will need

- A project file from AR Works. Its name ends in **.arengine**.
- The right AREngine file from the AREngine ZIP. Page 3 says which one.

2 Which file to install

The AREngine ZIP from ar.works/arengine holds this guide and two files that install AREngine. Find your device below and install the file it names.

Your device	Install this file	On which device
Display glasses that plug into a phone XREAL, VITURE, Rokid Max, RayNeo Air	**Install on phones and Android glasses - AREngine.apk**	**On the phone.** The glasses run nothing themselves.
Android glasses with their own camera INMO Air 3, Rokid Glasses, RayNeo X3 Pro, Vuzix Blade 2	**Install on phones and Android glasses - AREngine.apk**	**On the glasses.**
Headsets Meta Quest 3 and 3S, Samsung Galaxy XR, XREAL Aura, PICO 4 Ultra, other OpenXR headsets	**Install on headsets - AREngine XR.apk**	**On the headset.** Page 10 says how.
Just a phone	**Install on phones and Android glasses - AREngine.apk**	**On the phone.**

> **Important**
>
> If AREngine from Google Play is already on your device, uninstall it first (your projects in it will be deleted). A file from the ZIP cannot install over the Play version.

Installing the file on a phone or Android glasses

1. Copy or download **Install on phones and Android glasses - AREngine.apk** to the device. For example, copy it from a computer over USB, or download it from an email.
2. Open the file, for example in the Files app.
3. Android asks whether to allow installing apps from this source (the Files app or the browser). Allow it for that app only.
4. Tap **Install**. Then open AREngine.

> **Updates**
>
> AREngine from Google Play updates itself. A file from the ZIP does not: for a newer version, download the newest ZIP from ar.works/arengine and install the same file again. Your projects stay.

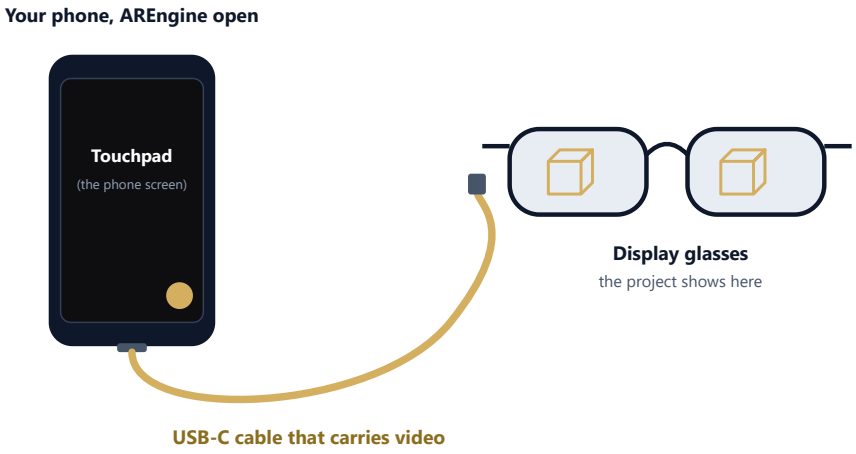
Only install files from people you trust. For headsets, page 10 explains the install.

3 Display glasses with a phone

Your phone runs AREngine and sends the picture to the glasses through a cable. The phone's own screen becomes a touchpad.

What you need

- **Display glasses**, for example XREAL One, One Pro, 1S, Air, Air 2, Air 2 Pro or Air 2 Ultra, Nreal Light, VITURE, Rokid Max or RayNeo Air.
- **An Android phone whose USB-C port sends video.** Most recent flagship phones do. Many cheaper phones do not. Google Pixel phones before the Pixel 8 do not. Your glasses maker's website often lists phones that work.
- **A cable that carries video.** The cable that came with the glasses is best. Many charging cables carry no video.
- **AREngine** on the phone: install **Install on phones and Android glasses - AREngine.apk** from the ZIP (page 3). And a project file.



The phone and the glasses, joined by one cable. *Drawing, not a screenshot.*

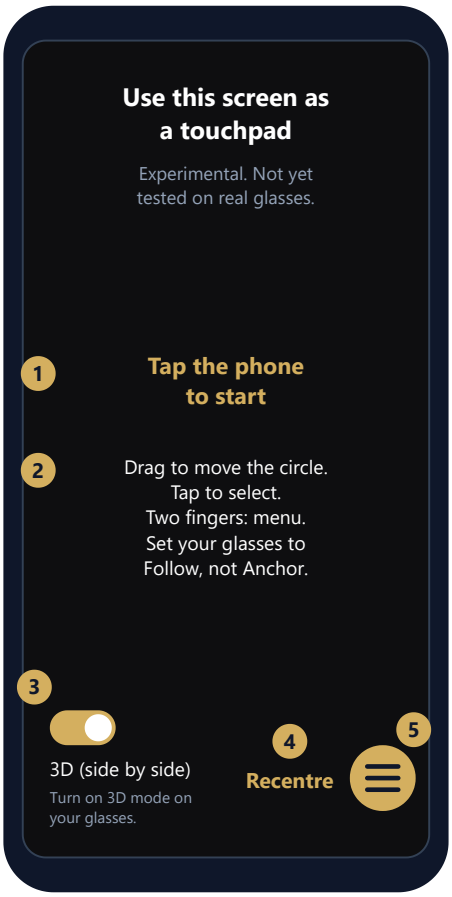
Connect and start

1. Open AREngine on your phone and open a project. AREngine only uses the glasses while a project is playing.
2. Plug the glasses into the phone's USB-C port.
3. **If AREngine knows your glasses**, the project moves to the glasses by itself and the phone becomes a touchpad.
   Other glasses, a TV or a projector: the phone asks **Show on the connected screen?**. Press **Show on the connected screen**. **Close** keeps the project on the phone.
4. Android may ask whether AREngine can use the glasses. Allow it. This lets AREngine read how your head turns.

Changed your mind? The player's menu on the phone has **Show on glasses** (or **Show on the connected screen**) while the glasses are plugged in.

The phone is your touchpad

While the project is on the glasses, the phone's screen is dark. You use it like a laptop's touchpad.



The touchpad screen. *Drawing, not a screenshot.*

1. **The hint** says what to do next, for example **Tap the phone to start** or **Shown without its printed picture**. A room project usually starts by itself in front of you, so the first hint shows only for a moment.
2. **Which view you have. Set your glasses to Follow, not Anchor.** means the view turns with your head. **A fixed 3D view. Drag to look round, pinch to zoom.** means it does not.
3. **3D (side by side)**: shown for glasses AREngine knows. See page 6.
4. **Recentre**: shown while the view turns with your head. Look straight ahead and press it. The project comes back in front of you. It is in the menu on the glasses too.
5. **Menu: Back to this screen** (the project goes back to the phone), **Restart**, **Re-place** (room projects) and **Close**. The same menu opens on the glasses with a two-finger tap (below).

Moves on the touchpad



Drag one finger

Moves the circle on the glasses. In the fixed 3D view it turns the view round the project.



Tap

Selects what the circle is on. Over something that reacts to a tap, the circle becomes a larger gold dot.



Two-finger tap

Opens the menu on the glasses. Drag up or down, then tap to choose.



Press and hold

Only if a room project is not placed yet: a grey shape shows where it will stand. Lift to put it there.



Pinch

Two fingers zoom in and out. This works in the fixed 3D view only.

The menu on the glasses

Tap the phone with two fingers and the menu shows on the glasses, so you need not look at the phone: **Recentre**, **3D (side by side)**, **Re-place**, **Restart**, **Back to this screen**, **Close the project** and **Close menu**, each only where it applies. The phone buzzes softly for each tap, if touch vibration is on in its settings. The phone's own Back button also means **Back to this screen**: the project returns to the phone and its camera.

See it in 3D

Display glasses can show each eye its own picture. Then the project has depth. AREngine cannot always switch this on for you: you switch it on the glasses.

1. Turn on 3D mode on the glasses themselves. The touchpad says **Turn on 3D mode on your glasses (full side by side).**
   - **XREAL One and One Pro:** double-click the X button and choose 3D mode.
   - **Other glasses:** your glasses' guide says how. Choose full side by side, not half.
2. The glasses' picture goes dark for a moment while it changes. AREngine waits up to five seconds for it to come back.
3. On the touchpad, or in the menu on the glasses, check that **3D (side by side)** matches the glasses: on with 3D mode, off without it.



3D mode on, switch on
each eye gets its own picture

3D mode off, switch off
one flat picture for both eyes

They do not match
looks double or squashed

What you see with each setting. *Drawing, not a screenshot.*

Two ways to see the project

The view turns with your head

XREAL One, One Pro and 1S; XREAL Air, Air 2, Air 2 Pro and Air 2 Ultra

AREngine reads the glasses' motion sensors. The project stays where it is while you turn your head. You cannot walk round it: the glasses know how your head turns, not where you are.

Set your glasses to Follow, not Anchor. The XREAL One and One Pro can hold their picture still in the room by themselves (Anchor). AREngine already turns the view with your head, so with Anchor on the turning is doubled. AREngine cannot change this setting: you set it on the glasses.

A fixed 3D view

All other glasses, and whenever the glasses' sensors do not answer

You see the project from its Start spot, a little from above. Drag on the touchpad to look round it and pinch to zoom.

On XREAL One and One Pro, Anchor is fine here: it keeps the view still in the room.

When the head turning starts

With XREAL glasses the touchpad may first say **Looking for the glasses' motion sensors**. AREngine shows the fixed 3D view until the sensors answer, then switches to the view that turns with your head.

- If you did not allow Android's question, the touchpad says **AREngine was not allowed to use the glasses' sensors.** You keep the fixed 3D view. Close the project, open it again and allow the question.
- If the sensors stop, the touchpad says **The glasses' motion sensors stopped. Showing a fixed 3D view.** The head turning comes back by itself when they answer again.
- Not sure the sensors work? Run **Check the glasses' sensors** in the device report (page 12) and send it to us.

A projector or a TV works too

Anything your phone can show its picture on works like glasses that AREngine does not know.

1. Open a project on the phone.
2. Connect the TV or projector to the phone with a cable or an adapter (USB-C to HDMI, for example).
3. The phone asks **Show on the connected screen?**. Press **Show on the connected screen**.
4. The screen shows the fixed 3D view. Drag on the phone to turn it and pinch to zoom, while the whole class watches.

Good to know

- If the cable comes out for more than five seconds, the phone says **Glasses disconnected** (or **Screen disconnected** for a TV or projector) and the project goes back to the phone. Plug the cable in again while the project plays.
- A project that starts on a printed picture shows **Shown without its printed picture**. That is normal: the project is placed in front of you instead.

4 Android glasses with a camera

These glasses run Android themselves, so AREngine runs on the glasses with no phone. Their camera follows printed pictures, the room and your hands, as a phone's camera does.

Install and open a project

1. Install **Install on phones and Android glasses - AREngine.apk** from the ZIP on the glasses, as page 3 describes. If the glasses cannot open the file themselves, install it the way your glasses' maker describes.
2. Put a project file on the glasses and open it with AREngine.
   Glasses without a touch screen: AREngine's home screen lists the project files in its own folder, under **Open a file**. The line above the list names that folder: **Copy .arengine files into … to open them here.** It ends in **Android/data/com.qode.arengine/files**. Copy the file there, for example from a computer over USB, and it shows in the list.

Tell AREngine the lenses are clear

Android cannot tell AREngine that your glasses are see-through. AREngine knows a few models (INMO Air 3, Rokid Glasses, RayNeo X3 Pro, Vuzix Blade 2) and draws for clear lenses on them by itself. On other glasses it may draw the camera picture behind the project, as on a phone.

1. Open **About**, then **Device report**.
2. Turn on the switch **This device has clear lenses**. AREngine looks at the device again. The **Display** line then says **Clear lenses, with nothing drawn behind the scene.**
3. Open your project again. AREngine draws only the project, and you see the real world through the lenses.

> The switch shows only on glasses without a touch screen, or while it is on, so that a phone user cannot turn it on by mistake. If your glasses have a touch screen and you do not see it, AREngine does not know them yet: please send a device report (page 12).

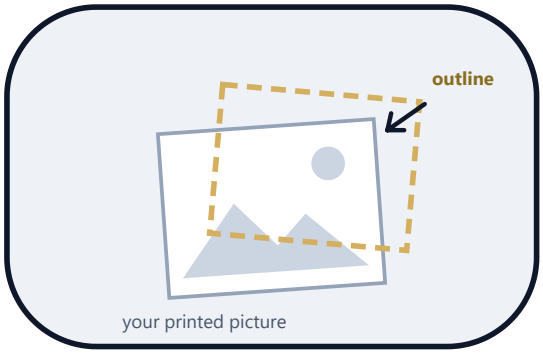
Keys, buttons and the touch pad

In the player a dot sits in the middle of your view. Turn your head to aim it.

To	Press
Select what the dot is on, or a button	Enter, the centre of the D-pad, Space, or a tap on the touch pad on the side of the glasses
Move between buttons	The arrows of the D-pad, or a swipe on the touch pad
Open the player's menu	Menu, a long press on the touch pad, or any arrow or swipe while the project plays
Go back	Back or Escape

Line up with the real world

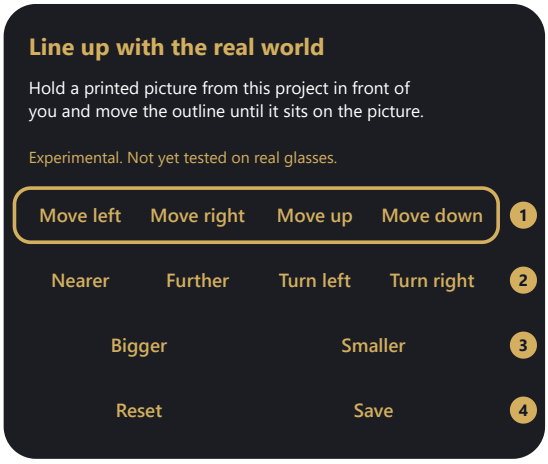
No glasses maker says exactly where your eye sits compared with the camera. So the project may look a little off to one side. The **Line up with the real world** screen fixes this. It is there while AREngine draws for clear lenses.



The view through the glasses

Lining up the outline with the print. *Drawing, not a screenshot.*

1. Open a project that starts on a printed picture, and have that picture printed.
2. Open the player's menu and choose **Line up with the real world**. It is the first entry.
3. Hold the print in front of you. AREngine draws an outline where it thinks the print is.
4. Nudge the outline until it sits on the real print. Then press **Save**, or Back.



The Line up panel. The gold outline marks the row the arrows work on. *Drawing, not a screenshot.*

The four rows

1. **Move left**, **Move right**, **Move up**, **Move down**: the arrows move the outline.
2. **Nearer**, **Further**, **Turn left**, **Turn right**: left and right turn it, up is further, down is nearer.
3. **Bigger**, **Smaller**: up or right is bigger, down or left is smaller.
4. **Reset**, **Save**: left resets, right saves and closes.

With a touch screen, press the buttons. With keys or the touch pad, Select goes to the next row.

Good to know

- Some keys nudge from any row: Page up or Volume up for nearer, Page down or Volume down for further, [and] to turn, + and - for bigger and smaller.
- AREngine keeps every nudge on the glasses as you make it, so Back loses nothing. **Reset** goes back to where AREngine started for these glasses.
- Your lining up goes into your device report. Send it: then other people with the same glasses can get it too.

Not known yet: whether these glasses are fast enough for AREngine's tracking and hand tracking. Your device report tells us.

5 Headsets

Headsets use a separate build of the app, **AREngine XR**. It is not in any store yet. It is in the AREngine ZIP with this guide (ar.works/arengine).

- The file to install is **Install on headsets - AREngine XR.apk**.
- It installs beside the AREngine phone app. On the headset it is called **AREngine XR**.
- Only install files from people you trust.

Install the AREngine XR build

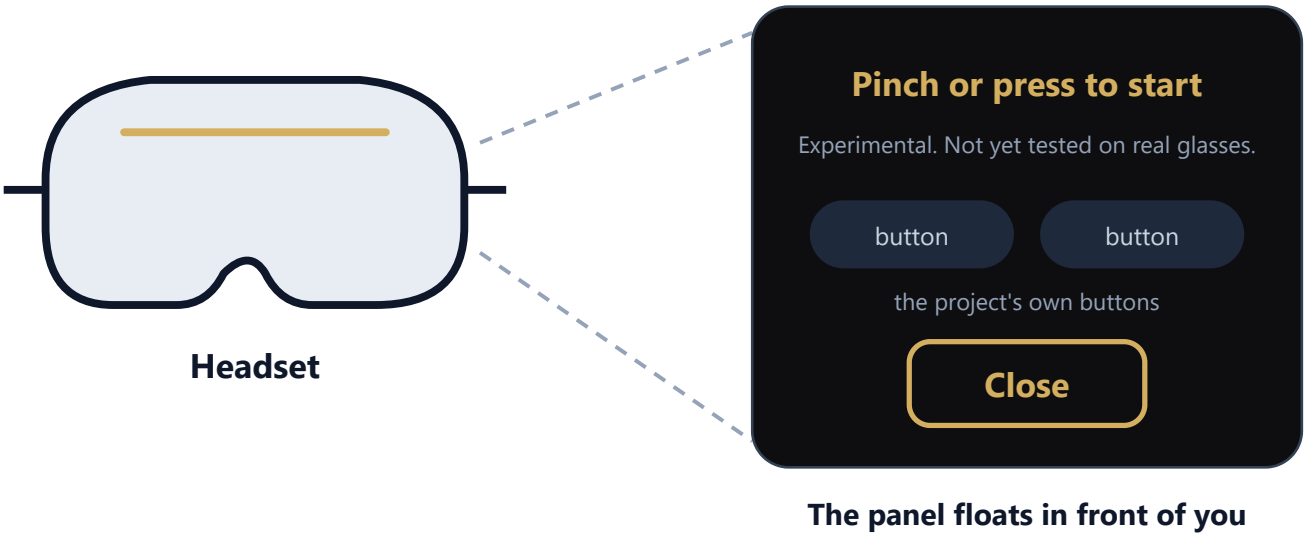
1. Allow your headset to install apps from outside its store. Each maker does this differently:
   - **Meta Quest 3 and 3S:** turn on developer mode in the Meta Horizon app on your phone. This needs a Meta developer account. Then install the file the way Meta describes.
   - **Samsung Galaxy XR:** copy the file to the headset, or download it in the headset's browser. When asked, allow the browser (or the Files app) to install unknown apps. Then open the file.
   - **XREAL Aura, PICO 4 Ultra and others:** follow your headset maker's instructions for installing an APK file.
2. Install **Install on headsets - AREngine XR.apk** and open AREngine XR on the headset. Its screens (the home screen, About, Device report) show as flat windows.
3. On Samsung Galaxy XR and other Android XR headsets, AREngine XR asks to use hand tracking. Allow it. Without it you can still point and select, but your hands are not followed.

> **Before you play**
>
> - Clear a space around you. A room project stands around you and you can walk in it.
> - Put the project file on the headset first, for example by downloading it in the headset's browser.

Open a project on the headset

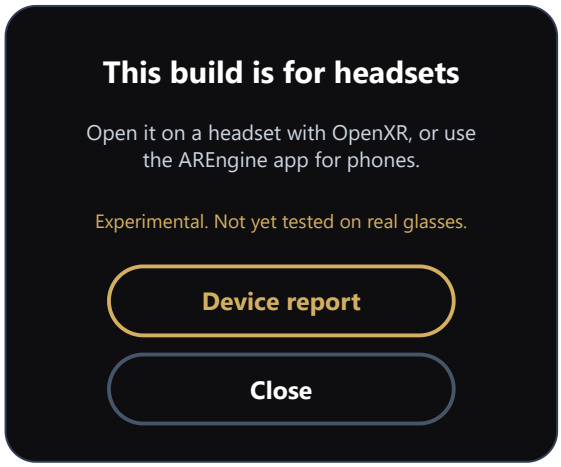
1. In AREngine XR, press **Open a file** and choose the project. Or open the file and choose AREngine XR.
2. The project opens in the headset's own 3D view. While it says **The headset is finding its place**, wait a moment.
3. When it says **Pinch or press to start**, pinch your finger and thumb together, or press the controller's trigger. A room project appears around you, with you on its Start spot.
4. To leave, point at **Close** on the panel and pinch or press. The headset's back button does the same.

What you see on the headset



The panel: the hint, the experimental line, the project's buttons and Close. It moves with your head. *Drawing, not a screenshot.*

A project that starts on a printed picture is shown without its picture (**Shown without its printed picture**): the headset's cameras are not used for pictures yet.



The message, as a flat window. *Drawing, not a screenshot.*

If you see "This build is for headsets"

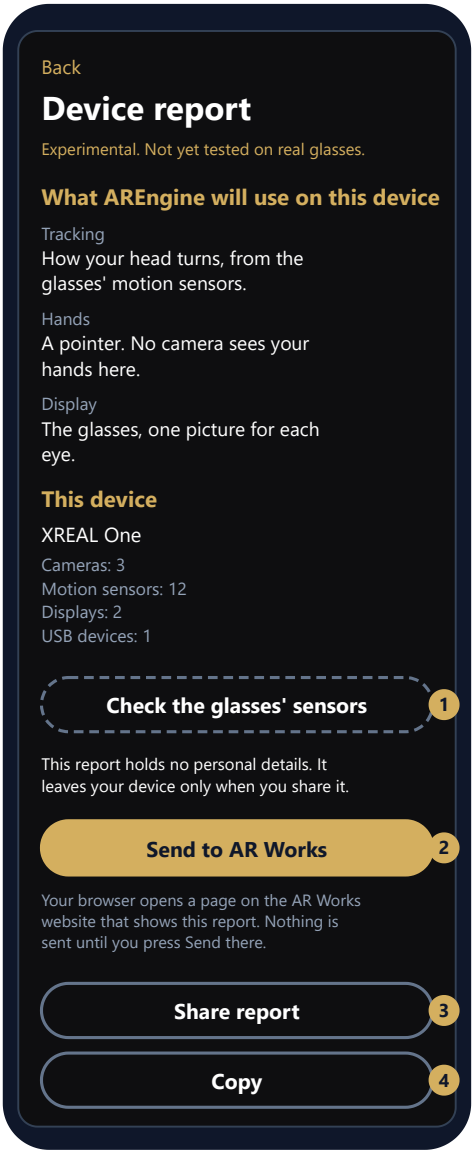
The headset's system did not start AREngine XR's 3D view. You also see this message if the XR build is opened on a phone.

1. Press **Device report**.
2. Send the report to us (page 12). It tells us what your headset offers, so that we can make AREngine work on it.

On a phone, install **Install on phones and Android glasses - AREngine.apk** instead (page 3).

6 Send us a device report

A device report tells us what your device has: its cameras, motion sensors, screens and USB parts, and what AREngine chose to use. It is the best help you can give.



Example with XREAL glasses plugged in. *Drawing, not a screenshot.*

1. Open AREngine (AREngine XR on a headset). Press **About**, then **Device report**. Wait while it says **Checking this device…**
2. **XREAL glasses only:** with the glasses plugged in, press **Check the glasses' sensors** (1). Android asks whether AREngine may use the glasses: allow it. After two seconds the report says, for example, **Sensors answered: … readings a second**.
3. Press **Send to AR Works** (2). Your browser opens a page on the AR Works website that shows the report. Nothing is sent until you press Send there.

Other ways

- **Share report** (3) sends the file **arengine-device-report.json** the way you choose, for example by email.
- **Copy** (4) copies the report, to paste into a message.

What is in a report

In it: the device's maker and model, its Android version, a description of its cameras, motion sensors, screens and USB parts, and what AREngine will use and why. After the sensor check, also the first readings from the glasses.

Not in it: your name, accounts, serial numbers, files or location. It leaves your device only when you share it. The AREngine app itself has no internet access.

7 If something goes wrong

What you see	What to do
The file will not install	If AREngine from Google Play is on the device, uninstall it first. Allow installing apps from the Files app or the browser, for that app only. Check that you chose the right file (page 3).
Nothing shows on the glasses	Open a project first: AREngine uses the glasses only while a project plays. Check that your phone's USB-C port sends video (page 4). Try the cable that came with the glasses.
The phone asks "Show on the connected screen?" about my glasses	AREngine does not know your glasses yet. Press **Show on the connected screen** to get the fixed 3D view. Please send a device report so that we can add them.
The view does not turn with my head	Only XREAL glasses can do this today (page 6). Set the glasses to Follow. If you said no to Android's question, close the project, open it again and allow it. Then run **Check the glasses' sensors** in the device report and send it.
The project turns twice as far as my head	The glasses are set to Anchor. Set them to Follow.
The picture is double or squashed	3D mode on the glasses and the **3D (side by side)** switch do not match. Turn both on, or both off.
The project is off to one side	Look straight ahead and press **Recentre** on the touchpad, or tap with two fingers and choose it in the menu on the glasses.
The glasses say "Tap the phone to start"	The project waits for a tap. Tap the phone once. It usually starts by itself.
I want the project back on my phone	Tap with two fingers and choose **Back to this screen**, or press the phone's Back button.
Camera glasses show the camera picture behind the project	Turn on **This device has clear lenses** in the device report (page 8).
The headset shows only a flat window	Flat windows are AREngine XR's menus. Open a project to see it in 3D. If you see **This build is for headsets**, send a device report.
A picture project floats in the air	That is normal on display glasses and headsets: no camera there can see the printed picture.

Still stuck?

Send a device report (page 12) and tell us what you saw through the contact form on ar.works. Every report helps.