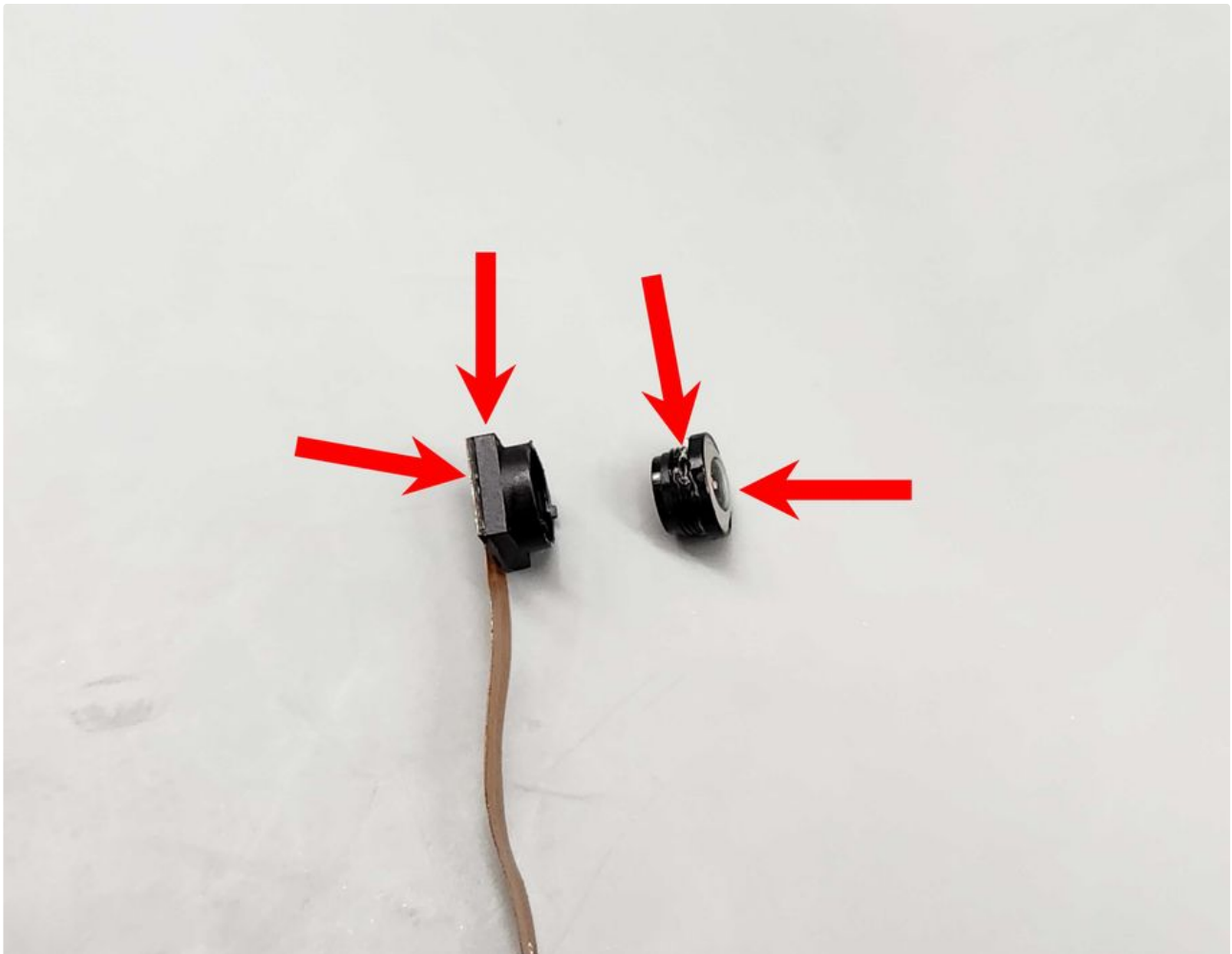


Focusing Tracking Cameras (M0014)

Overview and Context

Tracking sensor construction:



Identifying arrows left to right:

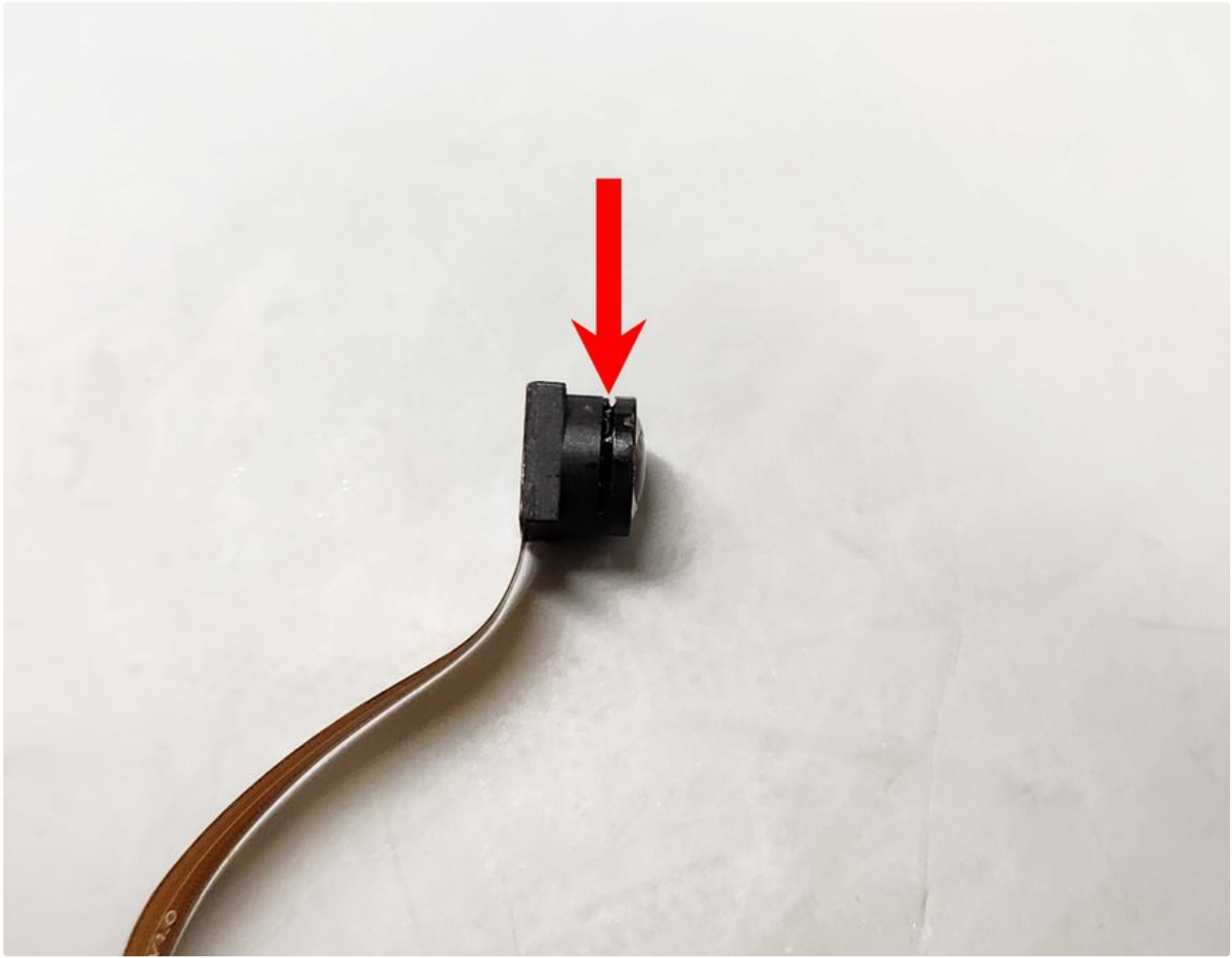
Location of sensor

Sensor housing

Glue (residue) on threads of lens housing

Lens

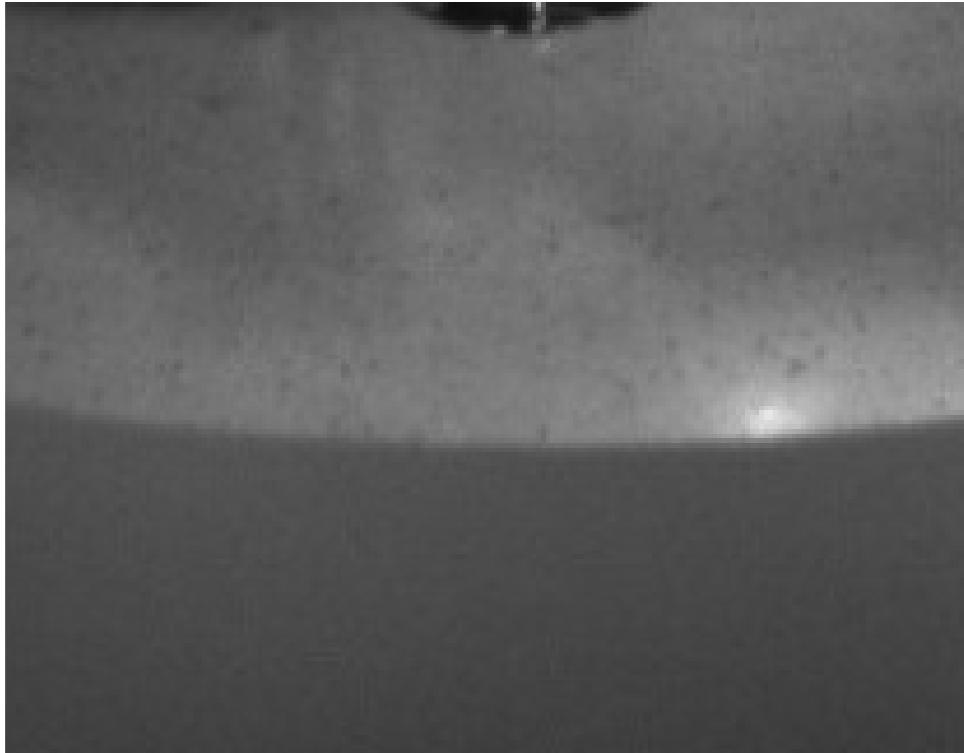
At the factory: lenses are screwed into the sensor housing, they are focused, and they get secured in place with glue



Glue is applied in between the sensor housing and the lens

Tracking





Shown here is a tracking sensor with acceptable focus viewed through VOXL Web Portal

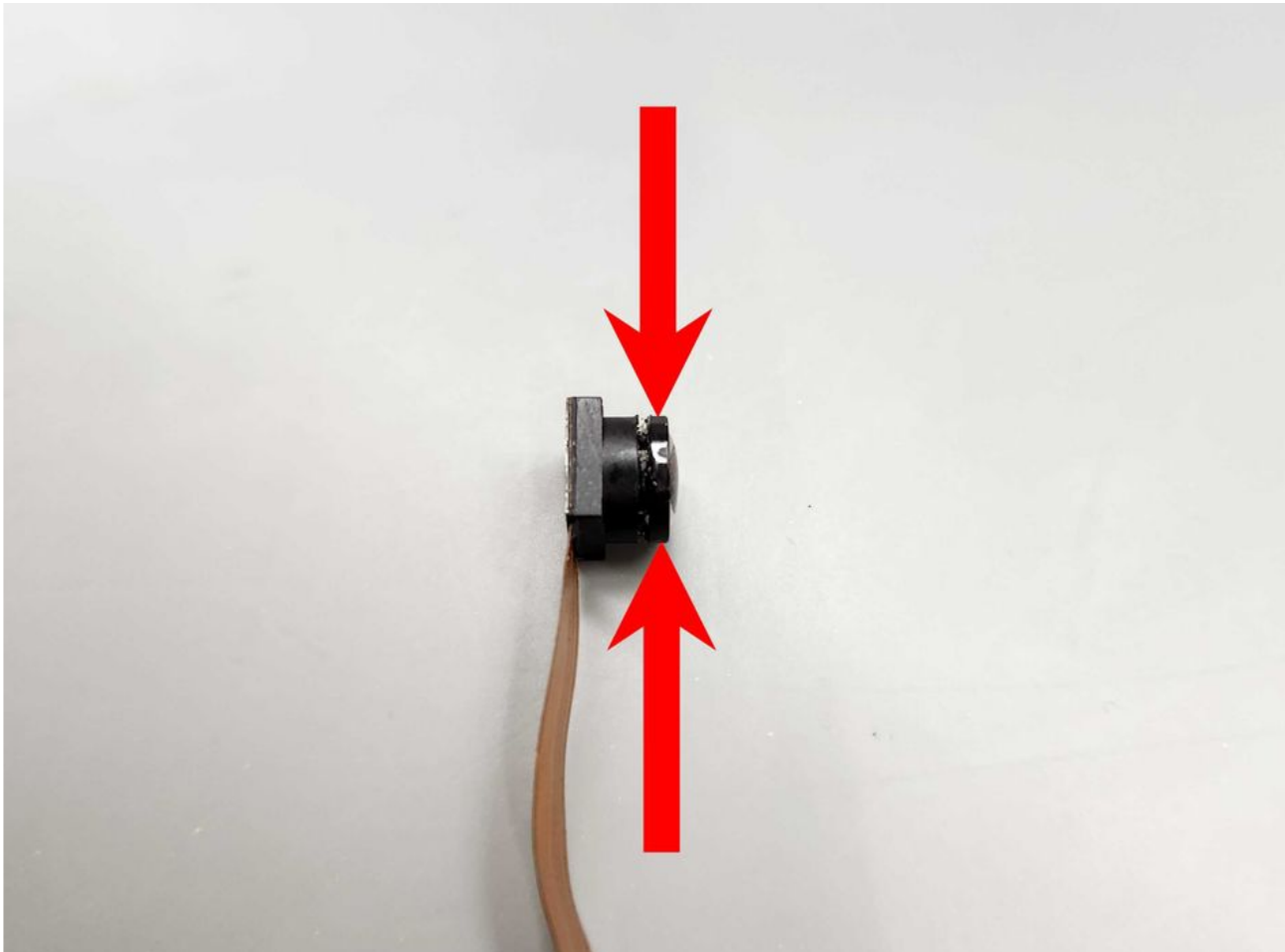
Tracking



Here we can see a tracking sensor with a lens that is out of focus

Focusing the Lens

To bring the sensor back into focus, you must adjust the lens on the unit. The lens is identified with arrows



To focus the lens, it must be loose enough to be screwed/unscrewed into proper position. You should be able to do this with your fingers. Sometimes the glue residue will prevent adjustment. If that is the case, chip away the glue using a small flat head screw driver or something similar. Use caution to not damage the unit

If you have a lens cover, you can use that as a tool to grip the lens and twist it free if needed

If you can not adjust the lens with your fingers, pliers may be used but only with extreme caution and as a last resort. It is very likely that the lens will get scratched if the pliers slip off so do everything in your power to not allow that to happen

Once the lens is able to be adjusted, open the tracking stream in VOXL Web Portal

Tracking



Screw the lens in and out until the image is back in focus as desired

Make small adjustments

Take note of how different objects go in and out of focus based off of the lens positioning

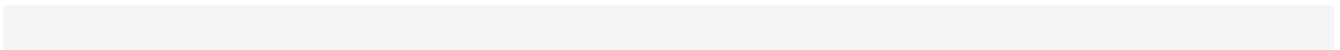
Clean the lens with a microfiber cloth to remove any oils from your fingers

Tracking



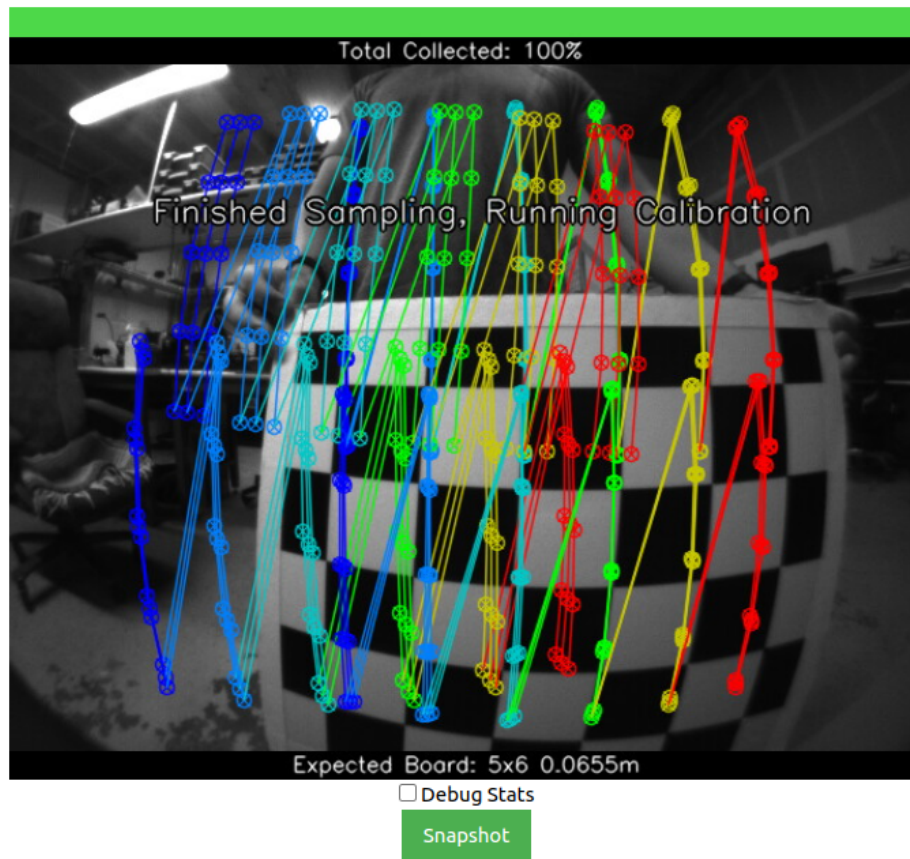
This lens appears to be back in focus

Test that the focus is acceptable by running a tracking camera calibration



```
1 voxl-calibrate-camera tracking -f
```

Camera Calibrator Overlay



```
voxl:/$ voxl-calibrate-camera tracking -f
Please open voxl-portal in a web browser to view the camera calibrator overlay stream
Matrix
[281.3622939248738, 0, 342.7760597753606;
 0, 280.6200222983771, 202.6968616073183;
 0, 0, 1]
Distortion
[-0.006435487286126328;
 0.0009765507278930909;
 0;
 0]
distortion_model: fisheye
Re-projection error reported by calibrateCamera: 0.12622
Calibration Succeeded!

Writing data to: /data/modalai/opencv_tracking_intrinsics.yml
Saved!
Exiting Cleanly
```

An acceptable re-projection error is 0.5 or less

Most tracking sensors that are properly focused and calibrated in the correct lighting will be able to achieve a re-projection error of 0.25 or less

Gluing the Lens in Place

Once you have verified your lens is properly focused, you will glue it in place

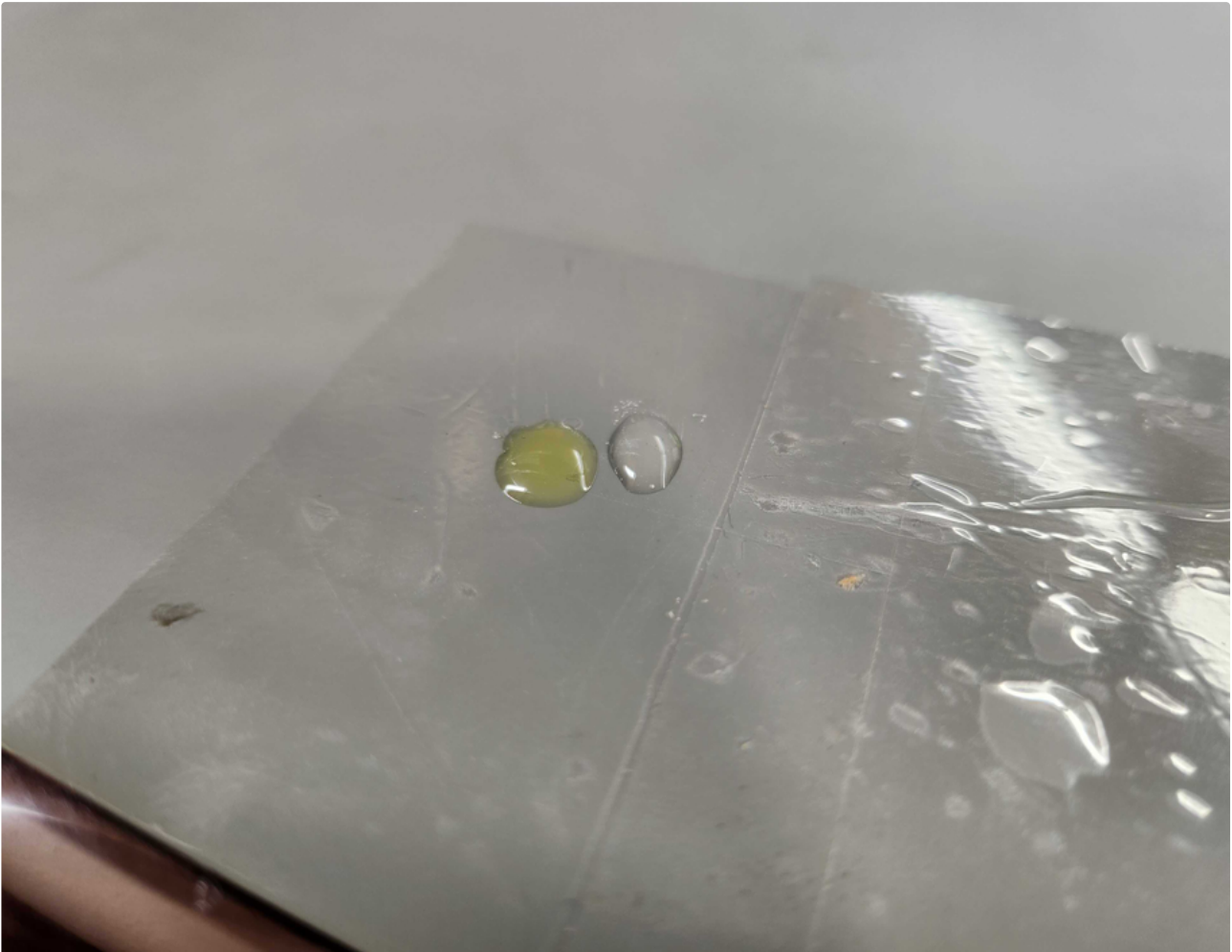
Use caution and be sure the lens does not move out of position during this process

We will be using a 15 minute mid-cure two part epoxy from Bob Smith Industries to glue the lens in place. Other glues will likely work, but we have had success in the past using this method

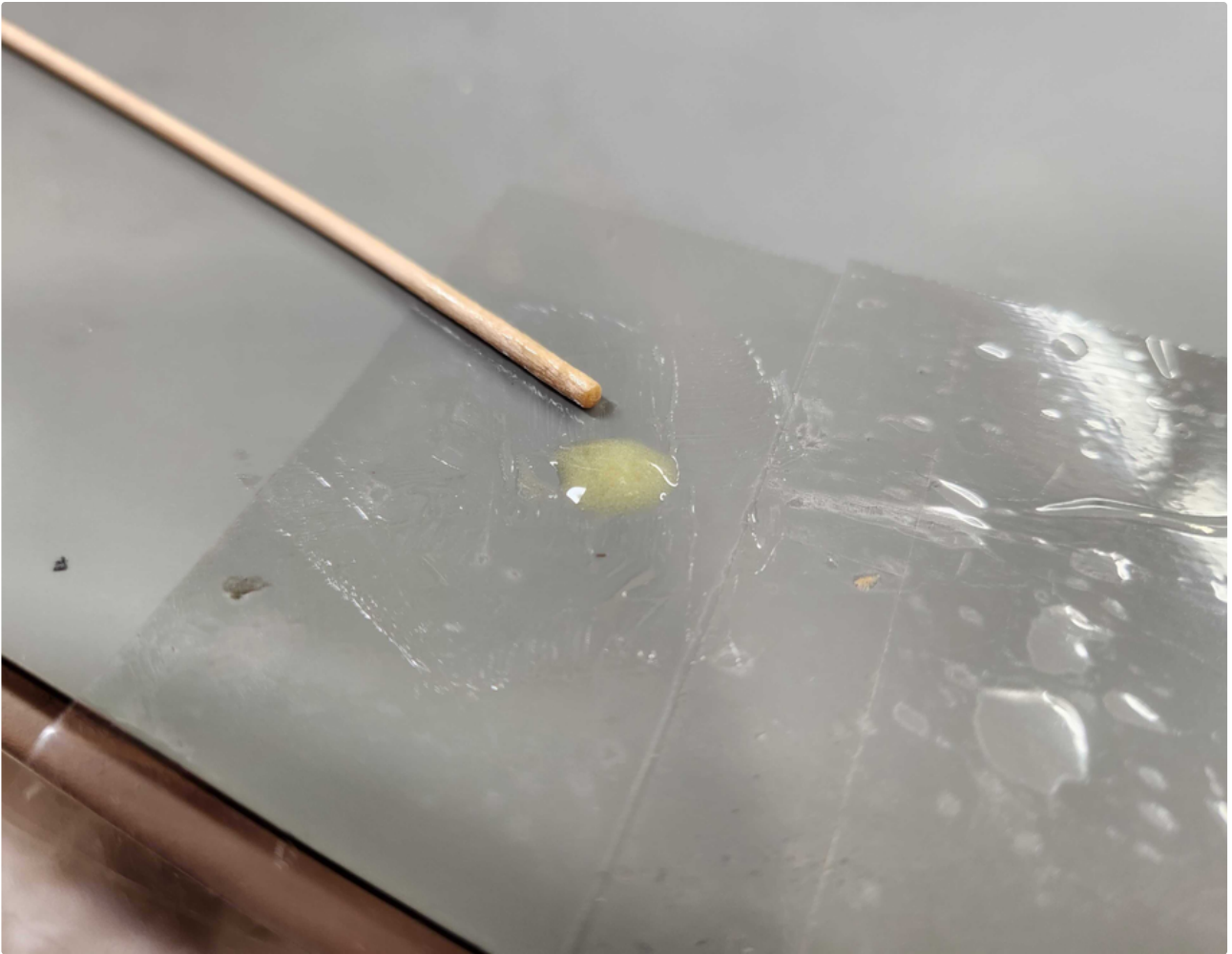
IMPORTANT: Do NOT use any kind of cyanoacrylate (superglue) in this process because the fumes can fog up the inside of the lens, rendering the unit useless

Before you start mixing glue, be sure the location you will be applying the glue is clean

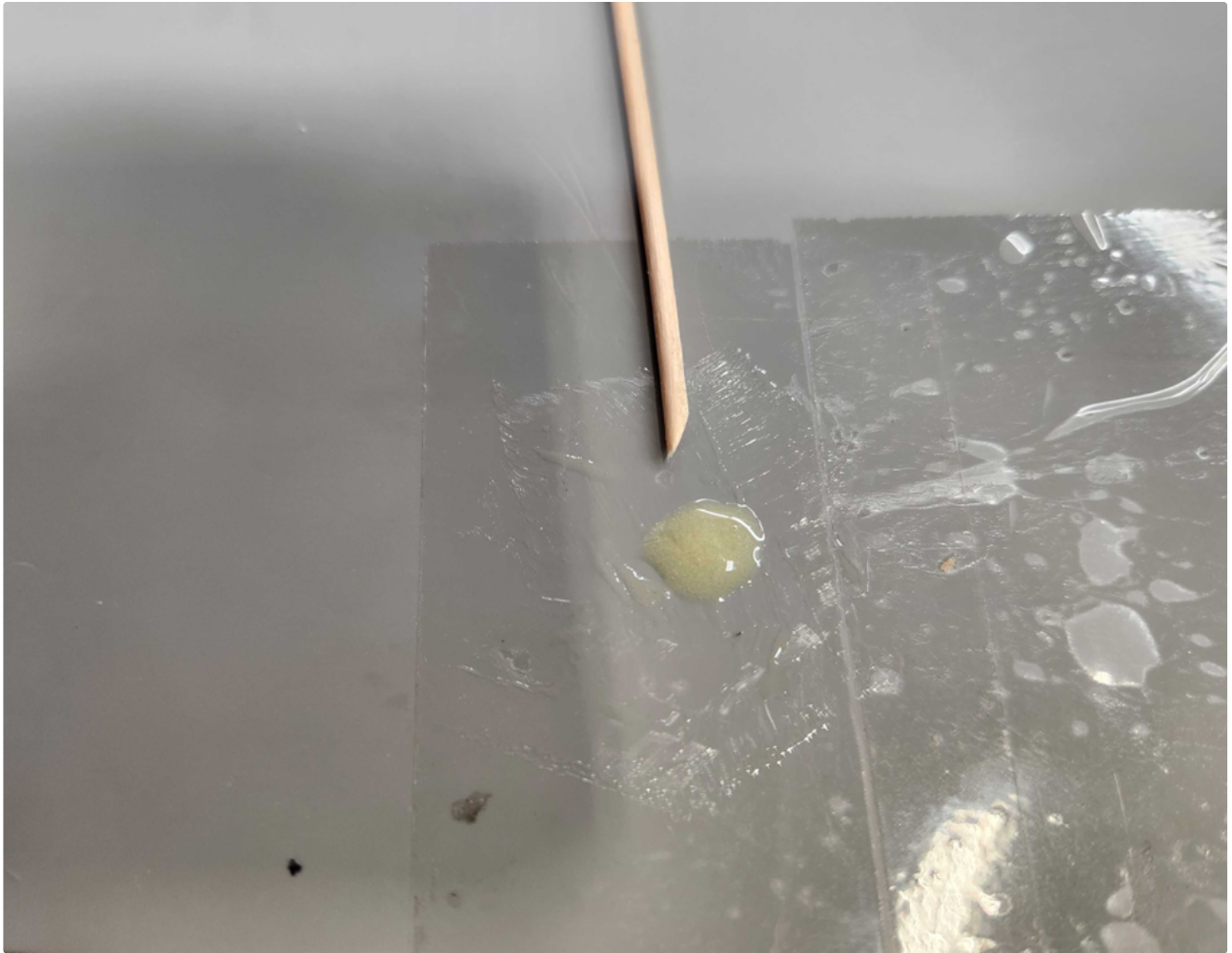
Lay out equal parts of a small amount of the epoxy



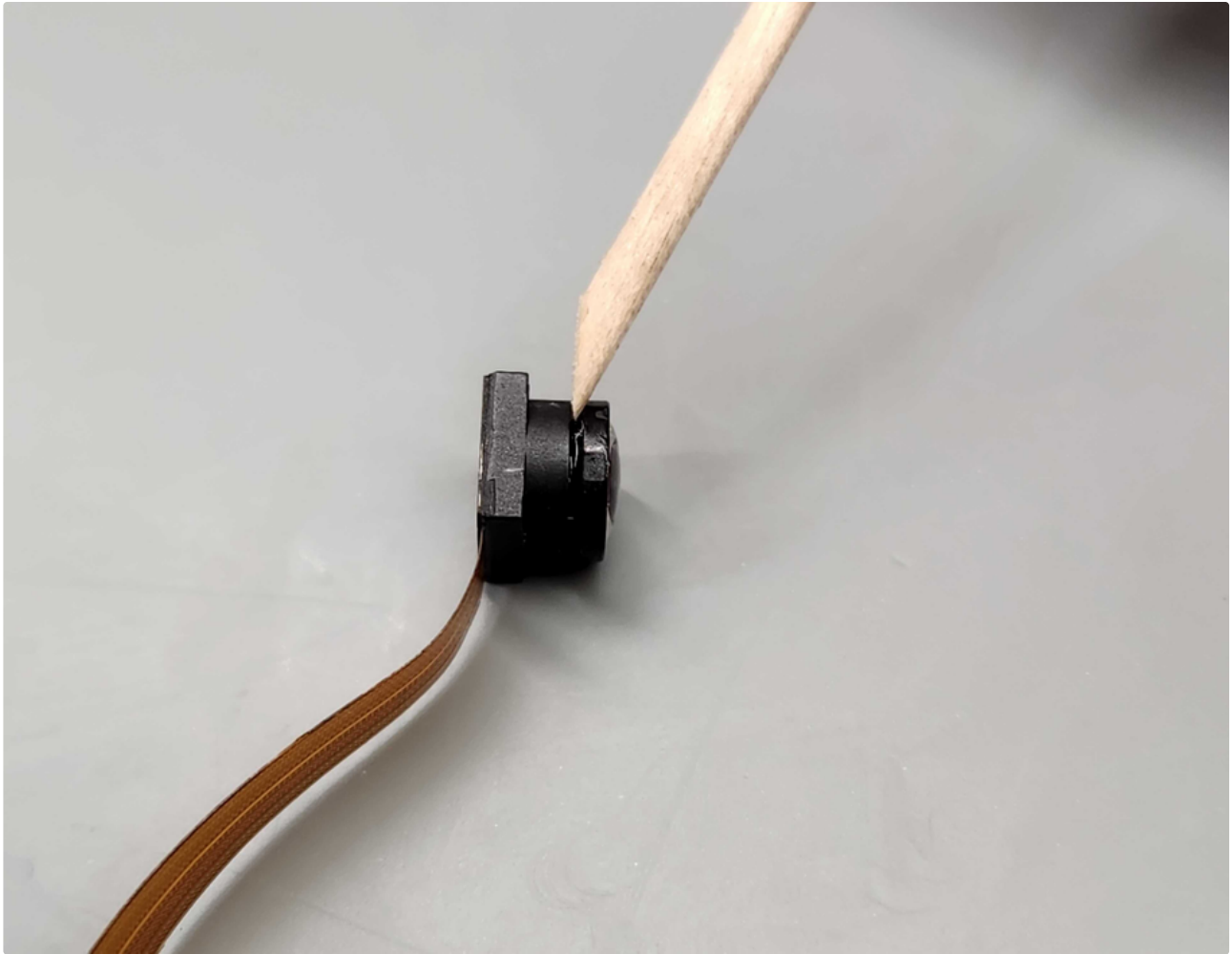
Adequately mix together using a thin wooden dowel (or something similar)



Cut your dowel so it has a sharp point as seen here. This will be used to apply the glue

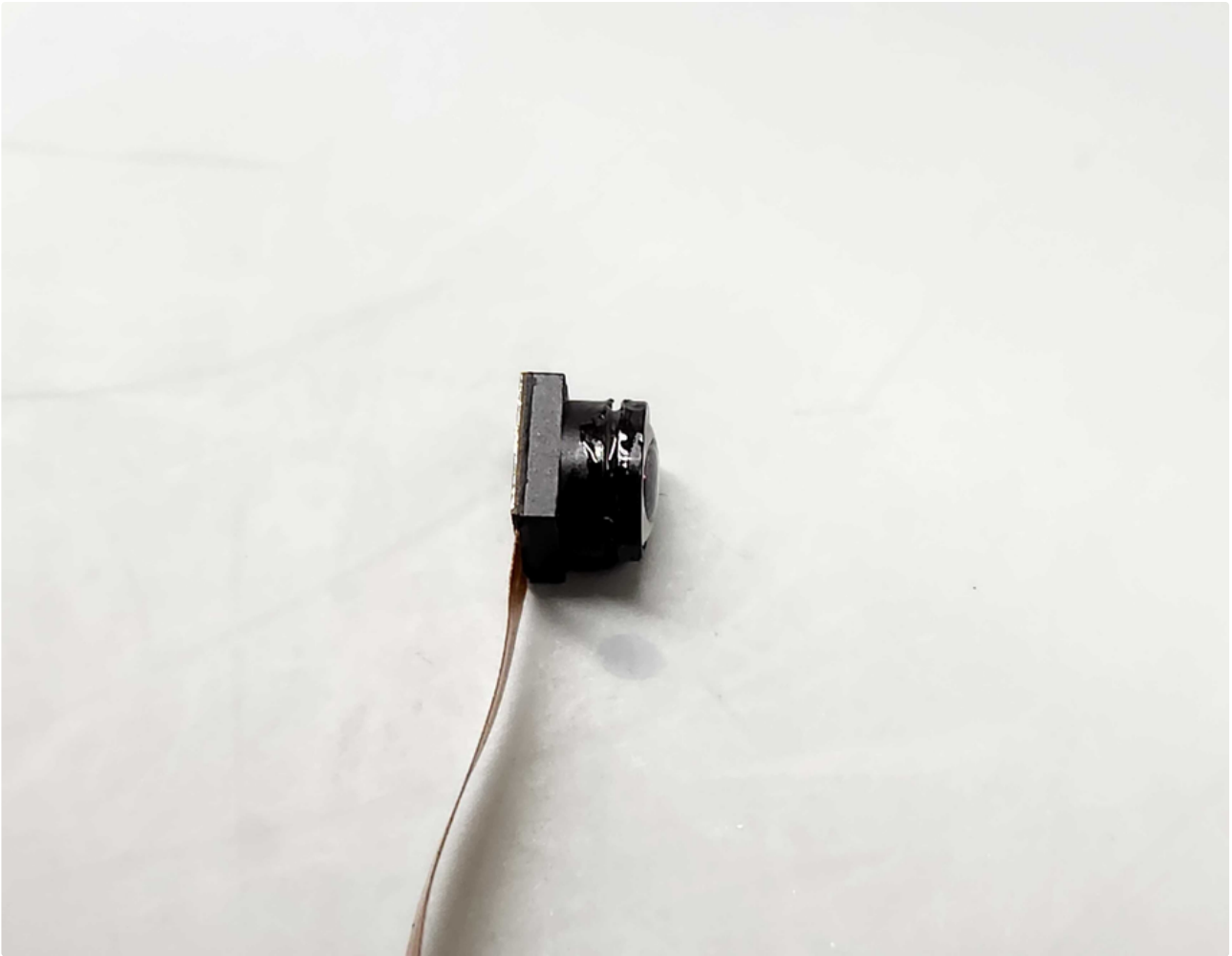


The tip should fit into the gap



Put some glue on your applicator and dab it in between the lens and the sensor housing. Use extreme caution to not let any glue get on the lens

If glue gets on the lens, use a microfiber and some isopropyl alcohol to clean it off

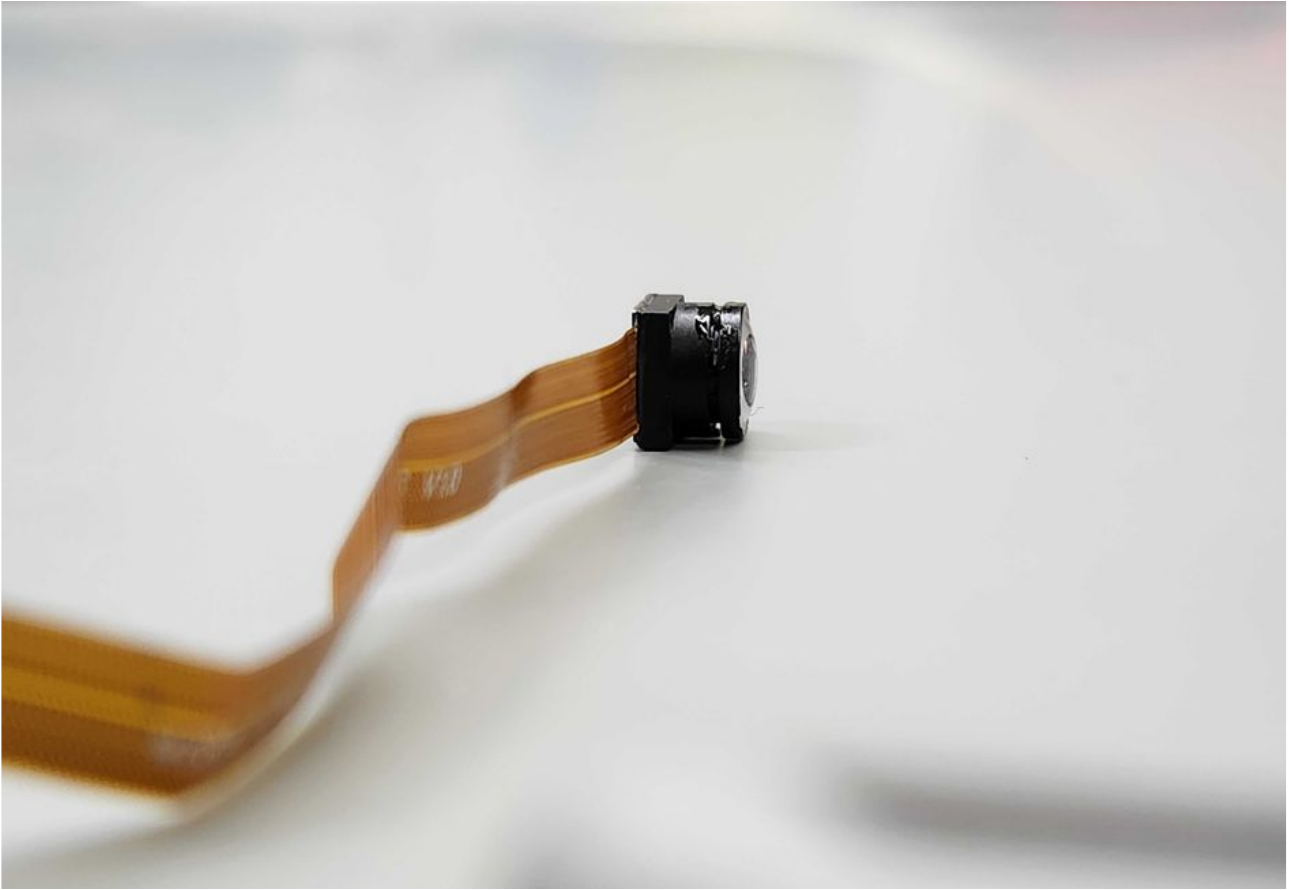


Hardly any glue is needed to keep this lens secure

Make sure the glue has sunk into the trough in between the lens and the sensor housing

Do not use so much glue that it protrudes off of the assembly. Too much glue could lead to fitment issues depending on where this sensor unit is being installed

Clean off any excess if necessary



From here you can recheck that the image is still in focus using VOXL Web Portal

Be sure the lens does not rotate while checking its focus

Let the epoxy cure

Check the image stream to be sure the unit is in focus and no glue is on the lens

Install the unit into the assembly you are working on and re-calibrate the tracking sensor once it is in place