

# EE 267 Virtual Reality: Lab 4

## Instructions

Students should complete this lab before starting on Homework 4. Completing the lab will give you useful information that will aid in completing the homework assignment.

In the lab session or office hours this week, you should have picked up your hardware kit for the course. The kit includes the following items:

- View-Master Deluxe VR Viewer housing
- Topfoison 1080p LCD panel and HDMI driver board
- Display spacer
- HDMI to Mini-HDMI cable
- USB to Micro-USB cable ×2
- VRduino with on-board InvenSense 9250 IMU
- Teensy 3.2

You will be responsible for returning each of these items at the end of the course. Make sure not to lose these! Since you will be asked to roll up the cables, please do not throw away the cable ties. Also, because we only have a limited number of hardware sets available, you may need to pair up with a teammate to complete Homeworks 4, 5, and 6.

## Task 1: Headset Assembly

~~Your task before starting on the homework this week is to assemble your headset.~~ **This year, we already have assembled the kit for you, so you don't need to assemble it, but we included the instructions for those who might be interested in the assembly process.** For this week's version of the headset, you won't be needing all of the components, just the first 5. Follow the steps below to put together your headset:

1. Tape the display spacer to the back of the LCD panel with double sided tape (see [Figure 2 Image 1](#)). You can find plenty of it in the teaching lab.
2. Connect the driver board to the LCD panel with the pins facing down. (see [Figure 2 Image 2](#))
3. Tape the driver board to the acrylic spacer with the double sided tape at roughly a 30° angle, like in [Figure 2 Image 3](#). This will allow you route the cable out of the headset more easily in step 5. Be careful with the display's flex cable. It is flimsy and might tear.
4. Connect the driver board to your computer using the HDMI and USB cables. The driver board receives power via USB and data via HDMI. At this point make sure you are able to see an image on the display. If you can't, double check that the display's flex cable is inserted into the driver board correctly. Try power cycling the



**Figure 1:** *Kit components.*

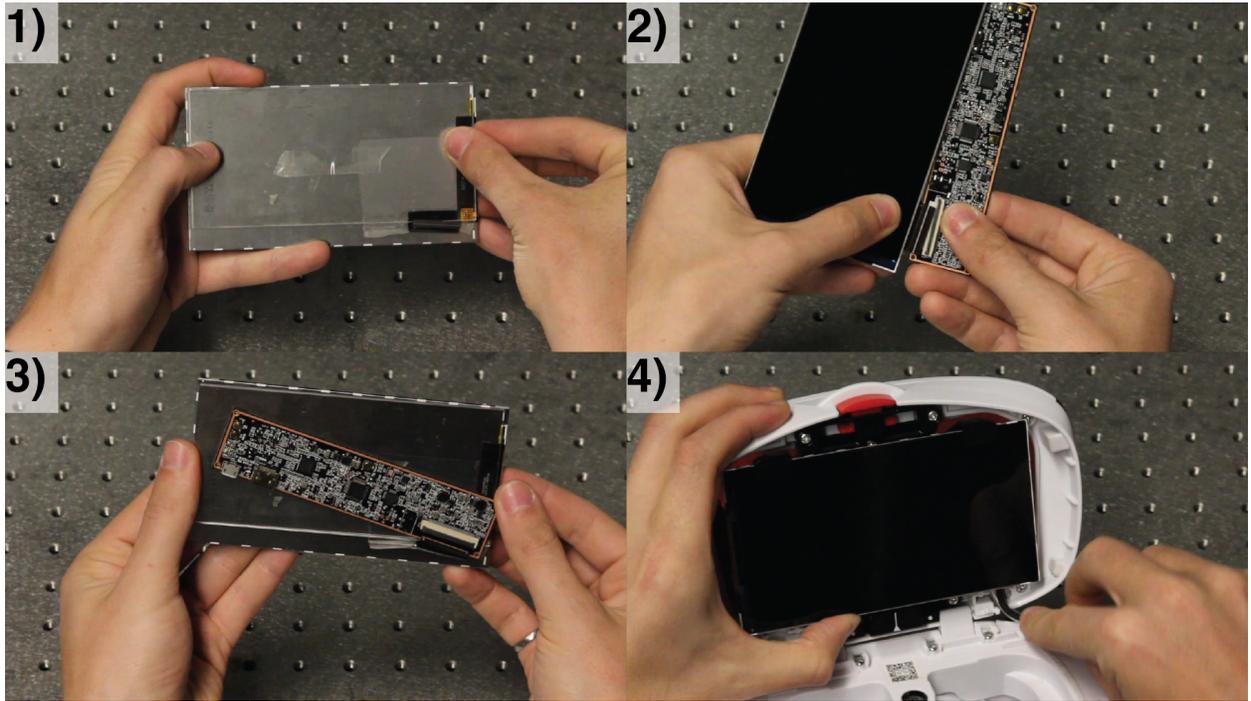
driver board as well. You may also need to set your display refresh rate to 30 Hz.

5. The display holder in the headset holds the display in place via a clamping mechanism. To install the display unit, slide it into the top holder slot and push up. This will cause the bottom slot to move down simultaneously. While the holder is pushed apart, slide the cables through the slot on the bottom of the back plate of the headset (see [Figure 2 Image 4](#)).
6. Once the cables are in the slot, gently let go of the display allowing it to be clamped from the bottom. Once clamped, make sure the cables are still routed through the slot.
7. Close the headset. You are done with the assembly!

Please take a look at the homework video as well, as there are instructions in video form there on the assembly. If you have any further questions, please come to office hours.

## **Task 2: Total Internal Reflection Overview**

For those of you not familiar with geometric optics and specifically total internal reflection (TIR), you might find it helpful to go over this short overview. [https://en.wikipedia.org/wiki/Total\\_internal\\_reflection](https://en.wikipedia.org/wiki/Total_internal_reflection). You may find some of the equations here useful for the theoretical part of the homework.



**Figure 2:** *Headset assembly.*