

Remote Teaching: Handwriting Options for Video-based Instruction

Handwritten Work

The issue of how to show handwritten work in a video conference or recorded lecture is an important consideration, especially for subject matter that emphasizes the derivation of certain conclusions via a set of iterative steps.

In Zoom, three different practical options for showing handwritten work

1. Attach a USB document camera to the computer, point the camera at a document, select the camera from Zoom, begin handwriting on the document
 - (A) All-in one integrated USB document camera
 - (B) Ad-hoc use of USB webcam not specifically designed for document camera use
 - (C) Ad-hoc document camera using cellphone, with added software
2. Use a drawing tablet together with a computer to:
 - (D) Draw in Zoom's built-in whiteboard feature
 - (E) Draw in a paint or drawing program
 - (F) Draw on top of Microsoft PowerPoint presentations using the "Pen" feature
3. Use an iPad or Android Tablet device, together with a stylus
 - (G) Draw in Zoom's built-in whiteboard feature

Notes on Specific Configurations

(1.A) Examples of all-in one integrated USB document camera

- Longjoy LV-1 Series LV-1020
<https://www.amazon.com/B01N9VY25B/>
- IPEVO VZ-R HDMI/USB Dual Mode 8MP Document Camera
<https://www.amazon.com/Ipevo-5-883-4-01-00-VZ-R-Document-Camera/dp/B0784RZNKT>

Example use with Zoom: <https://www.youtube.com/watch?v=NIYqvMp1Dbs>

- Elmo OX-1 (lower resolution than above)
<https://www.cdw.com/product/elmo-ox-1-document-camera/5966625>

(1.B) Examples of using supplemental webcam not specifically designed as document camera

Theory of operation: find a way to mount a small webcam above a document in a downward-facing direction, as discussed and shown in the following image:

<https://www.yawcam.com/forum/download/file.php?id=46>

Zoran Ilic from Northwestern IT recommends Logitech webcams, in general, though does not have a recommendation specifically for this purpose:

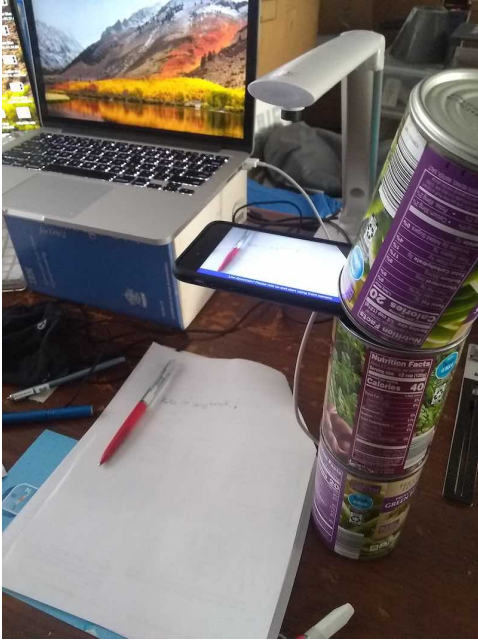
Standard web cameras:

- Logitech C920 (\$80)
- Logitech B525 (\$65)
- Logitech C930e (\$130)
- Logitech C925e (\$100)

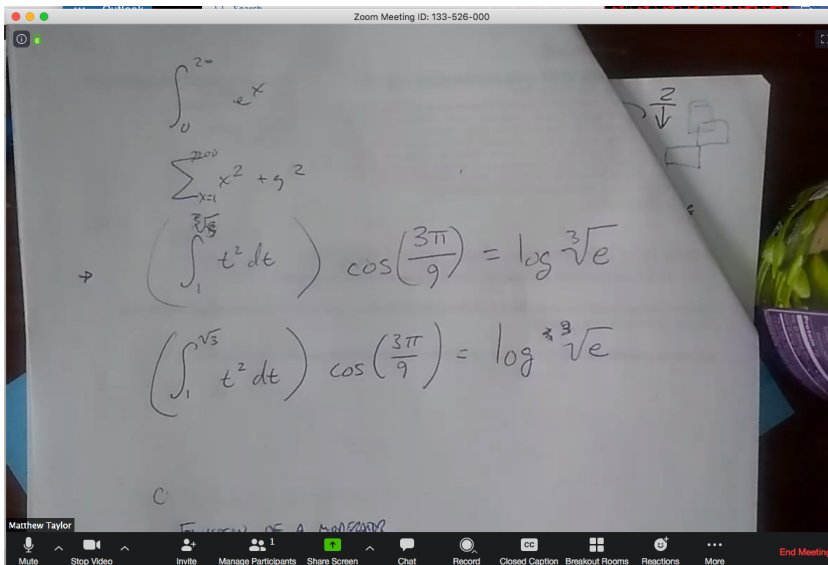
(1.C) Examples use of smartphone as impromptu webcam

A smartphone, equipped with an application (approx \$8) to enable its camera to be used as an additional web camera connected to a computer, used with Zoom. This is what the author has done at home.

- [EpocCam Pro](#) (iPhone/iPad) + EpocCam Drivers (Computer) + USB cable



- [EpicCam Pro](#) (Android) + EpicCam Drivers (Computer) + WiFi (both devices must be connected to the same WiFi network)



(2.D,E,F) Example drawing tablets compatible

Anything from the Wacom Intuos or Intuos Pro line is recommended, e.g.:

- [Wacom Intuos Creative Pen Medium](#) (\$200)
- [Wacom Intuos Pro Small](#) (\$250)
- [Wacom Intuos Pro Medium](#) (\$350)

(2.E) Example PC/Mac Software for drawing/writing with attached USB Drawing Tablet

Each of these apps support drawing on some kind of canvas using either the mouse, or a drawing tablet. These applications, once launched, can be screen-shared via Zoom.

- [Microsoft OneNote](#) — included with Northwestern’s Microsoft License; Supports typing text and drawing text and illustrations on a single note; Notes can be saved and organized in notebooks synchronized across multiple computers (and available online) via your Northwestern Microsoft account
 - Web version of OneNote also permits converting math notation to Math notation
- [Autodesk Sketchbook](#) — full featured drawing program, free for academic use; does not use “notebook” metaphor of Microsoft OneNote
- [Xournal++](#) — open-source handwriting, note-taking software. Lots of useful features, but recommended only for the computer-savvy power-user to install and use.
- [AWW board](#) — web-based whiteboarding software, offers large canvas that can be zoomed in and out

Example guidance from another institution: <https://www.math.uh.edu/~dave/help/tablets/>

(3.G) Example Hardware Configurations for Tablet Computers with Zoom

- Any Zoom-Compatible (Android, iOS) Tablet + 3rd Party Stylus (medium-precision)
 - [Targus Stylus](#) (\$9)
 - [Amazon Basics Stylus](#) (\$8)
- New **Apple iOS Devices** with Finer-precision Pens:
 - Any current iPad + 1st Generation Apple Pencil
 - [Apple iPad 10.2 inch](#) (\$330+)
 - [Apple Pencil 1st Generation](#) (\$99)
 - Any current iPad Pro + 2nd Generation Apple Pencil
 - [iPad Pro](#) (\$800+)
 - [Apple Pencil 2nd Generation](#) (\$130)
- New **Android Devices** with Finer-Precision Pens:
 - [Samsung Galaxy Tab S4 With S-Pen](#) (\$600)
 - [Samsung Galaxy Tab 10.1 inch with S-Pen](#) (\$380)

- [Samsung Galaxy Note Pro 12.2 with S-Pen](#) (\$350)