At the start of the COVID-19 crisis, a lot of DevRel folks started to upgrade their camera setups as we faced a world where we'd no longer be traveling and would be doing a lot of video work (virtual conferences, webcasts, etc).

There are 3 main components to a better video setup: The camera, mounting hardware, and video capture.

The camera

There are 2 requirements for the camera: First it needs to output clean video and second it needs to be able to stay powered on.

Most current DSLR and mirrorless cameras have a feature to output video as a way to preview/monitor video recording. Often this video output will include an overlay of exposure, battery level, and other information. Many cameras will allow you to disable this, but you'll need to research and confirm your particular camera. The other thing you may want to ensure is that the video output doesn't include any sort of filtering or video alteration (e.g. skin smoothing) or if it does that this can be disabled.

Most cameras also have some sort of power saving feature that causes them to turn off after a period of inactivity. Obviously this can be disruptive if your camera turns itself off during the middle of a video call, so you'll want to ensure that if it has such a feature, you can disable or override that setting.

I had a Sony Nex-3, but it did not allow you to disable the information overlay. So I purchased a used Sony a6000, which I believe is the oldest and most inexpensive Sony mirrorless that offers a clean video output (from some research, it seems the a5000 series cameras have a skin smoothing effect that cannot be disabled). This allowed me to use many of the lenses that I already owned.

The other part of your camera setup that's critically important is getting a power adapter. Cameras are designed to be portable and use batteries—that's not ideal if you're going to be on long streams, so getting a power adapter is important. Some cameras will have a power input jack, while others use a dummy battery connected to a power supply.

The lens you'll need is dependent on your particular setup and how far away the camera will be. My camera is mounted about 3 feet (1 meter) away from my face and I'm using a 28mm lens. This has a narrower field of view than the built-in macbook camera (i'd estimate that to be about a 20mm equivalent), so it's a bit more zoomed in on my face and captures less of the room behind me. You'll also want a lens with a low f-stop (i.e. larger aperture). A large aperture results in a narrower depth of field—that is, objects outside of the focal distance (such as objects behind you) will appear more blurry. If you plan to move around, you'll want an auto-focus lens.

I’m very static (just sitting at my desk), so I’m using a 28mm f2.8 manual focus lens. This gives me about a foot of front-to-back wiggle room without getting too out-of-focus.

The mounting hardware

This will be the most variable part of your setup. If you have space behind your desk, a camera tripod will be the easiest, most secure solution. If like me, your desk is up against a wall, you may need to get creative. My solution was to get a ½ inch pipe clamp and a “magic arm”.

Pipe clamps are extremely versatile and are only limited by the length of pipe that you get. In my case, I have a desk with drawers, so the pipe clamp easily allows me to clamp onto the very thick desktop (about 8” thick). The excess pipe extends vertically and I clamp my magic arm to it.

Magic Arms are small, articulated arms that include a camera screw mount on one end (intended to be screwed into the tripod mount of a camera) and a clamp on the other.

The video capture

Ultimately you need to get the video feed from your camera into your computer with little to no latency. Some cameras will output the video feed via a data port and you can receive this on your computer via a USB port—nearly all of these require special software that is sometimes incompatible with video conferencing software. You’ll need to explore the options with your particular camera. If your camera doesn't offer a direct video over USB or the software doesnt work with your video conferencing tools, you’ll need to use the HDMI (or mini/micro-HDMI) output from your camera and connect that video feed to a USB capture card (usually more of a dongle and not a card).

The biggest issue with capture cards is the amount of latency they can introduce as they convert the HDMI video feed into a webcam format. It’s not uncommon for cheap capture cards to insert 300ms of latency or more. If you’re using your computer’s microphone or an external microphone, this will cause the audio and video to be out of sync.

Most cameras will include an audio feed via the HDMI output, but many capture cards will not convert audio. If you find one that does, you might consider using your camera as an audio capture device to ensure your audio and video stay in-sync. But it’s best to just find a capture card that introduces little or no latency.

Details on my setup & other tidbits

Item	Cost

Sony a6000 camera body (used)	$285
SLR Magic 28mm f2.8 lens	$130
AC power supply	$25
½ inch Pony pipe clamp	$14
½ inch x 2ft pipe	$8
11 inch magic arm	$30
Micro HDMI to HDMI cable	$9
~~Mirabox Capture card~~ (no longer recommended, buy the cheap capture dongle)	~~$100~~
Generic HDMI capture dongle	$10
Total cost	**$511**

As noted above in the camera section, I already had the camera lens, so that saved me a bit of money. I also got lucky and was able to find a used a6000 body in excellent condition from B&H. A new a6000 body costs about $120 more than what I spent. Also the a6000 was first released in 2014, so if you're looking at a new camera, you should consider something like the a6100 that was released last year (2019). Especially if you plan to use the camera as more than just a webcam—Sony mirrorless cameras are nice and combine the power of a DSLR with the ease of a point & shoot.

Sony's alpha line of cameras use an APS-C sized sensor (35mm is about equivalent to 50mm on a full-frame 35mm camera), so if you're using a DSLR you'll want to choose your lens accordingly. A moderate telephoto lens can be extremely useful to find the right field of view, but fast (i.e. low f-stop, large aperture) telephoto lenses tend to be very expensive.

I ended up wasting a bit of money buying the wrong things while trying to piece all of this together. I initially bought a mini HDMI cable as I attempted to use my older Sony NEX-3 (as mentioned earlier this didn't work because the NEX-3 does not allow you to disable the information display). I also had initially bought a ¾-inch pipe clamp and pipe.

At the beginning of the COVID-19 pandemic, capture cards were extremely hard to find. This was a combo of high demand and limited supply (most are made in China and both manufacturing delays and import quarantines affected this). It took over 6 weeks to receive my capture card after ordering it. Supply is much better now, but there are also a ton of cheap options. As mentioned before, do your research on latency—too much latency will make it unusable as a webcam.

One area where this setup is lacking is lighting. My office area is in a large, brightly lit area, so I rarely need additional lighting except during early morning and evening times. I may need to buy an additional magic arm and some adjustable LED lights.

Capture card update

There are a lot of very inexpensive (often around $10-20) HDMI capture cards on Amazon. Despite different brand names, they're all the same: About 2-inches long, with an HDMI input (female) on one side and a standard USB type A connector (male) on the other. After seeing multiple positive reviews on youtube, I decided to purchase one and test it. The results were impressive. I tweeted some quick samples recorded via Zoom: https://twitter.com/gitbisect/status/1325207052226977792. Needless to say, this is now my recommended capture card because it's a steal for $10.

Update: Some folks have told me their $10 capture card died shortly after using it. Amazon's pretty good about returns, so hopefully they'll get a better replacement. My general opinion is that even if 1 or 2 are duds, you'll still be way ahead of buying my previous recommendation that was $100. But I also understand that time is money, so if you just want something that works (and the mirabox is super rugged), then spring for the better capture card.

Lighting update

Lighting can get expensive, especially if the lighting has tons of features like adjustable color effects and special controls (e.g. phone apps). As with everything else, what you need will be dictated by your particular setup.

In an ideal situation, you'll have great ambient, natural light (i.e. from big windows in front of you/behind the camera) and you will not need any lighting. The worst situation would be to have bright lights directly behind you that shine into the camera. Everything else falls somewhere in the middle, so I'll outline what you'll need for the worst case scenario and where you can save when adapting to any in-between situation.

If you have direct backlighting, the first step is to block that. Curtains, blinds, shades, etc. are likely your best solution, but if you want to take your home studio game to the next level, you can consider getting a green screen. This would let you block the light and use fun background effects (depending on your video software).

Ideally you want to be light from two directions. Imagine the lighting as a ✔️ with yourself at the vertex of the ✔️ and the camera in front of you between the arms of the ✔️. With a single light, you can often get sharp shadows on your face. For example, turn your head just slightly to the side and your nose casts a small, but sharp shadow. Two light sources from the sides prevents this, however you will want one light to be stronger than the other so you still have some soft shadows. When the lights are equally powered, it can eliminate all shadows and make you seem flat and unnatural.

Depending on your setup (e.g. a window to your side), you may only need one light source to complete the ✔️ shape.

Once you've determined your physical setup, you'll need to buy some lights. To keep your setup frugal, there are only a few key requirements:

- Adjustable color temperature: White isn't just white. Sometimes it's "cool" with a bluish tint, sometimes it's "warm" with an orange tone. Ideally you want a light that is adjustable. You'll likely only need to set it once, so don't worry about getting a light with a fancy remote or app to control this.
- Adjustable level: Controlling how much light is important. Too much and you'll be washed out, not enough and the light is useless.
- Power: A lot of lights are battery powered (because cameras are intended to be portable). Similar to your camera setup, you'll need to consider how long you'll be using the lighting and whether you require AC power.
- Mounting: Most small lighting solutions use standard tripod mount threading, so you can use a tripod, magic arm, etc. to mount them.

All that said, my lighting hardware setup isn't very good. I have fantastic natural light in my apartment and don't require lighting most of the time. For the few occasions where I need lighting, I decided to save money on a passable, but not great setup. I ended up buying a Viltrox RB08. Notably it has adjustable temperature and level, but is only battery powered. It's powerful enough that I dont need to run it at 100%, so the battery power easily covers any meeting I need. But I do have to charge it before each use to ensure it's ready.