Live Streaming Setup & Procedures

This will provide instructions for how to set up a system for live stream video production. The equipment required is as follows:

Software:

- OBS (Open Broadcast System) This will be the application that will manage all inputs from video, camera, screenshare, desktop etc.
- MonaServer: When executed this software runs in the background to connect a GoPro device remotely
- Microsoft Teams: Necessary only if streaming to Teams meeting.
- VLC Media Player: Needed to stream the GoPro from the smartphone to OBS
- Ffmpeg: This needs to run in the background for the GoPro to connect to OBS (ffmpeg run)
- EOS WebcamUtility: This software allows OBS to access the Canon Rebel SL2 video feed

Hardware:

Computer Hardware

- Laptop computer to run OBS
- Wireless microphones and Receiver
- External Harddrive with space for recording
- Headphones or earbuds to listen to Teams
- Extra laptop to cast Teams meeting to Flatscreen
- Monitor to view chat window (optional)
- Flatscreen TV with HDMI cord
- External USB Hub for additional input devices

Camera/Video Equipment

- Canon Rebel SL2 with USB cable and external hardwired power source
- Webcam 1 (Wally)
- Webcam 2 (Hal)
- GoPro Hero 8 black

INSTALL OBS

OBS

The software used to livestream the video and audio feed to Microsoft Teams was OBS, or Open Broadcaster Software. The software is the backbone of the setup and will be constantly referenced throughout this manual. The software can be downloaded at https://obsproject.com/. Once downloaded and installed, the main window for the software will appear as Figure 1. [1]

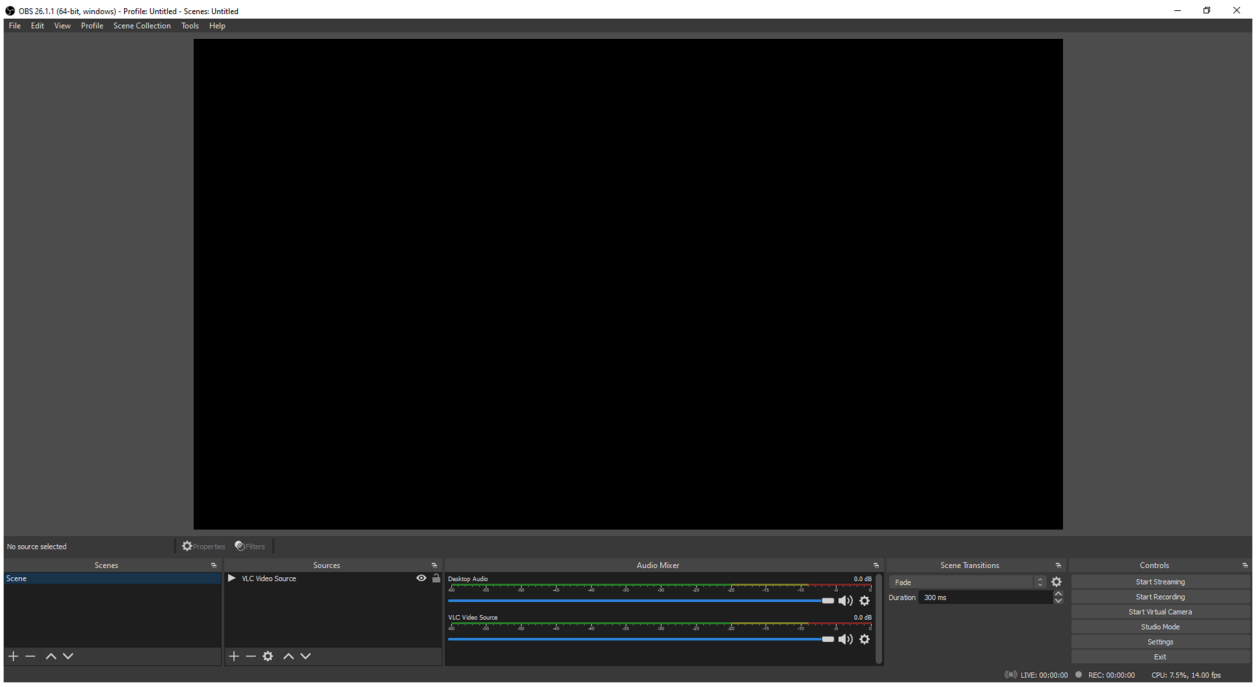


Figure 1: OBS Fresh Window

Below are a list of various settings and buttons that will be useful in setting up the livestream and will be referenced later in greater detail.

Scene – The scene window is used to manually toggle between “scenes”, much like a television studio. By selecting different scenes, the user may toggle between different representations of what will appear on the audience’s screens.

Source – These are the inputs to different scenes. A source can be anything from a video, audio, image, or computer application input (more on the latter in **Screen Source**). Any number of sources may be added to a single scene, and multiple occurrences of the same source may be included in a single scene. The sources are ordered from top-to-bottom, with the source on the top appearing on the top “layer” of the audience’s screen. For example, an image that is on the top of the source order will appear as an overlay to anything happening beneath it.

Video Preview – The video preview window is the large black box in Figure 1. The video preview shows what the audience will see based on the selected scene. Video, screen, and image sources will appear in this window and can be clicked and dragged to fit the desired size. Toggling a scene will change what appears in the video preview (assuming the scene differs from the previous one).

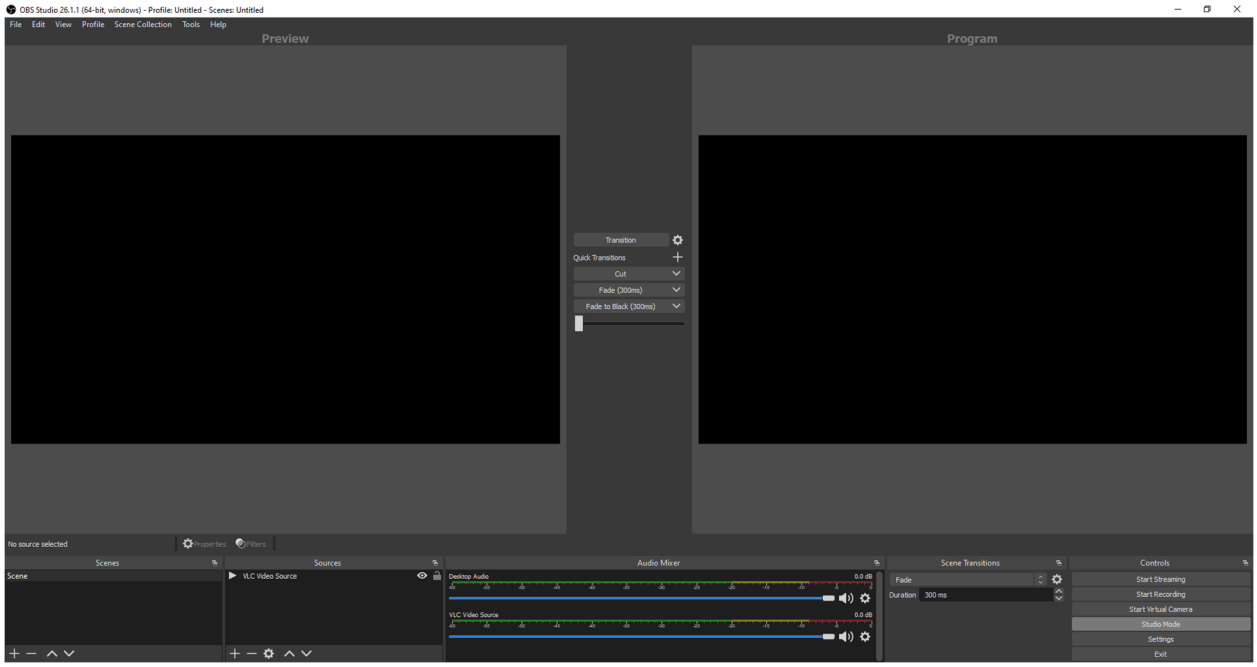
Audio Mixer – Audio sources that are included in the selected scene will appear in this window. Here, audio levels may be controlled using a slider. Audio sources may also be manually muted before and during a livestream.

Start Streaming – Initiates the stream to a stream hosting **website**. If the user is not using one of these websites (i.e. YouTube, Twitch, etc.) and is instead streaming to a video chat client (i.e. Teams, Zoom), refer to **Start Virtual Camera.**

Start Recording – Initiates recording of the Video Preview. Recordings are saved to a default folder and can be changed in the application settings (file > settings).

Start Virtual Camera – Initiates the "webcam" for video chat clients (more on this later). This will begin the audio and video output from OBS.

Studio Mode – A very useful tool for handling multiple scenes. Studio mode splits the Video Preview window into two windows; an active and a preview window. The active window displays what the audience sees, while the preview window displays the queued scene. The user may toggle between these two scenes using the **Transition** button, where the scene will fade into the next. While **Studio Mode** is active, manually selecting scenes will only change what is on the preview window. The active scene (what the audience actually sees) may only be changed with the **Transition** button while **Studio Mode** is on.



Adding Sources

Adding sources will be the first major task to accomplish and is the most difficult step in the entire process. Because almost every source has its own method of communicating with OBS, additional instruction may need to be found by the user if these general instructions are not sufficient.

Video Sources

For the DSM11 livestream, a total of four video sources were utilized: two webcams, a Nikon DSLR camera, and a GoPro Hero 8 Camera. These instructions will cover how to properly add these sources to a scene. If the user is using a different specialized camera (i.e. smartphone camera, GoPro-like camera), additional information may need to be consulted. A special note on sources: all sources may be copied using ctrl+c and pasted into another scene. This is particularly useful for sources with multiple settings configured where the source appears in more than one scene.

1. If a **Scene** has not been created, do so by pressing the "+" sign and hitting OK. The first thing to do for any video source is to add it to the **Sources** window. Only one source may be assigned to a single camera. To add the source, click the "+" sign in the bottom left corner of the **Sources** window and select "Video Capture Device". Give the source a name and hit OK. A settings window will appear as shown in Figure 2.

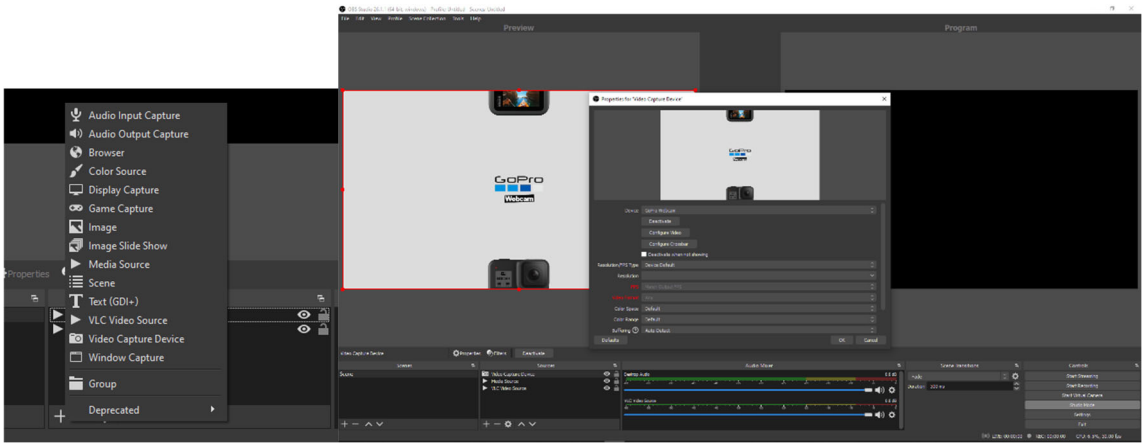


Figure 2: Video Sources

2. Select the device you want to add. If the device is NOT a webcam (i.e. GoPro, DSLR camera), skip this step and read the specified instruction for the specialized camera, then return to step 3. If the device IS a webcam, it will most likely appear in the dropdown menu called “device”. The other dropdown menus are self-explanatory and may be configured if the user desires. Once ready, hit OK.
3. The source has successfully been added to the scene. If you have added multiple sources at this point, you may only see one preview in the **Video Preview** window. You may alter the shape and size of the source by clicking and dragging the video in the **Video Preview** window (a red border will appear when you click the video). If your other video sources are still not appearing in the **Video Preview** window, you may need to check the settings on your sources and ensure the device is turned on and the settings are correct.

Specialized Cameras

The following specialized cameras require additional hardware and software in order to properly communicate with OBS, as they are not designed to communicate the same way webcams can with OBS and the computer.

GoPro

There are several methods of getting the GoPro to communicate with OBS. While this manual only covers one method, other methods may be explored if this fails to work correctly. Additionally, this instruction assumes the user is operating on a Windows computer and has a smartphone of any operating system.

First, the user must download the GoPro app for their smartphone (both Apple and Android operating systems may download this app from their respective application stores). The process for connecting the GoPro to the phone is a relatively straightforward and automatic process, though detailed instructions may be found on GoPro’s website.

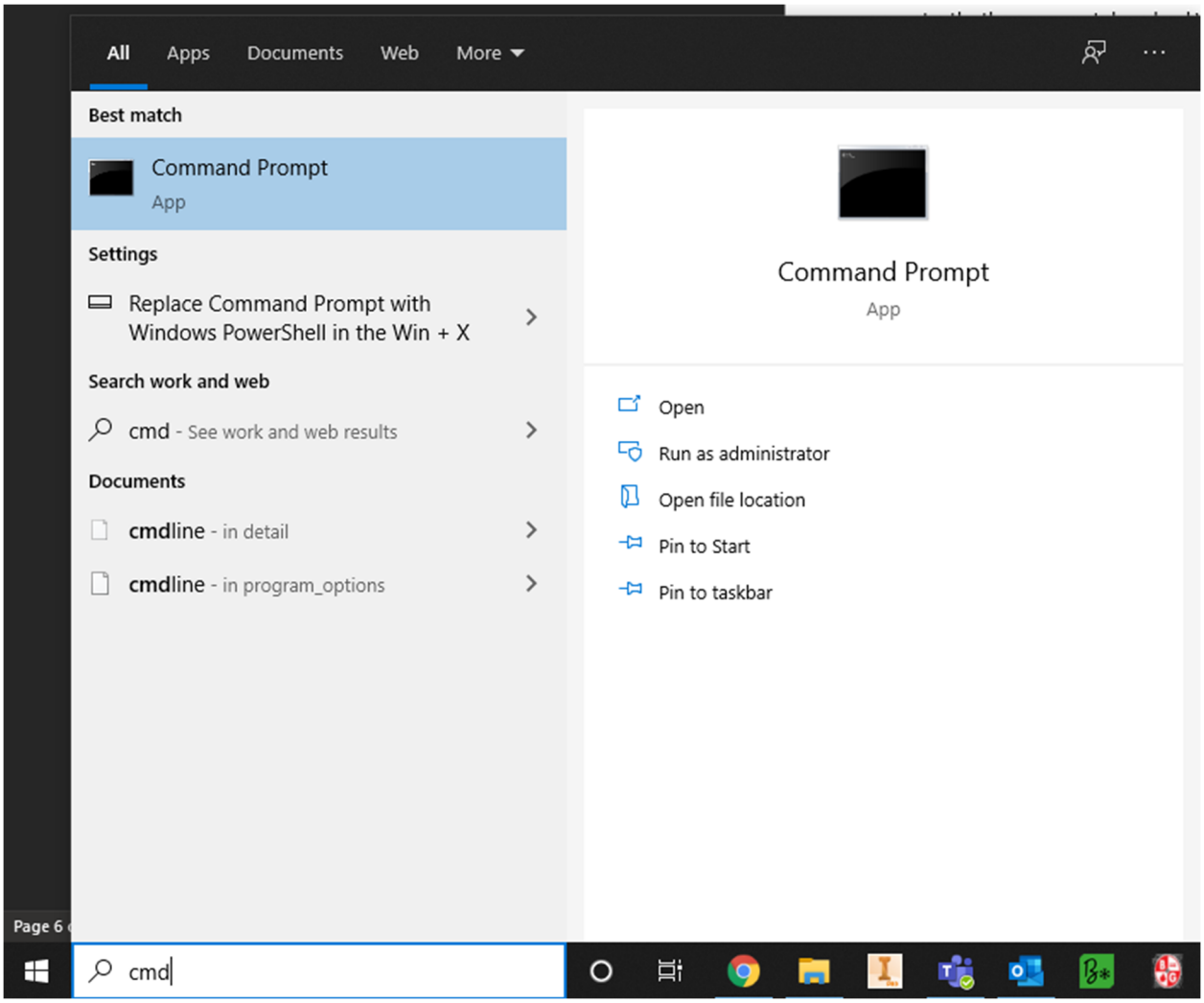
Second, the user must download MonaServer for Windows. MonaServer is the bridge between the GoPro and computer’s network. This allows the GoPro to send video information to the computer via WiFi in real time, effectively making it a wireless webcam.

Lastly, the user must download VLC Media Player for Windows. (This step is required, but different software may be used instead of VLC). VLC Media Player receives the video information from the GoPro via MonaServer and can act as a **Source** for OBS.

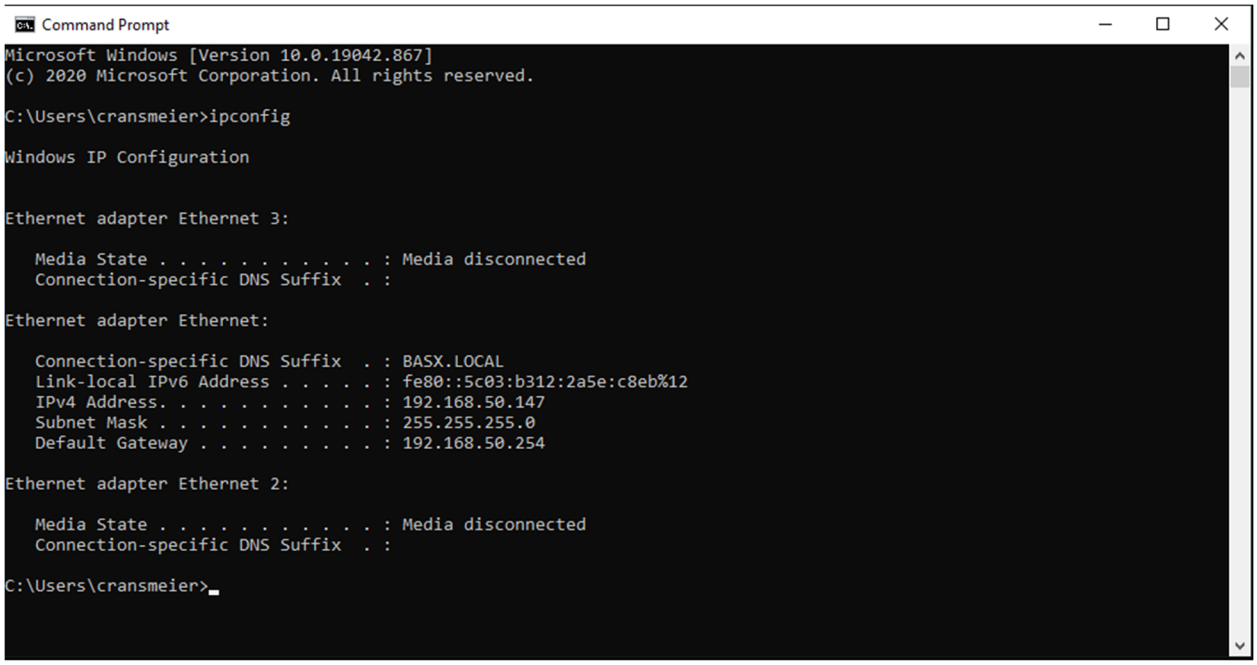
Getting the GoPro to work

After downloading the GoPro app, there should be an icon on the top-right corner of the login screen. It is not necessary to log in to a GoPro account. The phone should automatically connect to the camera with the “Control your GoPro” option. This allows the camera to be configured via smartphone.

Next, on the user’s computer, type “cmd” without the quotations in the Windows search bar. This will bring up the command prompt.



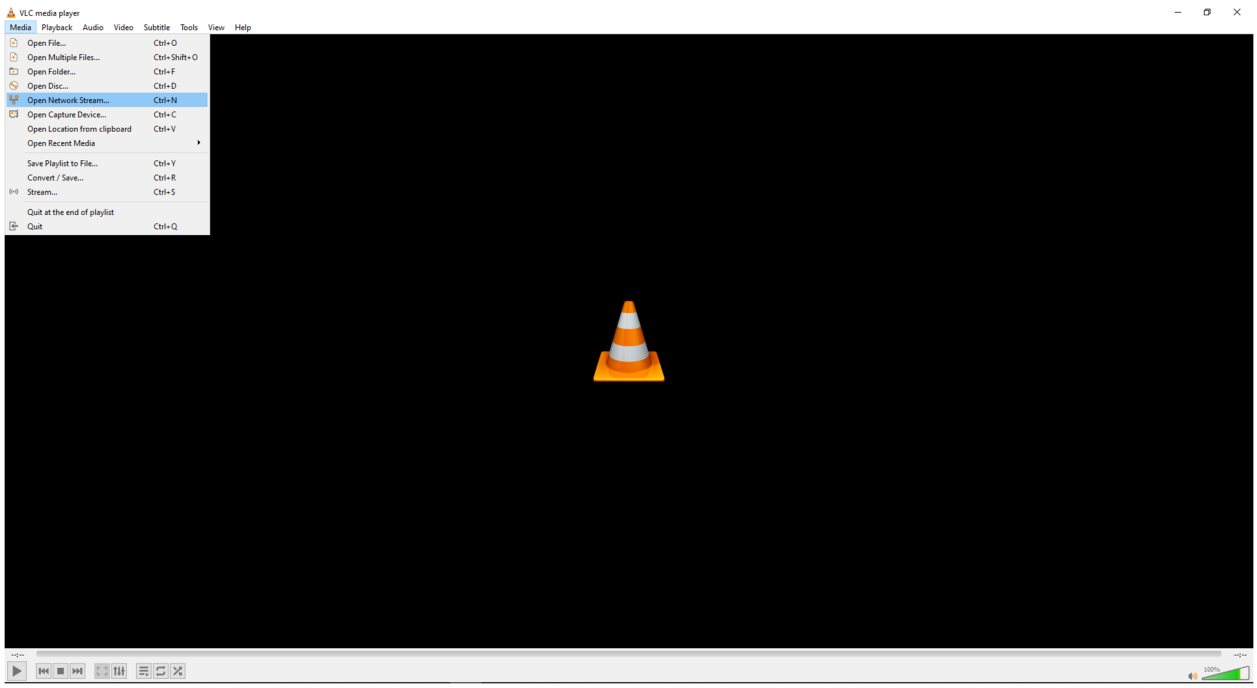
In the command prompt, type ipconfig. This will bring up the IP address of the computer, which is what we will use as the connection between the GoPro and the computer.



Under the “Ethernet adapter Ethernet”, there will be an IPv4 Address. This IP address will be the only thing we need to connect the GoPro to the computer. Save this IP address by writing it down somewhere convenient.

Open the MonaServer folder and run the MonaTiny application. Nothing needs to be done in the application, but it does need to be running for the following steps to execute successfully.

Open VLC Media Player. Select “Media” and “Open Network Stream” from the dropdown menu.



Select the “Network” tab if it is not already selected and type in the same IP address found in the command prompt. The format is as follows:

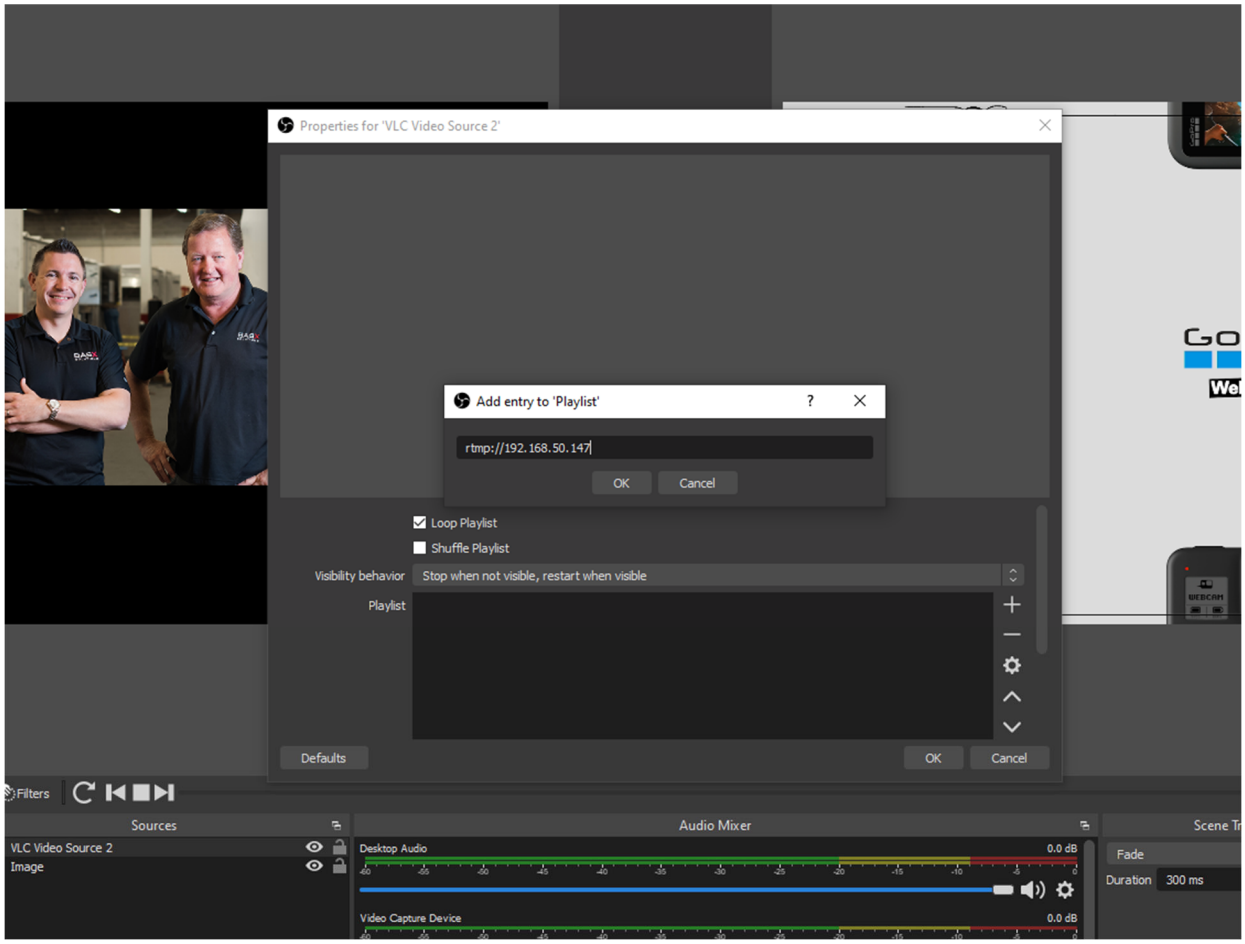
Rtmp://192.168.50.147

Hit play. If done correctly, the player will have an orange bar flying back and forth at the bottom of the screen. If an error prompt comes up, do not worry for now; there are a few more things to set up before this works.

Back in the GoPro application on the user’s smartphone, select the option to being a livestream. The setting to look for is RTMP server. Type in rtmp:///(ip address). (i.e., rtmp://192.168.50.147).

Back in the VLC Media Player, try to connect the device once again. This time, a live feed of the GoPro should appear on screen if all the steps were done correctly. This may take a few tries, but once it works the connection should be stable and should operate without hitches or flaws.

Finally, open OBS if not open already. In the **Sources** window, add VLC Media Source. Name the source and hit OK, then click the “+” button in the window and select “Add path/URL”. Type in the same rtmp:// address, hit OK, and close the window.



If everything has worked up to this point, congratulations! The GoPro has successfully been set up as a video source. If further instruction is needed on connecting the GoPro to OBS, there are videos on YouTube that help guide the process. This source may be copied over any number of times to different scenes, where it will retain the same settings set by the user.

In short, the line of communication is as follows: GoPro connects to WiFi via smartphone (GoPro) app -> MonaServer (on the computer) receives the information from the GoPro -> VLC Media Player processes the video information -> OBS uses the information from VLC as a **Video Source**.

Nikon DSLR

The Nikon DSLR camera is a simpler setup than the GoPro but requires additional hardware in order to properly function.

First, the DSLR must have a "dummy battery" in order to operate indefinitely. The DSLR camera only operates when a battery is found inside the camera, and thus is not able to normally operate when it is plugged into the wall. The "dummy battery" is a simple A/C hookup for the camera that the camera accepts as a battery but receives its power from a wall outlet instead.

Second, the DSLR must have an HDMI connection between it and the computer. Different cameras have differently sized HDMI connections, so ensure the cable being used is the correct one. (Generally, the connection will be mini-HDMI -> HDMI from camera to computer, but in some cases a micro-HDMI -> HDMI cable may be required instead).

Finally, the computer should recognize the DSLR camera as a **Video Source**. If it does not, additional instruction may be found online on how to connect a DSLR camera to OBS.

Image Overlays

The user may be inclined to add an overlay or border to give the broadcast a more professional look. The best type of image to use for a source is typically a .png image, as the images typically have a transparent background and allow sources to be displayed behind the image without blocking too much of it. However, any image format will do if the image is simply a rectangle (of any size). Add the image the same as you would a video source by selecting the "+" sign and selecting "image". The user may raise or lower the image on top of or beneath the other sources in the scene.

Audio Sources

Adding an audio source is the same process as adding a video source. During the livestream, the team used a two-channel microphone hub that connected to two wireless microphones. Normally, this would connect straight to the computer. However, the team utilized a "monitor" (a speaker to hear the audio feed externally to ensure audio was functioning correctly). The hub was attached to the monitor, which then plugged into the computer as the audio source. The monitor is automatically detected by the computer when it is plugged in and can be found in the "+" menu, similar to the **Video Source** method of adding a source.

Creating Scenes

Now that all sources have been added, it is recommended to create several scenes. This allows for seamless transitions between camera angles and adds a layer of polish to the stream. Adding scenes also creates a layer of organization that makes managing the livestream a painless task.

Layering

As briefly mentioned in the **Sources** section, sources may be layered such that multiple sources display on a single scene. Sources appear in the **Source** menu from top to bottom and are physically layered on the scene in the same orientation. For instance, if a .png image is on the top of the **Source** menu with a video source just below it, the video source will appear "behind" the image. Figure 3 gives an example of a foreground border (highlighted in red) over a video source (GoPro).

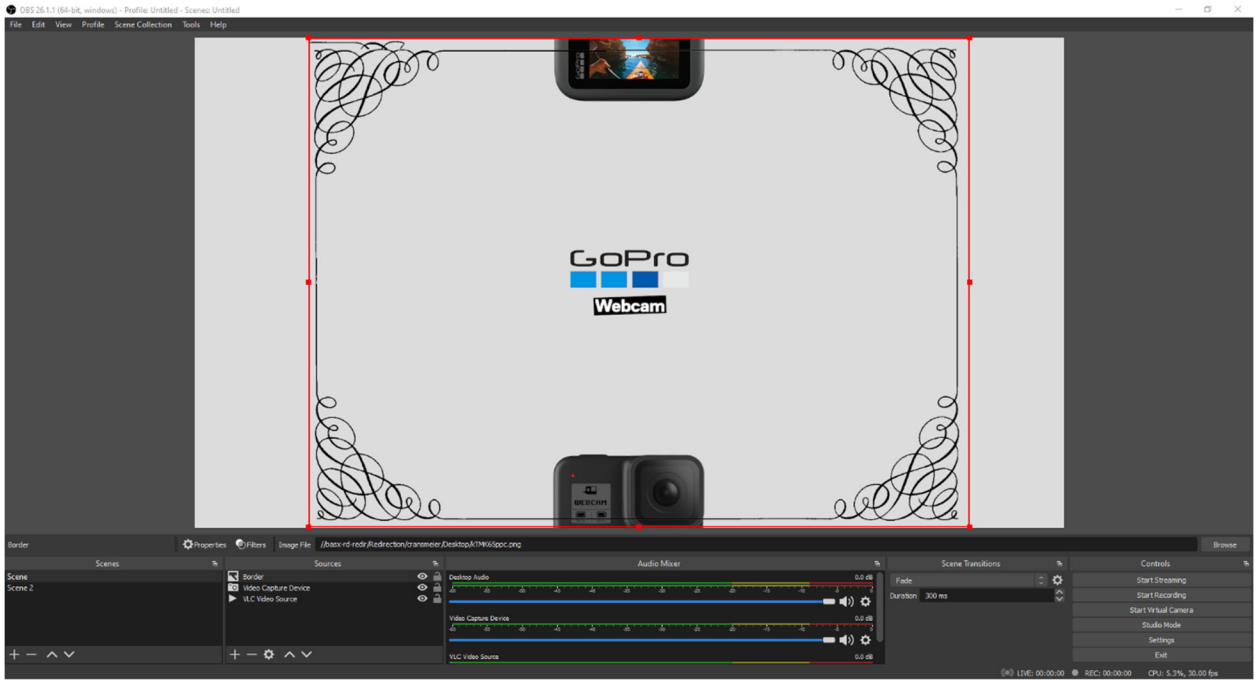


Figure 3: Border overlay

Images do not necessarily have to be .png files and do not have to be stretched over the entire screen, though if the user wishes to see through the blank spaces of an image, it must be a .png.

Once the desired layering is set for a scene, the scene is complete. The user may then create a new scene and copy over sources if they wish. While not required, it is highly recommended to only have the displayed sources in the scene. Notice in Figure 3 how there is an additional source, "VLC Media Source" in the **Sources** menu. This source is hidden from the **Video Preview** because the GoPro scene above it is stretched across the entire screen. To reduce confusion, the user should remove the VLC Media Source and add it to a different scene where it is utilized.

Swapping Scenes

Scenes may be swapped by double-clicking on the desired scene. This will bring up the new scene in the **Video Preview** window.

Studio Mode

Studio Mode is a powerful tool that makes hosting a professional livestream a trivial task. Figure 4 shows what appears when **Studio Mode** is activated.

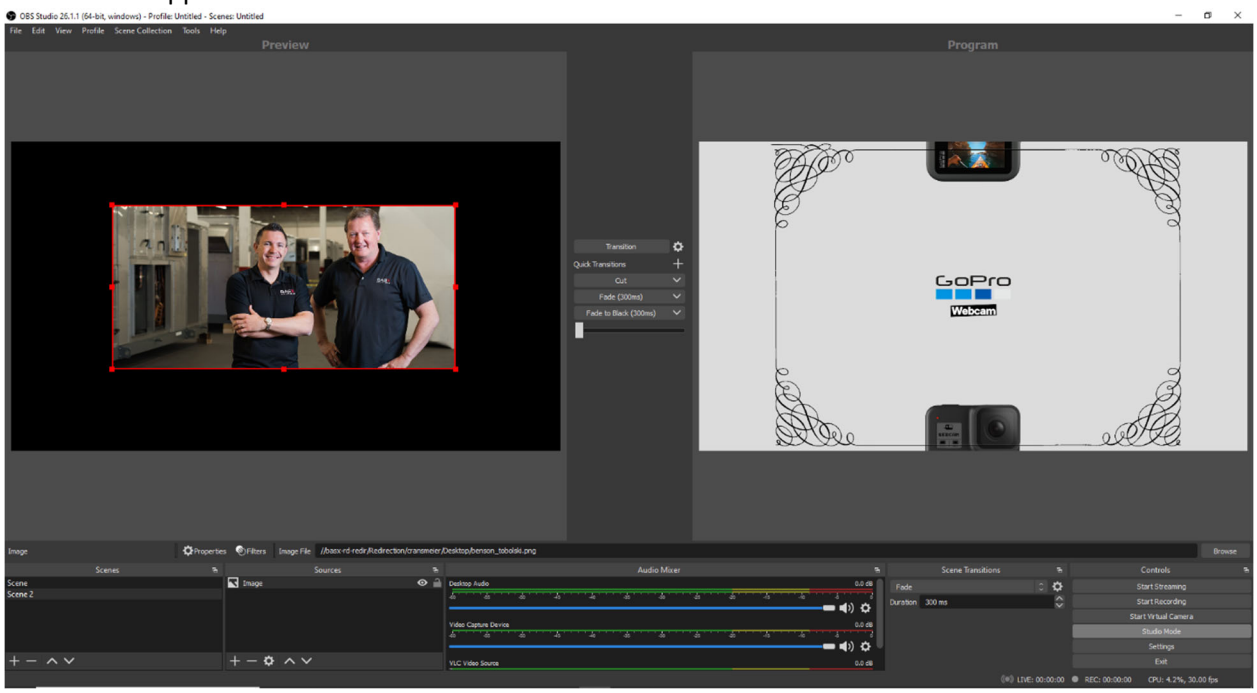
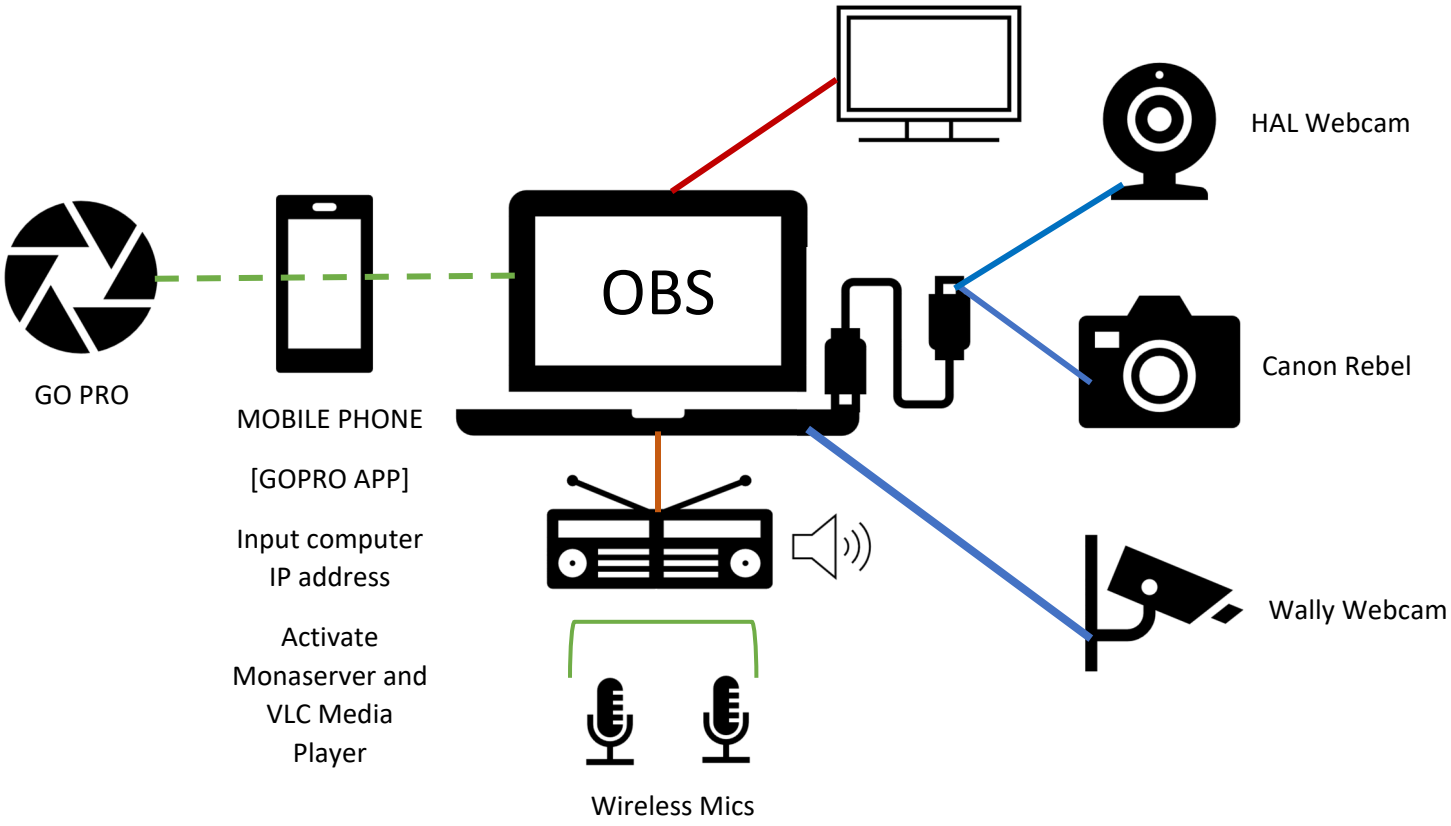
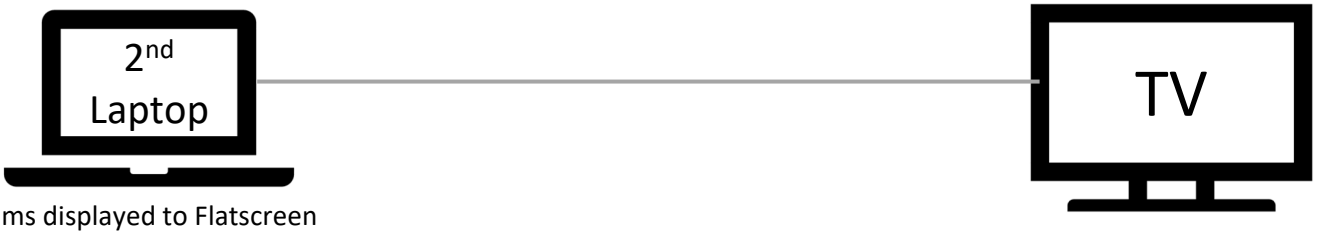


Figure 4: Studio Mode

The **Video Preview** window will split into two separate screens; an active window (right) and a queued window (left). The active window shows what is currently displayed to the audience. The queued window shows the next scene that is queued. Double clicking a scene in the lower-left **Scenes** window will only change the scene that is queued. In order to change the scene that the audience sees, the "Transition" button between the two previews must be pressed. By utilizing studio mode, the user can easily transition between the correct scenes, even if the wrong scene is selected from the **Scenes** window since this will not change what the audience sees.

Setup Schematic





Teams displayed to Flatscreen TV via HDMI input