MULTI-TRACK REMOTE VIDEO AND AUDIO RECORDING
BY JOHN HACKETT

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*T*his article is based on my presentation for the 2021 ITG Virtual Conference on multi-track recording. I am a member of the ITG Non-Pro Players Committee and play for several amateur orchestras in London, England. Since the start of the COVID-19 pandemic, I have been making audio and video recordings as a way to stay motivated and in shape.

I have recorded myself playing solo studies, created multi-track videos, recorded duets with a colleague, and organized a few larger group recordings with brass-playing friends from the amateur orchestras in which I play. Differences in technical ability and the equipment they had available made these the most challenging to put together. On the whole, though, they were a valuable and enjoyable exercise in keeping us together while in-person playing was impossible.

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Equipment

Obviously, you need a computer! I use an Apple Mac, but any desktop or laptop will do. The more modern and powerful, the better, as audio and video editing is processor intensive. Some older computers can be very slow, and some may not be able to cope at all when editing multiple video and audio tracks.

For audio recording, any iPhone or Android phone will work just fine. For highest-quality sound, it is best to use an external microphone, but it is not essential; you can certainly start without one and upgrade to a good-quality USB or stand-alone mic later if you want.

For video, you can use the camera on your phone or, if you have access to one, a DSLR camera that can record video. Most of my videos have been recorded in high definition on a ten-year-old Canon 600D. Later models can also record in the newer 4K standard.

Workflow

With a solo audio recording, the workflow is simple: record, edit, listen. The process with a solo video is much the same, but with the added problem that you really need to play the whole piece in one take unless you are prepared for some tricky post-production editing. For example, it is possible to record and edit all of the audio first to produce a perfect audio track and then play the piece to camera while listening to the recording. This way, you don't need to worry about the odd split, wrong note, or tuning issue as you will be combining this video with your "perfect" audio. The problem with miming is that it can be difficult to coordinate the finger movements precisely with the audio. Of course, you could keep your fingers out of the shot or stay far enough away from the camera that it doesn't matter!

Another option is to record the audio and video at the same time, but in small sections, which you edit together for the final video. One tip is to move the camera between shots to make the cuts look more natural and planned. You could, for example, decide on three camera positions—left, front, and long shot—and move the camera between positions for each of the sections you play.

Audio-Technica AT2020USB+ microphone

Zoom H4n microphone

If you use a separate microphone to get better sound, you must be able to sync the video with the soundtrack. Movie-makers use the clapperboard for this. It creates a spike in the audio, which is then used to align with the video. I do not have a clapperboard, so I clap four times before starting and use these spikes to synchronize the external audio with the video. Modern DSLR cameras have a line-in port to connect an external microphone so you can avoid this synchronization problem and still have high-quality sound.

For duets or larger groups, you have to record each part (audio and video) in a way that ensures each part is in tune and can be synchronized with the others, and then you edit it all together.

Audio only

If you have never done any recording before, you know that it is best to start simple and get used to the equipment and software before trying more complex recordings. Few of us have the luxury of a studio or church in which to record, so the results often sound dull; adding a touch of reverb in post-production will make a significant difference in the quality of the final result with minimal effort.

Studio Mini

I use the StudioMini app (https://tinyurl.com/itg2203h), which is available for both iPhone and Android. Other audio recording apps are available as well, including the free, open-source Audacity (https://www.audacityteam.org) software for sound editing.

StudioMini can also be used for multi-tracking, as it can record onto four separate audio channels. This article is not the place to go into the details of how to use a particular application, as specific instructions can usually be found in a "help" screen within the app or in an online manual. Popular applica-

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tions will also have video tutorials online—some produced by the company that wrote it and others by enthusiasts. Search YouTube, and you will almost certainly find what you need. The workflow will, however, be essentially the same: check the recording level to avoid distortion, record the piece, upload to your computer, and edit as required.

The advantage of audio-only recording is that you can correct any minor errors by re-recording them. Both files can then be imported into Audacity and the error replaced with the corrected recording. If your settings are all the same, then, with a bit of luck and patience, the edit will be seamless. If the piece is quite long, it can be recorded in smaller sections and put together in Audacity.

Recording at home always benefits from some judicious editing—the key ones being noise reduction and reverb. If you have computers running where you record, the background hum can be caught by the microphone and reduce the overall quality of the recording. However, Audacity can reduce this hum considerably with just a few clicks.[1]

Similarly, houses tend to have poor acoustics for recording; adding some reverb will make the recording sound much better. I usually choose the "Large Room" preset in Audacity, but you can experiment with which setting sounds best for your style of playing and the music you are recording.[2]

Solo video

Once you are comfortable with audio recording and editing, the next step is to record video. The simplest way to do this is to use a smartphone's built-in camera app. Modern TV and cinema is shot in wide screen (landscape mode, 16:9), and it is generally best for you to do the same. The phone can be put on a tripod to keep it steady during the recording.

Once you have made the recording, transfer the file to your computer, ready to be edited. I use an Apple Mac and open my iPhone movies in QuickTime. If you have a PC, you can either install QuickTime or use whatever video software comes with your operating system.

You will want to edit two main things: the start and end of the video and the audio. Trimming the video to cut out the bits before and after you play makes it look more professional; nothing says "homemade" like seeing you start and stop the recording and blow water out of the trumpet before you start!

You will also want to do the noise-reduction and reverb editing as mentioned above. To make sure the video and audio remain in sync after your edits, you need to export the video as an audio-only file (probably mp3 or wav format) and edit it in Audacity. Just be sure that you *do not change its length*. Once the edits have been made, save the new file and replace the original soundtrack. How you do that, exactly, will depend on the software. In QuickTime, use "Edit/Remove Audio," followed by "Edit/Add clip to end…," and select the edited audio file when requested. As this file's length is unchanged, both the video and audio should align.

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is that, when recording both video and audio, you may run into problems with synchronization of the audio and video if the computer cannot process both simultaneous data streams quickly enough. That is why I prefer and would advise using a standalone mic; I use a Zoom H4n (https://tinyurl.com/itg2203j), which is perfect for this (but can be quite expensive).

As an aside, the Zoom microphone is also excellent for multi-tracking. You can record onto one of four tracks while you listen—via headphones—to what you have already recorded on the others. This is ideal for recording yourself playing a duet, trio, or quartet.
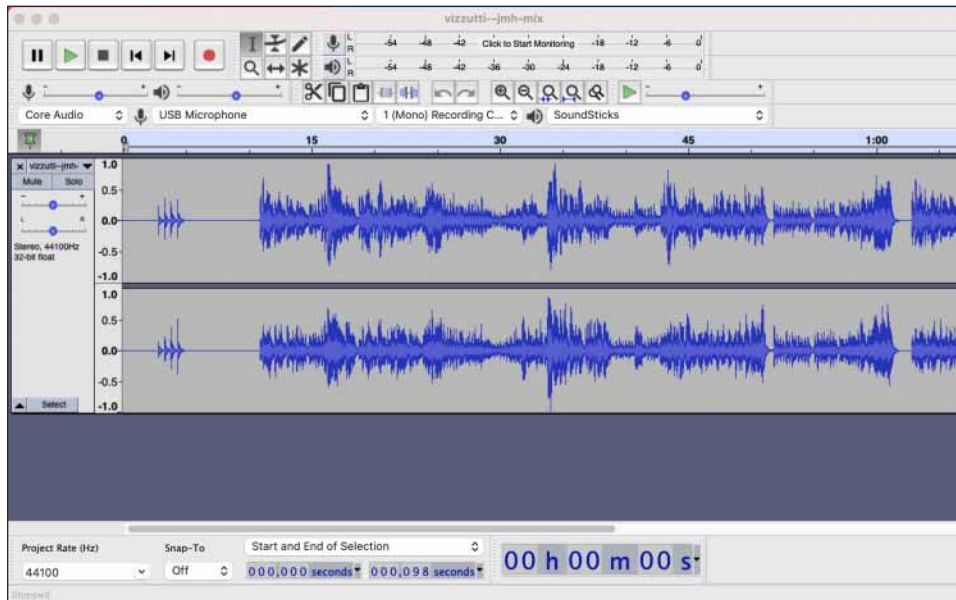
The process is much the same as before, but now you have to align the audio and video perfectly. This is where a clapperboard is used in a professional video recording; however, clapping four times is (almost) as good. The claps form four distinct spikes in the audio that can be used to line up with the four claps seen in the video.

To edit the audio, copy the file to your computer and edit in precisely the same way as before with Audacity, making sure to retain the claps! Then, copy the smartphone video to the computer and import them both into your video-editing software. Put them together by carefully aligning the claps by matching the spikes in your edited audio with the original soundtrack.

Audacity interface

Filmora audio and video interface

Using an external microphone

Smartphones are fantastic pieces of hardware, and the quality of their cameras and microphones are improving all the time. However, there is no doubt that recording with a good, standalone microphone will offer more control over the sound and deliver a better result.

A good USB mic will let you record directly into your computer. I have an Ars-Technica AT2020USB+ microphone (https://tinyurl.com/itg2203i), which costs about US$150, or £140. You can purchase USB microphones less expensively, but be aware that cheap ones will not give much improvement in quality over the smartphone. A potential issue with USB mics
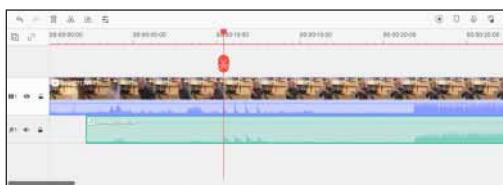
Once they are aligned, mute the original audio in the video so you just have the cleaned-up audio playing. It sounds confusing, but it is really quite easy after you have done it a few times. Finally, tidy up the beginning and end and export it as an mp4 file.

So, what movie editing software can you use? I use Filmora X (https://tinyurl.com/itg2203k), which is not terribly expensive and is available for both PC and Mac, but other free and open-source options are also available with similar capabilities. *Tom's Guide* has but one of many lists available online of the best video editing software.[3] With Filmora, you import both of the media files (audio and video), drag them onto the timeline, and align them using the claps. Once aligned, you can mute the video, trim the ends, and add any effects (for example, a title sequence and a "fade to black" at the end) before exporting it in a range of formats. I always export as mp4, but a wide range of other codecs are supported for both import and export.

Duet recording (smartphone)

Once you have become familiar with the software and basic recording technique, it is time to try recording a duet. Again, start simply and record a duet with yourself using just your smartphone. Once you can do that, try it with a friend.

When recording a duet, there is the extra problem of keeping both parts in time! This is where a click track is invaluable;

you can use Audacity to create one and export it as an mp3. Now record the first part while listening to the click-track on your headphones—remembering, as always, to clap (on the beat) before you start so everything can be synchronized later.

When the first part is complete, upload the video to your computer, export the audio, and use Audacity to add the click track to it. Then, play this back while recording the second part. I usually allow some silence and at least five complete bars of click before the first part starts so I have plenty of time to start the playback, start the iPhone recording, clap one bar, and settle down to play the second part.

Working with a friend is similar, except that once you have created the first part and added the click track, you send the mp3 file to them. They then record their part and send it back to you. When both parts have been recorded, you can edit the sound in exactly the same way you did for the solo recording so that you end up with two videos with an edited soundtrack.

Now you are ready to put the two together. In Filmora, you import all the media files—both videos and the click track—so everything can be aligned. Before exporting the final video, you mute or delete the click track. Drag both videos and the click track to the timeline and, using the clap spikes in the audio, align the videos.

Once you are satisfied that the parts are in sync, you can then create the "split-screen" so you can see both videos on the screen simultaneously. How to do this will vary from editor to editor; it is quite simple in Filmora. It amounts to cropping the videos so that each takes up half of the final movie's size. So, in a typical 16:9 screen of 1920 by 1080 pixels, you crop each video to 860 by 1080 pixels and set each beside the other. It appears tricky in writing here, but it is actually quite straightforward in practice. There are also online tutorials describing how to do split-screen in Filmora (just search YouTube). As a finishing touch, add some titles and a fade and then export as an mp4 file.

Digital camera and external mic

Smartphones are getting better and better for recording all the time. Their cameras and microphones are quite remarkable for their size. However, for the best-quality video, a modern DSLR camera is hard to beat. Combined with an external mic, you can achieve excellent quality. If you connect the mic to the camera, the recording process is the same as using a smartphone; the camera's internal mic is disabled when an external one is connected via the line-in/microphone input jack.

As a demonstration of this type of project, I recorded myself playing Chris Colletti's arrangement of the Bach Goldberg Variation No. 5, which can be seen on Vimeo (https://tinyurl.com/itg2203L). This duet recording was produced using a Canon DSLR on a tripod and a Zoom

H4n microphone, sound edited in Audacity, and video edited in Filmora.

More than two

You are now ready to take on something larger, but take your time. This may seem obvious, but the larger the group, the more time it takes to distribute the music and instructions, get everyone to record their part, and edit them all together. Good software and hardware help, but it can still take a lot of time to coordinate everything and produce a satisfactory video. Try a trio or quartet before you attempt a ten-part brass ensemble or large brass choir. The larger the group, the more time you will need to fit everything together, and it increases exponentially!

The technique is the same as recording a duet; there are just more files to coordinate and people to organize. For a large group, a conductor video is probably better than using a click track, as you will likely want to use more expression and changes of tempo during the piece.

You can either use a silent conductor track or include the music as well. If you use a silent track, the players record their part while watching the conductor. Alternatively, they may find it easier to listen to the music (via headphones) and watch the conductor at the same time—much like being in an orchestra. This may help with tuning as well, and it is also a good idea to add a tuning note at the beginning of the recording.

Once all the players have recorded their parts and sent them back, the work of putting it all together begins. The layout on screen of the players can be as simple or complex as your control of the software allows. It takes time to learn how to use video editing software, as there is often quite a steep learning curve once you get past the simple stuff!

With more players, the most uncomplicated layout is to divide the 1920 by 1080 pixel (16:9 widescreen) layout into boxes and scale each video to fit inside for the whole piece. The more adventurous can show and hide players at different times and in differently sized boxes. It all depends on the amount of time you are prepared to spend learning how to use the software and editing the video itself.

I have posted online a few videos as examples of what I have done with a simple split-screen layout—a four-part piece, "Il est bel et bon" (https://bit.ly/beletbon) and an arrangement of Gabrieli's *Symphoniae Sacrae* (https://tinyurl.com/itg2203m) for eleven brass in three choirs, performed with some of my friends and colleagues.

I hope this article inspires you to experiment with recording. Always remember that this should be a fun thing to do; there should be no pressure to make it any more perfect than you want. In general, recording—whether as a group or solo—is

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very good for your playing and can be a great motivator. If you would like more details on audio and video recording than fit comfortably into an article, please watch my 2021 ITG presentation, which is now available for viewing online (https://tinyurl.com/itg2203n).

About the author: John Hackett lives in London with his violinist wife. He studied trumpet at the Royal Academy of Music in the late 1970s and worked as a freelancer and teacher for some years before changing direction. He now works as an IT consultant and plays as much as he can. John is currently principal trumpet with the Salomon Orchestra and Covent Garden Chamber Orchestra and sub-principal with the Kensington Symphony Orchestra and Chelsea Opera Group. On his personal website (http://www.johnhackett.me), you can find, among other things, recordings of some duets and Charlier studies.

Endnotes

1   "Noise Reduction," Audacity Team, accessed June 21, 2021, https://tinyurl.com/itg2203o.
2   "Reverb," Audacity Team, accessed June 21, 2021, https://tinyurl.com/itg2203p.
3   "Best Video Editing Software 2021," *Tom's Guide*, accessed June 21, 2021, https://tinyurl.com/itg2203q.