

360 Degree video – shooting tips (lessons learned)

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Overview.

Virtual Reality (VR) has become a new and exciting way of engaging with people. Using smartphones, tablets, computers and VR headset devices it is now possible for people to experience much more engaging media than standard video. However, 360 video presents a number of challenges that need to be considered when attempting to produce your own VR content.

Quality

Cameras should have a minimum recording quality of not less than 4K resolution. This can be achieved by most modern consumer (entry) level cameras on the market today. Whilst 4K resolution is currently the default expectation (September 2018), 4K resolution within 360 degrees is more akin to 720p video from the late 1990's. Camera's with higher resolutions (5.7k and 8K) are available and these do provide for a clearer viewing experience, but subsequent processing power required to work with these videos and their subsequent bandwidth requirements can leave viewers waiting for files to buffer when downloading, negating any improvement in video quality. Until such time that bandwidth speeds increase, 4k resolution appears to be the most reliable platform presently.

User experience

Whilst it is great to experiment with 360 content and to be able to highlight items of interest to viewers that might be behind them or to the extreme left or right. For anyone sat in a chair or bed-bound, this can be disrupting/annoying as they strain to view out of sight content. Experience suggests that most people will happily accept content that is within their cone of vision (usually around 60 degrees) or outside of this (up to about 120 degree field of view). Anything beyond that which requires the viewer to rotate their head, neck or body to view the content (which for the elderly, infirm or mobility impaired) is not ideal.

Camera positioning – bearing in mind the above, I have found that it is best to:

1. Consider what it is you are trying to video. If it is a machine then the camera may be best placed nearby or at an angle where a narrator can point out the various salient areas of information such that the viewing can comprehend what is being said as if they were stood there themselves. If you are trying to convey what a ward, waiting room or garden might be like then it is perhaps better to position the camera where the person may be able to get the best view without having to move too much e.g. they don't have to turn around.
2. Light sources. If your camera is a dual lens variant then try and split the view so that each lens gets to access to a balance in light sources. e.g. the sun to both lenses. If you have one lens on the dark side and another facing bright light, there will be a lighting variance as each lens uses a different exposure level from its neighbour which will appear in your finished media.
3. Seam or stitch lines. Try to avoid important details crossing the stitch/join line. As each lens captures half the view there will be a join line (usually blurred) where the camera has done its best effort at bringing the two halves of the image together.

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4. Camera height. Try to keep the camera at head height as this will feel normal to the person viewing your video. If the camera is placed too low, people standing around the camera may look like giants and similarly a camera too high will make the people look small and the viewer won't feel part of the scene (unless a high/low viewing angle is required of course).
5. Keep the camera upright. Our brains are hard wired to see the world from an upright perspective. If your camera is at an angle, then this will only lead to an uneasy feeling by anyone viewing your content. If you are recording motion video at an angle then this is also highly likely to trigger feelings of nausea. Setting your camera upright is not always easy to achieve, but if you are using a selfie pole or similar try and stand back and view the pole/camera from many angles. Any lean will show up and can be addressed before filming begins
6. People lying down (e.g. bed patients) may not be able to view your content from that angle. Most VR headsets have built in gyros that recognise up from down and therefore set the view to that starting point. You may find that your content becomes unusable in a VR headset by those confined to a bed.

Camera mounting

VR cameras should come with standard tripod attachment threads. Some cameras will also come with some form of basic mini tripod included. These can be useful, but impractical for most recording environments. I have found that the purchase of a basic selfie stick combined with a mini tripod good for desk based recording. However when trying to record standing scenes the selfie stick is simply not tall enough.

A standard photographic tripod provides a good solid base and can usually reach an acceptable height, but the base will display prominently in all your content which can be prove distracting. To remedy this, I use a photographers extending pole which I attach to a micro tripod based. This allows for the camera to operate at an acceptable height whilst also minimising the tripod interfering in any recordings/photographs. Whilst this combination works well for indoor (controlled environments) if you are aiming to work outside then this setup is simply not stable enough. In wind prone conditions or on uneven surfaces, the camera may end up being blown/falling over with devastating results to the device/lenses.

If you are aiming to undertake work in outside environments then I would suggest either a photographer's lamp tripod with suitable camera attachment or the extending pole mounted onto a standard tripod head. Both have far greater stability at the base and can be weighted if necessary, I would strongly suggest **not** extending the photo pole as this could put too much strain on the threaded attachment to the tripod, which could ultimately fail resulting in devastating damage to the camera.

Camera Control

Most cameras can be controlled by smart phone apps. In such cases the app can access a range of features that will make the manual control of the camera far easier. Many camera functions are simply not accessible with using an app. Apps generally allow the user to alter the exposure value, ASA, shutter speed and preview the scene before recording. They will also normally allow recording to be started and stopped remotely.

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Camera power

Camera power can range anywhere from 35 minutes to an hour or more. Some cameras have interchangeable batteries, whereas others may not. If using the latter I have found that the purchase of a standalone power pack can be useful to give doses of charge in between shooting. It is possible to connect some cameras to external power e.g. Ricoh Theta V to provide for longer/live streaming but this is not an area that Velindre has currently investigated.

The Xiaomi Sphere 360 and Ricoh Theta V have built in batteries. The GoPro fusion has we believe a interchangeable battery, but this cannot be hot swapped during a recording.

File transfer to computer

Most cameras should connect via USB or by using external card readers without much hassle. If you need to write files to external non encrypted devices then you will need to contact/observe any local ICT policies. At Velindre we have an iMAC that can connect to the devices and managed file transfers, stitching and uploads as required.

File stitching – joining of the hemispherical images/video

The mobile apps will normally provide a level of joining or stitching as the term is generally known. However whilst this is possible, some apps may reduce the image size/quality in order to make the files web friendly. I prefer stitching on the computer as this is generally faster and means the files should remain at their recorded size. The camera supplier will usually provide access to an application that can be downloaded free of charge. Installation of the application will need to observe local ICT policies /guidelines. *It should be noted that not all camera manufacturer's support Apple computer system. Most however will support Windows (currently version - 10) operating systems.*

File sizes

4K 360 videos can become unwieldy if you are trying to edit from a network resource. We have found the network speeds can vary and that editing can become tricky if network traffic is busy. We prefer to transfer a master copy to network drives and then work from local copies. This provides faster access to the files and also secures a master file backup onto the network should the PC crash or files become corrupted (hasn't happened yet). File sizes are dependent on duration of video clips, but as an example, a 3 minute and 20 second clip can result in file sizes of around 1.48GB. A 25 minute teaching session would normally record in 4GB chunks due to the windows operating system limitations. Each segment needing to be stitched and compiled in a video editing application.

Audio

360 cameras will typically have microphones built into them. These provide basic recordings and will tend to pick up all sorts of ambient sounds. If you are recording a procedure with a narration, it can be most useful to use a separate voice recorder and/or clip on lapel microphone. It is useful to note that Dictaphones should be avoided as the quality can sometimes be low and cause lip sync issues later on at

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the editing stage. We have used Tascam voice recorders such as the DR-05 to good effect. These provide excellent clarity yet are light enough to be carried in a pocket or held in the hand.

Narrations can typically be added as a separate audio source within a video application and this can be investigated from your own software application.

Additional developments of note

Camera technology in this sector is changing rapidly and of note is Youtube's support for 180 virtual reality video using 3D technology. I have pre purchased a VUZE 180/360 camera that records 5.7K video. This camera should allow the option to record 360 degree or 180 degree 3D by altering the position of the lenses. Other cameras such as the Qoocam Kandoa offer similar, but the latter is a 4K camera. Other cameras such as the Insta360 Pro can record at 8K which clearly improves clarity, but equally increase processing time and memory overhead. I am particularly keen to test the 180 3D functionality/image quality.