



# Media players

Media players are often used by galleries to display video works. There are many advantages to using a media player including automatic playback, looping and synchronisation. The cost of media players and the expertise needed to set them up varies widely. It is important to take these factors into consideration when deciding on a model to buy. A number of options commonly used in galleries are outlined below.

## Raspberry Pi

A Raspberry Pi is a small computer that was designed as an affordable option for experimenting with computer programming. They can be used in innumerable ways including robotics and, most relevant to museums and galleries, as media players.

The operating system for the computer is housed on a micro SD card, which is inserted into the back of the Raspberry Pi. Open source software is available online to set up your Pi as a media player. Because the Raspberry Pi was created for educational purposes, the official Raspberry Pi Foundation website is the most useful source for software downloads and tutorials.

Raspberry Pis are most useful to museums and galleries when they are programmed to play a video from a USB automatically on loop. You can outsource this programming or download open source software online and write it onto an SD card yourself (ensure the source is trustworthy). MP4 Museum was developed for this purpose and is freely available online.

Once the looping software is programmed and inserted into the Pi, all you need to do is save your video/sound file onto a USB, insert it into the Raspberry Pi and plug it into a monitor/projector/speaker to play. You can connect to a speaker through AUX for sound files or connect to a monitor/screen through HDMI for video files. If you are using an older style of TV without an HDMI port, you can play through the AUX port on the Pi with an AUX to RCA cable (ensure the RCA cable has three plugs, red, white and yellow for video).

Raspberry Pis can overheat and are easily corrupted if they are unplugged multiple times because the Pi has no formal way of shutting down. This means that they can have a short life span if they are playing 24hrs a day for long periods of time.

As at August 2018, Raspberry Pi 3 Model B+ is the latest model. You can purchase Pi's in 'kits' that include a case, power supply, SD card and HDMI cable, all of which are essential, for around \$129.00 AUD.

### Summary

| Advantages   | Limitations   |
|--|---|
| <ul style="list-style-type: none"> <li>Automatic playback possible with programming</li> <li>Looping possible with programming</li> <li>Discreet</li> <li>Relatively cost effective</li> <li>Pre-programmed disc images exist - some technical knowledge still required to set up (see below)</li> <li>HDMI and AUX ports</li> </ul> | <ul style="list-style-type: none"> <li>Potentially short lifespan (easily corrupted)</li> <li>Temperamental - programming can become outdated and functionality can be compromised</li> <li>Technical knowledge required to set up before it is 'plug and play' ready</li> <li>May incur additional costs if need to outsource programming</li> <li>Cannot be synched, only appropriate for single channel media works</li> </ul> |

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## Writing a disk image to an SD card

Looping software comes in the form of a disc image (a copy of the structure and contents of a storage device). A programmer may be able to create a disc image for you that you can use multiple times. If you keep the disc image on your computer you can write it to any number of SD cards. Alternatively, if you download an open source disc image from the internet, you will need to know how to write it to an SD card for use in your Raspberry Pi.

- Download Disk Imager software to your computer ie. Win32 Disk Imager (a free windows tool for writing images to SD cards)

**Note:** If your workplace computer requires administrator permission to install software, this may also impact on the functionality of the disk imager software

- Insert your micro SD card into your computer

**Note:** if your computer does not have an inbuilt SD card reader, you may need to purchase a card reader that plugs in via USB. You will also need to insert the micro SD card into a Micro SD card adaptor as most card readers only take standard sized SD cards

- Open the Disk Imager software
- Select your SD card from the 'device' or 'drive' option
- Select the disc image file from your computer
- Select 'Write'

**Note:** Ensure your SD card is empty before writing. You can reformat the card to erase all data. Writing will also erase all previous data on the card.

- Insert micro SD card into Raspberry Pi
- Once USB is inserted and Raspberry Pi is plugged into screen and power, the video should automatically play on loop

## Troubleshooting

Before panicking, if a Pi is not working, unplug the unit from the projector/monitor and from the power and re-plug in the following order:

- Projector/monitor power cable to power
- USB to Raspberry Pi
- HDMI cable to projector/monitor - select correct HDMI source on projector/monitor
- HDMI cable to Raspberry Pi
- Power cord to Raspberry Pi
- Give a few seconds to start up

## Issue: I am having trouble copying my video onto a USB for playback

USBs can have a number of different formats. The most universally supported format for media players is FAT and FAT-32. For instance, if you are using the MP4 Museum looper software on a Raspberry Pi, your USB needs to be formatted as FAT in order to play. Unfortunately, FAT and FAT-32 have a 4GB file limit. This means that even if you have an 8GB USB stick, the largest file you will be able to transfer on to the USB stick at a time is 4GB. If your video is greater than 4GB, even if you have an empty 8GB USB, you will get an error message telling you the file is too big. Take this into consideration if you have a large video file.

If your video file is large because you have combined multiple videos into the one file for ease of playback, you can transfer each file onto the USB separately, as long as each one is less than 4GB. If you are using MP4 Museum looper software, the videos will playback in the order you copied them to the USB. Therefore, it is best to copy one at a time in the order you wish them to playback.

## Issue: Small square rainbow icon in top corner of display

A small rainbow square appears in the top corner of the display when the power source to the Raspberry Pi is not strong enough. A new power cord with a higher power output (ie. 5V 2.5A – power supply for Raspberry Pi 3) will need to be sourced for the icon to disappear.

## Lūpa

Lūpa is a new media player that is designed specifically for the gallery sector as a simplistic, powerful and affordable option for displaying media works. The player is powered by Raspberry Pi, but arrives as a complete package that can be used straight out of the box with no setup required. Simply load your media file onto a USB and plug it in to the port corresponding with the playback mode you require. There are two modes, Loop and Sync:

- In Loop mode, Lūpa finds your video file on the USB inserted in the loop port and plays it continuously until the unit is switched off.
- In Synch mode, connect two or more Lūpas to a network switch/router via the Ethernet port. When the USB is inserted into the sync port, Lūpa will automatically find other players connected via the network cable and play back the video in sync with the other players. There is no limit to the amount of Lūpas that can be synced. As long as all Lūpas are connected via network cables, they will remain in sync until switched off.

It is important to have your video/sound file and USB prepared properly for use with Lūpa. Lūpa supports the industry standard codec H.264 MP4. The official website provides export presets for all major video editing software that can be downloaded to ensure the video is optimised for use with Lūpa when exported. You can also use media conversion software such as Adobe Media Encoder to convert your video to H.264 MP4 or supply an artist with the export presets to ensure they provide the file in a compatible format. Lūpa can output in high definition through the HDMI port or in standard definition through its analogue port, for use with older monitors such as CRTs.

Lūpa supports exFAT and NTFS USB formats, allowing you to play a video file of any length or size. The official website provides instructions on how to prepare your USB for use with Lūpa. Lūpa will only play the most recent file that was copied on to your USB. If you want to loop multiple videos on one screen, you will need to combine the videos into one file.

Lūpa also supports both stereo and digital audio. Stereo audio can be played through the 3.5mm analogue port and digital audio, including surround sound, through the HDMI port. Export presets are available through the official website to help you format the audio properly.

Seamless, quick installation has been built into the Lūpa's design. The unit is powered through a micro USB cable, which is supplied with the player. It can be plugged directly into the USB port on your screen or projector, reducing the amount of visible cords coming from your display. This also means Lūpa can be turned on and off along with the display. Alternatively, it can be plugged in to a power socket if needed and left running 24/7. Magnets have been embedded into the case allowing Lūpa to attach to any metal surface behind your display.

Lūpa also has the capacity to accommodate more advanced settings. Through the official website, you can use the 'advanced settings system' to change the resolution and refresh rate, adjust over-scanning, adjust default audio volume and turn on standard definition to play through the analogue port. You input the advanced settings relevant to the playback of your media file, download the settings file and save it onto the USB drive along with your video. Any Lūpa the USB is plugged into will automatically read your adjustments and apply them.

Whilst Lūpa was designed in a way that avoids the need to update software, if an update is ever required, Lūpa is committed to supplying the software update free of charge.

Lūpa retails for \$299 per unit (Aug 2018), including all equipment required to run the player, [lupaplayer.com](http://lupaplayer.com)

| Advantages  | Limitations   |
|---|---|
| <ul style="list-style-type: none"><li>• Automatic playback, looping and syncing with minimal setup</li><li>• Syncing for 2+ channels</li><li>• On screen troubleshooting</li><li>• Affordable, all equipment included</li><li>• Easy and discreet installation - magnets</li><li>• Supports stereo and surround sound</li><li>• Simple set up for custom advanced settings</li><li>• No video file size restriction, supports exFAT format USB</li><li>• Helpful website with numerous resources to assist in operation</li></ul> | <ul style="list-style-type: none"><li>• Does not play multiple video files saved on a USB in a loop. However, if you need to loop a playlist of videos, this is easily achieved by combining all videos into one file. Player is exFAT compatible, allowing playback of any file size</li></ul> |

## BrightSign

Brightsigns are media players purpose-built for commercial digital signage. This means they are incredibly robust and reliable, as they are designed to play 24hrs, 7 days a week. Brightsigns have been adopted by galleries because of their reliability and their ability to synch videos. This means Brightsigns can be used for 2+ channel works.

Brightsigns can play a single channel video automatically on loop without programming. Simply save your media file onto an SD card, insert it into your Brightsign, plug into a monitor and power source and your video will play automatically on loop.

### Sync videos with BrightSigns

BrightSigns can be programmed to synchronise playback of videos, allowing galleries to present multi-channel works. Synchronisation occurs automatically when the units are powered on and, if programmed correctly, will remain tight all day. You need a BrightSign for each channel of the work (ie. each monitor/projector needs its own BrightSign). The BrightSigns are then connected via a network switch/router, which allows the BrightSigns to 'speak' to each other. You can outsource the programming. However, BrightSign offers free PC software, BrightAuthor, which can be downloaded from their website and used to create a synchronised project. The BrightSign support page has published a video tutorial on 'Interactive Synchronised Video Projects', which takes you through the steps of setting up your BrightSigns for multichannel synched works.

BrightSigns are significantly more expensive than other media player options. As at August 2018, a new unit starts at around \$699.00 (for an HD223). However, they are more reliable and more versatile. BrightSign is also committed to offering updated firmware and software for all previous models (their 'legacy players') as well as new models, allowing a longer lifespan for your player. When purchasing, ensure the BrightSign includes ports you are likely to need (ie. HDMI, AUX etc.). Newer models do not have VGA ports. BrightSign also offers instructive videos on setting up your player through their official webpage. It is essential to watch this before setup.

**Note:** You need to have Brightsigns from the same product line in order to synch (ie. HD, XD). For example, an HD BrightSign (ie. HD223) will not synch with an XD BrightSign (ie. XD234). However, you can synch across models within the same product line, for example an HD223 will synch with an HD220.

### Summary

| Advantages   | Limitations  |
|--|--|
| <ul style="list-style-type: none"><li>• Automatic playback and looping possible without programming using SD card for single channel works or multichannel works that do not require syncing</li><li>• Can be drilled into the wall behind TV using wall mount holes on casing</li><li>• Sync possible with programming</li><li>• Very reliable</li><li>• Long lifespan</li><li>• BrightSign provides free, user friendly software and video tutorials on their official webpage</li></ul> | <ul style="list-style-type: none"><li>• Expensive</li><li>• Technical knowledge required to set up for synchronisation</li><li>• May incur additional costs if need to outsource programming</li><li>• Not as discreet, can be quite visible behind TV</li></ul> |

## Mac mini

Mac Mini is a 20cm<sup>2</sup> computer desktop unit, which functions as a normal desktop computer when connected to a monitor. Because it has the full functionality of a computer, it is very versatile. It is possible to set up automatic playback and looping on the computer so your media plays when the unit is turned on. You can even schedule the computer to turn on at a specified time of day, removing the need for gallery staff to turn on in the morning (keep in mind the monitor will still need to be switched on as it is powered separately to the Mac Mini).

Script can be written in 'Script Editor' on the Mac Mini to create an application that prompts the computer to automatically play and loop a video on start up. Alternatively, Quicktime Pro and computer settings can be adjusted to achieve the same result. Quicktime Pro costs approx. \$30 to download.

### Using Script Editor

- Save your media file onto the Desktop.
- Find the Application *Script Editor* in Finder on the Mac Mini and open.
- Copy the following text into the text frame of Script Editor:

```
tell application "QuickTime Player"  
  open "movie path"  
  set looping of document 1 to true  
  present document 1  
end tell
```

- Replace the text in between the quotation marks (movie path) with the file path of your media file

**Note:** You can copy the file path by right clicking on the file in finder, holding down 'Option' and selecting 'Copy' from the dropdown menu. Paste in between quotation marks in the script.

- Run your script to test that it works.
- Export your script as an application
- Go to System Preferences and select 'Accounts' or 'Users' from the menu
- Select 'Login items' and add your exported application to the list
- Make sure the box next to your application is ticked and save changes
- Ensure your computer logs in to the account automatically on start up
- When the computer is turned on and logged in the application will start the video playing automatically

### Quicktime Pro settings

- Make a copy of the desired video file and save to your Desktop
- Open the copied video file in *QuickTime Pro*
- Under the 'View' menu, select 'Loop'
- Open the 'Properties' window and select 'Presentation'
- Select 'Automatically play movie when opened' and 'enter fullscreen mode when opened'
- Save video file and test by opening from desktop
- Go to System Preferences and select 'Accounts' or 'Users' from the menu
- Select 'Login items' and add your video file to the list
- Make sure the box next to your application is ticked and save changes
- Ensure your computer logs in to the account automatically on start up

When the computer is turned on and logged in the video should start playing automatically

### Scheduling computer to switch on

If you want to program the computer to switch on and shut down by itself at the same time every day, follow these steps:

- Open System Preferences and select 'Energy Saver'
- Select 'Schedule'
- Select 'Start up or wake' checkbox and fill out days and times to suit your opening hours
- Select 'Sleep, restart or shutdown' checkbox and select 'Shutdown', fill out days and times to suit your opening hours.

If you have programmed the computer for automatic playback, your computer should now turn on in the morning and automatically play the video on loop until it shuts down in the evening.

### Manually start video playback

Alternatively, if you would like to manually start up the video each day you can use a wireless keyboard. A wireless keyboard with trackpad is ideal as you can use keyboard commands *and* navigate with the mouse. Most wireless keyboards will connect to the Mac Mini through a USB receiver plugged in to the USB port. Ensure looping is turned on when you play the video.

## Multi-channel videos

Because the Mac Mini has at least two display ports (thunderbolt display and HDMI) it is possible to play a multi-channel work through the one computer as you can connect a projector/screen to each port. Free 3D video player software, such as Bino3d, can be used to set up a two channel display presentation.

A Mac Mini starts at \$750 AUD for 500GB storage and a 1.4GHz processor

### Summary

| Advantages  | Limitations   |
|---|---|
| <ul style="list-style-type: none"> <li>Automatic playback and looping possible with some degree of technical knowledge</li> <li>Very versatile and can be used for more complex media artworks (ie. interactive installations etc.)</li> <li>Syncing possible through additional software (two channel only)</li> <li>Very reliable</li> <li>Long lifespan</li> <li>Can schedule computer to switch on and off each day to cut down on set up time</li> </ul> | <ul style="list-style-type: none"> <li>Expensive</li> <li>Technical knowledge required to set up automatic playback and synchronisation</li> <li>May incur additional costs if need to outsource programming</li> <li>Not as discreet as other options</li> <li>Manual start up is relatively time consuming if auto playback is not set up</li> <li>Extra cost of keyboard</li> <li>Extra cost for software (ie. QuickTime Pro)</li> </ul> |

## Commercial media players

Commercial media players such as WDTV and the Laser Smart Media Player can be used in a gallery setting to play media work. However, they are designed for use in the home and lack seamless playback options that are achievable with Raspberry Pis, BrightSigns and Mac Minis.

Media plays through USBs on these players and minimal programming is required. However, when starting up the TV/Player in the morning, gallery staff will need to navigate the menu on the player to find the media file and play. Most of these players have a 'loop' setting that can be turned on to keep the video playing throughout the day. However, they tend to show symbols or video titles on the screen as the video loops. WDTVs can be set up to 'auto play' a selected file on the USB to minimise navigation through menus. However, it can be temperamental.

These players are becoming more and more obsolete and harder to purchase as homes move towards streaming devices such as Chromecast, Apple TVs and Smart TVs to watch their media content. The manufacturers are increasingly incorporating streaming functions to the players, thus their prices have not reduced as much as would be expected. They generally cost between \$150-\$200 AUD.

### Summary

| Advantages  | Limitations   |
|---|---|
| <ul style="list-style-type: none"> <li>Automatic playback and looping may be possible depending on make/model and settings - minimal technical knowledge needed to set up</li> <li>Relatively discreet</li> <li>No reprogramming required to use for a new project</li> <li>Relatively inexpensive</li> </ul> | <ul style="list-style-type: none"> <li>If auto playback cannot be set up, it is time consuming to get media to play in morning</li> <li>Icons and symbols can be seen on display when looping</li> <li>Synchronisation not possible</li> <li>Increasingly hard to find Australian retailers who sell these media players</li> </ul> |

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## USB to TV

Using your TV as a media player is the most cost effective option as the only additional equipment you need to purchase is a USB. It is similar to using a commercial media player such as a WDTV (see above) as the TV will have an inbuilt media player that functions in a similar way. However, the settings can be limited. Automatic playback is generally not possible. Staff will have to navigate to the media centre of the TV with the remote to get the file playing. In addition, as with the WDTV, icons, symbols and titles can show up on the screen as the video plays/loops. Syncing is not possible for multichannel works. Despite these drawbacks, it is a simple, cheap option to display single channel media work in a gallery space.



### You might also like ...

#### **Resources and downloads for Raspberry Pi**

Raspberry Pi Foundation

<https://www.raspberrypi.org/>

#### **Resources and downloads for Lupa**

<http://lupaplayer.com>

#### **Tutorials, resources and downloads for BrightSign**

BrightSign

<https://www.brightsign.biz/support/training/overview>

#### **Opensource software for looping on Raspberry Pi**

MP4 Museum

<http://mp4museum.org/>