

Choosing the Right Frame Grabber

Assessment of the pros & cons of available options

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Abstract

One of the reasons why cell phones and tablets are gaining popularity over traditional PCs is the ease of connecting the real world to digital world. Integrated cameras have made video chatting, creating informative and entertainment videos a child's play. But many of us wish the same to be available on the PCs where a lot more can be done with videos compared to handheld devices. A **frame grabber** is one of the popular option to achieve this. With several frame grabbers available in the market, it is tricky to choose the best one for you, unless you know exactly what to look for.

In this paper we discuss several key factors such as the Operating System, video standards/resolution, and audio/video interfaces related to the process of selection from the frame grabber options available.

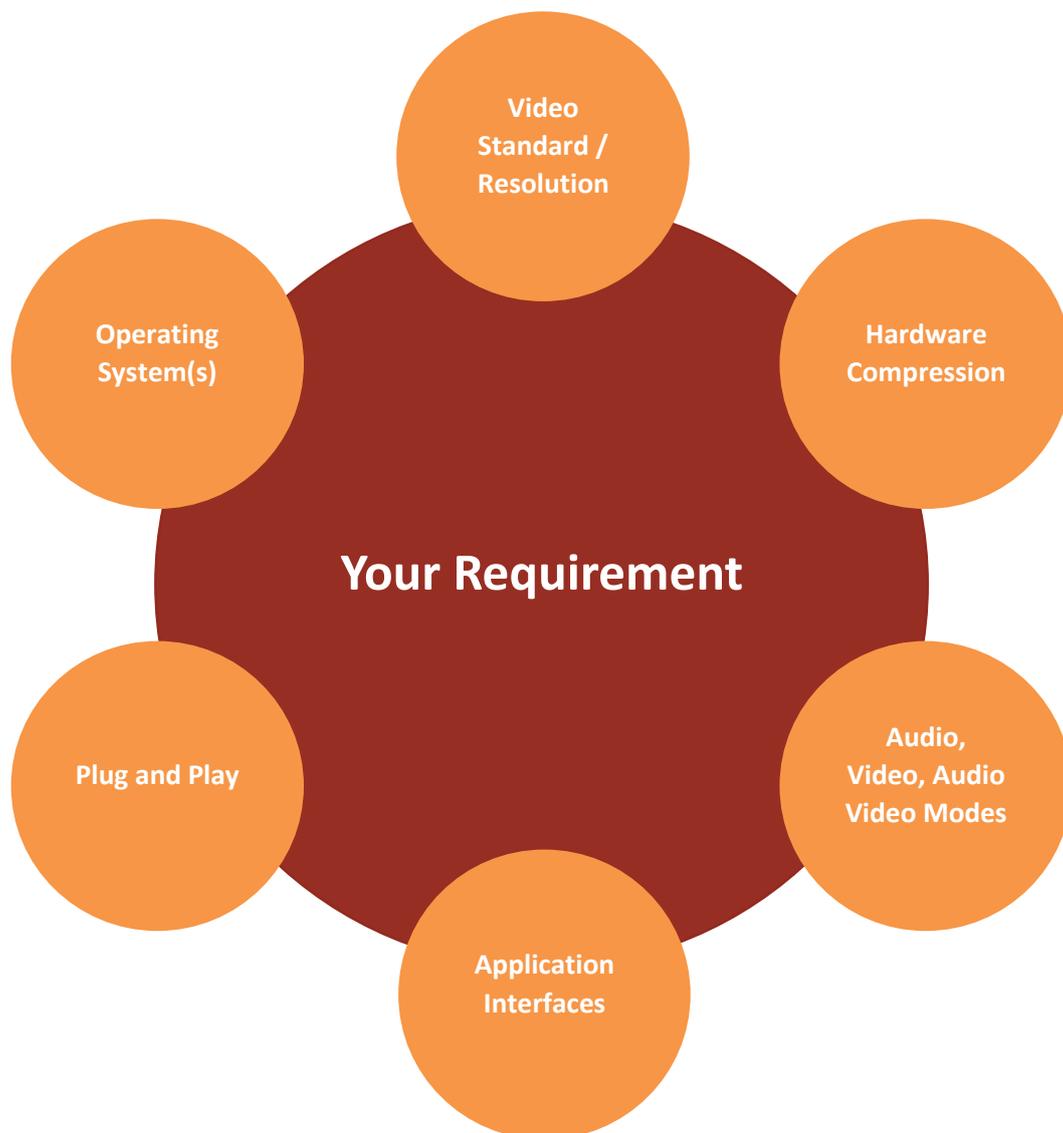


Figure 1 - Criteria for selecting a frame grabber

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Introduction



Frame Grabber is a term typically used to refer to devices that provide audio/video capture functionality on personal computers (PC). Frame grabbers come with a variety of forms and features such as PCI capture cards, USB webcams, FireWire cameras to name a few. Some frame grabbers capture analog only / digital only signals while some may support both. The selection of the right type of frame grabber is entirely dependent on the end use-case.

Due to a large variety of frame grabbers available in the market, choosing the right one is not straight forward. As we discuss in the subsequent sections, few factors need to be considered before making this choice. However, there are two criteria common to all these factors:

1. Are you getting what you need?
2. Are you paying for what you don't need?

With these thoughts in mind, let's look at different factors to choose the right frame grabber!

Key Considerations & Decision Making

Target Application

The most important consideration for choosing the frame grabber is knowing what exactly you need it for. Typically frame grabbers are used for video chatting, editing, classroom recording, medical support, gaming and surveillance / security systems. Each use-case has its own set of requirements for the frame grabber. What you need? Find out yourself by analyzing the frame grabbers based on the characteristics described below –



Image: emrefirat.edublogs.org/2013/10/22/an-alternative-to-android



- **Compatibility with various Operating Systems (OS)**
 - Typically frame grabbers support Windows & Linux OS. So, if you have a Windows or a Linux PC, you should be able to find a compatible frame grabber. However, carefully check what exactly your chosen frame grabber supports. A frame grabber that works with Windows 7 may not work with Ubuntu.
- **Compatibility with capture software**
 - To use a commercial software like Skype or VLC for audio / video capture, we must check the specifications of the frame grabber to ensure that it supports such software. Commercial video applications typically support standard interfaces like **V4L2** and **ALSA** (on Linux OS) or **DirectShow**[®] (on Windows OS). Frame grabbers which comply with these standard interfaces are more likely to work with such applications, giving a true plug-and-play experience.
 - Some frame grabber vendors offer their own customized applications if their hardware is not compatible with commercial video capture software. However, these applications may not

serve all use-cases (recording, streaming, editing, and so on). Moreover, these applications typically are incompatible with frame grabbers from other vendors.

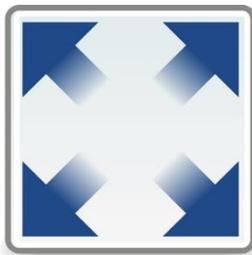
- **Video resolution and frame rate**

- Video resolution is a major factor that determines the quality of video that you get from a frame grabber. Most frame grabbers support one or more video resolutions since it increases the likelihood of frame grabber being compatible with any capture software.
 - SD (NTSC/PAL/480p/576p) – Suited for low-end use cases like video chatting.
 - HD (1080p/1080i/720p) – Suited to higher end use cases like video recording and editing.
 - UHD (4K) – Suited for niche applications like cinema and broadcasting.
- Video frame rate is an important factor that determines video quality. For gaming and broadcasting sports events, frame grabbers that support high frame rate (50, 60 or higher fps) is recommended. For other use-cases like video chatting and classroom recording, video quality typically remains the same even at lower frame rates (25, 30 fps).



- **Scaling, Audio Video Compression & Color Format Conversion**

- Scaling and compression are usually required when streaming / storing video. These operations can be done on the PC but this comes at a huge cost of CPU processing power on your PC. The recommendation is to go for frame grabbers which can support hardware scaling and hardware compression.
- Color formats may lead to incompatibility between frame grabber and PC application. It is recommended to opt for a frame grabber which supports multiple color formats, the most typical of which are variants of RGB and YUV. For instance, VLC supports YV12 format, Skype supports YU12 format and Hangouts video chat supports YUYV. A frame grabber which supports all of these color formats will work with all these PC applications.



- **Multi-capture / Multi-instance / Multi-channel**

- For applications like recording a live event (a lecture, for instance) having multiple instances of the same video will enable watching and recording the video at the same time.
- For applications involving more than one video source, a single frame grabber which can capture video from all the sources will be a big advantage.
- Choose the frame grabbers that support as many instances as required.



Mobility and Portability

Consider a scenario where you want to capture a television program on your desktop. You need the frame grabber to take the A/V out signals from your TV and play (or record) it on your PC. Now you know the TV is not going to be moved from its place and neither is your PC. For this setup, the best solution would be to pick a PCI capture card with the capture interface same as your TV's A/V output, plug-in the card to your PC, connect the TV's output to the capture slot on the capture card in your PC and that's it, you're done!

Audio / Video Source

An important consideration before choosing your frame grabber is knowing what type of video source you need. Frame grabbers typically do not *generate* video but simply *capture* from a different source, like an SDI camera, media player or a gaming console. You need to make sure the frame grabber can receive video from this source. If not, you will need additional converters, making your setup bulkier and more expensive.

Recording of lectures & video calls are typical use-cases where audio is a key requirement. Not all frame grabbers support audio capture. Check frame grabber to ensure this compatibility exists!

Usage	Audio / Video Sources	Audio / Video Interfaces
Medical	Camera	SDI, GigE vision, Camera Link®, CoaXPress
Industrial	Camera	SDI, CoaXpress
Broadcast / Entertainment	Camera	SDI, HDMI
Surveillance	Camera	SDI, GigE vision
Consumer or Personal Electronics	Camera	SDI, HDMI
	Gaming consoles	HDMI, component (video), Line out (audio)
	TV	HDMI, component (video), Line out (audio)

Table 1 – Typical audio/video sources

Availability at Ittiam

Ittiam's PCIe capture card, **PCIdash**, is a product that embodies all the desirable attributes described in this paper. Compliant to PCIe 2.0, PCIdash supports the following:

- 2x HD-SDI input video (up to 1080p30), 2x Line-in audio (mono)
- Up to 2x 720p30 or 2x D1 raw video capture on host PC
- Hardware accelerated H.264 video compression, enabling up to 2x 1080p30 / 4x 720p30 / 8x D1 encoded video capture on host PC
- DirectShow, V4L2, ALSA for Windows/Linux drivers
- Plug-and-Play operation with VLC, Skype, Hangouts, Adobe Flash Media Encoder
- ~16 Watts for two-channel operation, with an operating temperature range of -30°C to +75°C

For more details contact us at mkt@ittiam.com

References

1. [Frame grabber \(Wikipedia\)](#)
2. [Comparison of different camera interfaces from Adimec](#)

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