



**TECHNOFROLICS**<sup>TM</sup>  
integrating art & science

11 Miller Street  
Somerville, MA 02143  
Ph 617-441-8870 Fx -8872  
[www.technofrolics.com](http://www.technofrolics.com) [info@technofrolics.com](mailto:info@technofrolics.com)

FrameGlide video explorer with Spin Browser<sup>TM</sup> dial  
(abbreviated FG|SB below)

Content Aesthetics, Clip Sources, and Custom Production  
(Last updated 2022-09-03 DD.)

# Table of Contents

What kinds of video (or still) content works particularly well, or badly, with the FG SB System?.....	3
Works well.....	3
Works badly.....	5
Additional notes.....	5
Length of content:.....	5
If performing custom filming:.....	6
Raw clip sources.....	8
General.....	8
Medical.....	8
Other.....	8
Custom filming.....	9
Post-production.....	10
Overall and in Summary: Do not hesitate to call us with any questions, comments, or requests!.....	10

# What kinds of video (or still) content works particularly well, or badly, with the FG|SB System?

## *Works well*

1. Fixed camera imagery of processes with intrinsically high levels of complexity. Examples include:
  - a. The motions of groups of fish within a large school as they change directions.
  - b. The chewing motions of an infant.
  - c. The robotic assembly of an automobile.
  - d. The facial expressions of a person being told a joke.
  - e. Fluid flow.
2. Fixed camera imagery of processes with high levels of entropy change. Examples include:
  - a. A forest fire.
  - b. The dispersal of ink in a glass of water.
  - c. A building being constructed or explosively demolished. (A science museum filmed their building going up over a 3-year period and put the footage on a FG|SB system within their newly constructed facility as an exhibit.)
  - d. A sandcastle being eroded by the tide.
3. Fixed camera time-lapse imagery of interesting phenomena. Examples include:
  - a. Sprouts growing, flowers blooming.
  - b. Crystals forming as a liquid freezes.
  - c. A cocoon opening to release a butterfly.
4. Fixed camera high frame rate imagery of interesting phenomena. Examples include:

- a. A bird in flight.
  - b. A dart piercing a balloon.
  - c. A bullet going through a wine glass.
  - d. High speed machinery.
  - e. Vehicle collisions and crash tests.
5. Moving camera imagery of journeys of all kinds. Examples include:
- a. A flyby through a city.
  - b. A walk through a forest.
  - c. A shot out a submarine of the ocean floor and coral reef.
  - d. Endoscopic footage of human veins, intestines, etc.
  - e. A truck ride through an African wildlife refuge.
  - f. A tour of a museum.
  - g. Footage from a spacecraft (assuming sufficient scene change over time).
6. Processes with elements of interest spanning multiple time scales. More specifically, where examining subject at (say) 30fps frame density provides much to see of interest, but so does capturing (say) 1 frame per day for year. (See below discussion of the FG|SB's dual frame rate live capture option.)
- Examples include:
- a. Bridge construction, where at 30fps users can explore such things as the spark spray pattern from welding, and at 1 frame/day, can see the entire bridge assemble from nothing.
  - b. The maturation of an animal, where at 30fps users can experience the creature's feeding habits and facial expressions, and at 1 frame a day, its long-term growth into an adult.
7. Still images:
- a. Note that photos can also work wonderfully on the FG|SB system. While at first glance it might seem that stills are quite ill-suited to the technology, in fact that is not the case. Creative, artistic editing, combined with the enormously high resolution of most photos, can turn collections of still images into unique, fluidly-perusable journeys.
  - b. Please contact us to discuss past stills-based projects, produced by TechnoFrolics and others, with content including architectural views, shots of university campuses, botanical images, microbe photos, industrial machinery, Power-of-Ten type zooms, flipping the

pages of a virtual book, and more. Compared to the alternative of conventional touch screen graphic-button-based access, the FG|SB experience is dramatically more sensual, rugged, and engaging.

- c. Why make the process of locating images be a chore, when instead it can be a magical journey?

## ***Works badly***

1. Sections with many short cuts. For example, a typical music video.
2. Sections with relatively low complexity of imagery. For example, an animated cartoon of “The Simpsons” or “Family Guy” variety.
3. "Talking Heads" — e.g., a news broadcast. (Unless the FG|SB technology is primarily being used as a content-locating tool, rather than an education medium in and of itself, in which case this limitation does not apply.)
4. Sections filmed with a camera in a position that is neither fixed, nor moving point-of-view, but rather, intermittently wanders from one to the other.
5. “Straight” pans<sup>1</sup>. The issue is that human perceptual system, combined with non-even frame steps when visitor turns the dial, tends to make things look “jerky”<sup>2</sup>. Potential mitigating options:
  - a. Zoom simultaneously with pan. This can help a surprisingly large amount — particularly if the zoom relative to pan is large.
  - b. Inset the pan into a fixed-frame background. (Unsure how much this helps — should be tested.)
  - c. Attempt super-high temporal frame update rates. This requires the combination of a very fast computer, small dimension images, and monitor with significantly-greater-than 60 Hz refresh rate.

## ***Additional notes***

### **Length of content:**

---

<sup>1</sup> Regardless of whether pans were created at filming time, via animation, or from high-res stills.

<sup>2</sup> It is not fully clear why pans are so much worse in this regard than zooms and 1001 other things that are experienced as liquid-smooth by the viewer. It is definitely a human perception issue, as the technical frame update details are identical. It may have something to do with the fact that there is no element of the scene that remains substantially fixed over time. This is in contrast with (even) zoom or point-of-view journeys, where the direct straight-ahead point (assuming the camera is pointing in the direction of the zoom or vehicle travel) is fixed — or at least changes only relatively slowly.

1. If budget and subject matter media availability allow, include *much* more content than with a typical public exhibit. More specifically, persons used to producing video for interactive single-user/viewer exhibits often think in the scale of 30 seconds to 3 minute lengths (at 30fps equivalent). For the FG|SB system, depending on the content, this can be lower than ideal by a factor of *10-1000*. Indeed, some of our most interesting and engaging installations contain several orders of magnitude more than this — for example a 7 hour 30fps point-of-view journey from Canada to Hartford CT along the Connecticut River filmed out a helicopter, the last running 24 hours at 30fps of salt marsh tank containing fish and sea stars, a year-long time-lapse filmed at one frame every 30 seconds for the past year and 1 frame per second for the last week. Think of the video content more as a visual data-set for the user to explore, than a “produced” experience.
2. What matters for FG|SB exhibits is total number of frames in the content; do not think of time — rather, think of number of frames. Thus, 300 time-lapse frames of (say) a building construction, shot 1 frame per day for about a year, is substantially "equivalent", in terms of the user experience, to 10 seconds of "normal" video at 30fps showing (say) a crab feeding, which in turn is equivalent to 3000fps shot for 1/10 of second of (say) a glass breaking.
3. Visitor dwell time is substantially unrelated to the amount of perusable content on the FG|SB system.<sup>3</sup> There exist public FG|SB installations with 24 hours of content (at 30fps equivalent), and those with less than 2 minutes. In both cases, visitor dwell time could range from just 10 seconds, to 15 minutes or more. It is important to keep in mind that a visitor may review a particular 30 second clip back and forth at great length, or zip through 8 hours of content in less than 1 second.

### **If performing custom filming:**

1. Limit “random” pans and zooms.<sup>4</sup>

Typically, best results are achieved by either fixing the camera (limited/no pans, zooms, etc., and ideally on a tripod if circumstances permit), or attaching the camera securely to a moving vehicle (car, plane, boat, etc.) at a fixed viewing angle (i.e., again limited/no pans, zooms, etc., and ideally, if budget allows, mounted on a 3 axis gyro stabilizer).

In other words, what is not good is 5 seconds of the camera fixed on the subject, then a 3 second zoom into the subject, then a 2 second pan, then a walk-around with the camera, etc. Users of FG|SB exhibits will in such circumstances become frustrated (just as they think they understand what they are controlling with the dial, the context shifts), and will become physically queasy as well.

2. Shoot long clips

Extending comments made above about length of content generally: Take much longer clip shots than you would shoot for a documentary or

---

<sup>3</sup> Assuming kiosk, not lecture, application.

<sup>4</sup> Comments about limited/no pans/zooms assume such are performed in the "standard" manner “randomly” intermingled within the overall video. If the whole *point* of the clip is a pan or a zoom, and the action is very very steady (ideally computer controlled), such as a complete 360 of a scene, or a zoom onto a human hand over several orders of magnitude from complete limb to cell level (like the Powers-of-Ten-video), that of course could be very cool. Note however that because of human perception related pan issue discussed above, pans can be a challenge regardless. And one final tip regarding Zooms: Remember you will need to have the zoom proceed in an exponential not linear manner — otherwise users will experience the zoom barely moving when far away and then wildly speeding up as the object is approached. Adobe After Effects has an exponential tweening mode to address this issue. Additionally, the FG|SB system itself has the ability to “warp” time arbitrarily via an Excel spreadsheet, including in an exponential manner. Please contact TechnoFrolics for more information as desired.

the like. In a “normal” production, it is rare to find a single camera angle held for more than say 15 seconds. With the FG|SB system, in contrast, there are successful installations that include fixed camera shots exceeding 24 *hours* at 30fps to years in time-lapse.

### 3. Short exposure time

Even if you don't have access to a high speed (high frame rate) video camera, if you are shooting moving objects, or shooting from a moving point-of-view, be sure to drop the exposure time down such that each frame is clear and without blur<sup>5</sup>. Otherwise, visitors who pause at a particular point in the video will see a blurred image. For many 30/60fps applications, changing the exposure from 1/framerate (1/30th second to 1/60th of a second) to between 1/250 and 1/2500 second should suffice. Most video cameras, from "prosumer" to professional grade, will readily allow this. If you are shooting with a high-speed camera, the exposure may need to be much shorter even than this.

### 4. Specialty long-duration capture methods provided by live camera versions of the FG|SB systems.

Preamble: Multiple timescale subjects provide among the most magical of subjects. However, acquiring and presenting such content presents challenges. Historically, time-lapse has been shot by taking 1 frame every periodic interval of time — once per minute, once per day, etc. For subjects in which there is no fast motion — such as a flower blooming — this is adequate. However, there are many scenes where interesting evolution is occurring on multiple time scales. Examples include tides in the ocean over 12 hours (where the motion of waves, sea birds, and the like, is occurring relatively quickly), building construction over years (where the pounding in of pipes, motions of cranes and backhoes, and the like, are similarly occurring relatively quickly), the maturation of a young chick over weeks, etc. In all these multi-timescale cases, conventional time-lapse loses dramatic amounts of real-time information and is frustrating because of this, as well as being annoyingly jerky. And it is not practical to simply film the sequence continuously over months to years at 30fps because of the astronomical storage requirements. The FG|SB system provides two creative options to address these scenarios.

#### a. Dual self-pruning frame rate capture:

For example, you can capture 1fps for the last running week and a frame every 30 seconds for the last running year. This offers such things as a week of smooth cloud motion, decent views of animals passing by, etc., while at the same time allowing a full year of seasons. Or, speeding up both frame rates, can offer 30fps full-motion video for the last running 12 hours, and 1fps for the last running week. This could be a good fit for a cityscape, animal watering hole, undersea coral reef, etc.

#### b. Cluster Capture:

With this technique, footage is captured in full motion video at 30fps for X minutes (say 1/2 minute), then capture pauses for Y minutes (say 30 minutes), and the cycle repeats. In this way, with the exception of the “occasional” periodic "jerks" at Y+X minute intervals, the user experiences smooth, full frame rate control when turning the dial slowly and thus can readily explore the relatively quicker motions. However, when turning the dial fast, the experience is just like conventional time-lapse. You have the best of both worlds.

---

<sup>5</sup> This also applies to camera motion resulting from hand-shake or vehicle vibration (though if you have significant amounts of that, the production may be “in trouble” anyway). Anti-shake software is getting better and better (assuming you don't have a Steadicam or gyro stabilizer at shoot time) — but these applications cannot fix single-frame motion blur; so this is yet another reason to have short exposure times. (Of course you will have to trade off short exposure times with reduced depth of field, increased ISO/graininess, etc. So shoot with lots of light whenever possible!)

# Raw clip sources

(Disclaimer: The below covers only a fraction of what is out there, but does include some major players, and hopefully will prove helpful.)

## **General**

1. 100% free <https://pixabay.com/videos>
2. 100% free <https://www.pexels.com/videos/>
3. If the above does not have what you want, we would next recommend royalty-free<sup>6</sup> crowd-sourced clip clearing house <https://www.pond5.com>. Content is both diverse and affordable.
4. Both royalty-free and rights-managed<sup>7</sup> <https://www.gettyimages.com><sup>8</sup>
5. Subscription plans, royalty-free <https://www.istockphoto.com>
6. Royalty-free <https://www.shutterstock.com>
7. Royalty-free <https://www.storyblocks.com/video>
8. Public domain <https://www.buyoutfootage.com>

## **Medical**

1. Yearly rental, medical <https://cine-med.com/aorn>

## **Other**

1. There are diverse specialty image categories such as:

---

<sup>6</sup> Royalty free means that once you purchase, you can use in multiple productions without paying additional per-use licensing fees. Exact details of the license associated with each provider vary.

<sup>7</sup> Right- managed is typically significantly more expensive and logistically time-consuming/complicated than royalty free offerings. But can offer higher quality and/or more specialized content than most royalty free places.

<sup>8</sup> Getty Images appears to have “absorbed” many firms’ offerings that were previously independent, including Oxford Scientific Films, National Geographic, Discovery, etc.

- a. High speed camera slow motion content.
- b. Time-lapse content.
- c. Ultra-high-res content.
- d. Many more...

In these cases, Google is your friend.

2. Universities, libraries, researchers<sup>9</sup>, companies, organizations (government or NGO)<sup>10</sup>, and individuals may have specialty content that is either affordable, or if that is not how filmer makes their living (and indeed, may even pay to get their video out there — like companies filming their products in operation<sup>11</sup>), free. Again, Google is your friend.
3. Approach your local TV stations to donate footage as a community service.
4. Encourage local students to create footage specifically for the FG|SB system as a for-credit project.

## Custom filming

1. If your in-house staff, and/or firms local to you, are not adequate, please contact us for references to firms that perform custom filming and with whom we have worked in the past in connection with our technology.
2. TechnoFrolics is also available to consult regarding filming issues unique to the FG|SB system (many of which have already been discussed above).
3. While TechnoFrolics is also available to do custom filming itself<sup>12</sup>, in many cases others would be better suited — either because of their greater filming expertise and higher-end equipment, or because of their geographical proximity to the project.

---

<sup>9</sup> Projects funded by NSF, NIH, ED, etc. often have as a goal — and indeed may even require — getting images out to the public.

<sup>10</sup> E.g., a government-funded firefighting school with educational training tapes.

<sup>11</sup> E.g., a beverage bottling plant video, a machine tool manufacture showed their equipment in operation, etc.

<sup>12</sup> We filmed several of the clips in our Fish-to-Physics offering (<https://spinbrowser.com/av-content/pre-produced/frameglide-medley-1/>), including the initial sparrow and several high-speed camera slow motion items, including the sand and milk on vibration table, the coffee and cream fluid droplets, and others. (Also, by the end of 2022 there should be some really fun squirrel clips linked to at <https://daviddurlach.com>.)

# Post-production

1. Whether you are providing the raw content, we are, or a combination, TechnoFrolics is uniquely suited to create productions<sup>13</sup> for FG|SB use. This is because our years of experience creating content specifically tailored to our environment have provided us with a deep sense of what “works” and what does not within our system.<sup>14</sup>
2. The above said, we are delighted to collaborate with 3rd party firms producing the content, and will happily share our expertise and experiences in an advisory capacity.

## Overall and in Summary:

**Do not hesitate to call us with any questions, comments, or requests!**

---

<sup>13</sup> What is confusingly called “post-production” by the industry.

<sup>14</sup> Elements where we would likely *not* be appropriate, but could offer 3rd party references, include producing complex animations (particularly 3D ones) such as (say) the photo-realistic functioning of a bacterium and/or detailed nature drawing whose creation requires the hand of a trained illustrator.