DIFFICULTIES WITH HIGH-SPEED ANIMATION pdf

1: UFO Test: Persistence

difficulties with high-speed animation Animation is an important capability of any home computer system. Activity on the screen can greatly add to the excitement and realism of any program.

Interstellar probe Slow interstellar missions based on current and near-future propulsion technologies are associated with trip times starting from about one hundred years to thousands of years. These missions consist of sending a robotic probe to a nearby star for exploration, similar to interplanetary probes such as used in the Voyager program. Researchers at the University of Michigan are developing thrusters that use nanoparticles as propellant. Their technology is called "nanoparticle field extraction thruster", or nanoFET. These devices act like small particle accelerators shooting conductive nanoparticles out into space. Kaku also notes that a large number of nanoprobes would need to be sent due to the vulnerability of very small probes to be easily deflected by magnetic fields, micrometeorites and other dangers to ensure the chances that at least one nanoprobe will survive the journey and reach the destination. With onboard solar cells, they could continually accelerate using solar power. One can envision a day when a fleet of millions or even billions of these particles swarm to distant stars at nearly the speed of light and relay signals back to Earth through a vast interstellar communication network. As a near-term solution, small, laser-propelled interstellar probes, based on current CubeSat technology were proposed in the context of Project Dragonfly. Generation ship A generation ship or world ship is a type of interstellar ark in which the crew that arrives at the destination is descended from those who started the journey. Generation ships are not currently feasible because of the difficulty of constructing a ship of the enormous required scale and the great biological and sociological problems that life aboard such a ship raises. Sleeper ship Scientists and writers have postulated various techniques for suspended animation. These include human hibernation and cryonic preservation. Although neither is currently practical, they offer the possibility of sleeper ships in which the passengers lie inert for the long duration of the voyage. Embryo colonization A robotic interstellar mission carrying some number of frozen early stage human embryos is another theoretical possibility. This method of space colonization requires, among other things, the development of an artificial uterus , the prior detection of a habitable terrestrial planet , and advances in the field of fully autonomous mobile robots and educational robots that would replace human parents. There may be ways to take advantage of these resources for a good part of an interstellar trip, slowly hopping from body to body or setting up waystations along the way. Time dilation Assuming faster-than-light travel is impossible, one might conclude that a human can never make a round-trip farther from Earth than 20 light years if the traveler is active between the ages of 20 and A traveler would never be able to reach more than the very few star systems that exist within the limit of 20 light years from Earth. This, however, fails to take into account relativistic time dilation. For example, a spaceship could travel to a star 32 light-years away, initially accelerating at a constant 1. After a short visit, the astronaut could return to Earth the same way. After the full round-trip, the clocks on board the ship show that 40 years have passed, but according to those on Earth, the ship comes back 76 years after launch. From the viewpoint of the astronaut, onboard clocks seem to be running normally. The star ahead seems to be approaching at a speed of 0. The universe would appear contracted along the direction of travel to half the size it had when the ship was at rest; the distance between that star and the Sun would seem to be 16 light years as measured by the astronaut. At higher speeds, the time on board will run even slower, so the astronaut could travel to the center of the Milky Way 30, light years from Earth and back in 40 years ship-time. But the speed according to Earth clocks will always be less than 1 light year per Earth year, so, when back home, the astronaut will find that more than 60 thousand years will have passed on Earth. Regardless of how it is achieved, a propulsion system that could produce acceleration continuously from departure to arrival would be the fastest method of travel. A constant acceleration journey is one where the propulsion system accelerates the ship at a constant rate for the first half of the journey, and then decelerates for the second half, so that it arrives at the destination stationary relative to where it began. Supplying the energy required, however, would be prohibitively expensive with current technology. It will undergo hyperbolic motion. When the ship reaches its destination, if it were to exchange a message with its origin planet, it would find that less time had elapsed on board than had elapsed for the planetary observer, due to time dilation and length contraction. The result is an impressively fast journey for the crew. Rocket concepts[edit] All rocket concepts are limited by the rocket equation , which sets the characteristic velocity available as a function of exhaust velocity and mass ratio, the ratio of initial M0, including fuel to final M1, fuel depleted mass. Very high specific power , the ratio of thrust to total vehicle mass, is required to reach interstellar targets within sub-century time-frames. Thus, for interstellar rocket concepts of all technologies, a key engineering problem seldom explicitly discussed is limiting the heat transfer from the exhaust stream back into the vehicle. In an ion engine, electric power is used to create charged particles of the propellant, usually the gas xenon, and accelerate them to extremely high velocities. By contrast, ion engines have low force, but the top speed in principle is limited only by the electrical power available on the spacecraft and on the gas ions being accelerated. Such vehicles probably have the potential to power solar system exploration with reasonable trip times within the current century. Because of their low-thrust propulsion, they would be limited to off-planet, deep-space operation. With fission, the energy output is approximately 0. For maximum velocity, the reaction mass should optimally consist of fission products, the "ash" of the primary energy source, so no extra reaction mass need be bookkept in the mass ratio. Based on work in the late s to the early s, it has been technically possible to build spaceships with nuclear pulse propulsion engines, i. In each case saving fuel for slowing down halves the maximum speed. The concept of using a magnetic sail to decelerate the spacecraft as it approaches its destination has been discussed as an alternative to using propellant, this would allow the ship to travel near the maximum theoretical velocity. The principle of external nuclear pulse propulsion to maximize survivable power has remained common among serious concepts for interstellar flight without external power beaming and for very high-performance interplanetary flight. In the s the Nuclear Pulse Propulsion concept further was refined by Project Daedalus by use of externally triggered inertial confinement fusion , in this case producing fusion explosions via compressing fusion fuel pellets with high-powered electron beams. Since then, lasers , ion beams , neutral particle beams and hyper-kinetic projectiles have been suggested to produce nuclear pulses for propulsion purposes. This treaty would, therefore, need to be renegotiated, although a project on the scale of an interstellar mission using currently foreseeable technology would probably require international cooperation on at least the scale of the International Space Station. Another issue to be considered, would be the g-forces imparted to a rapidly accelerated spacecraft, cargo, and passengers inside see Inertia negation. In theory, a large number of stages could push a vehicle arbitrarily close to the speed of light. Because fusion yields about 0. However, the most easily achievable fusion reactions release a large fraction of their energy as high-energy neutrons, which are a significant source of energy loss. Thus, although these concepts seem to offer the best nearest-term prospects for travel to the nearest stars within a long human lifetime, they still involve massive technological and engineering difficulties, which may turn out to be intractable for decades or centuries. Although these are still far short of the requirements for interstellar travel on human timescales, the study seems to represent a reasonable benchmark towards what may be approachable within several decades, which is not impossibly beyond the current state-of-the-art.

2: Interstellar travel - Wikipedia

This video is about Krone HDP High Speed PTO Problems. this is just poop!! no big deal but its not making me very happy.

You can also adjust speed for spatial properties in the motion path in the Composition or Layer panel. In the Composition or Layer panel, the spacing between dots in a motion path indicates speed. Each dot represents a frame, based on the frame rate of the composition. Even spacing indicates a constant speed, and wider spacing indicates a higher speed. Keyframes using Hold interpolation display no dots because there is no intermediate transition between keyframe values; the layer simply appears at the position specified by the next keyframe. Motion path in Composition panel top compared to speed graph in Graph Editor bottom A. Dots are close together, indicating lower speed top ; speed is constant bottom. Dots are far apart, indicating greater speed top ; speed is constant bottom. Inconsistent spacing of dots indicates changing speed top ; speed decreases and then increases bottom. For information about keyframe interpolation, see Keyframe interpolation. The following factors affect the speed at which a property value changes: The time difference between keyframes in the Timeline panel. The shorter the time interval between keyframes, the more quickly the layer has to change to reach the next keyframe value. If the interval is longer, the layer changes more slowly, because it must make the change over a longer period of time. You can adjust the rate of change by moving keyframes forward or backward along the timeline. The difference between the values of adjacent keyframes. You can adjust the rate of change by increasing or decreasing the value of a layer property at a keyframe. The interpolation type applied for a keyframe. For example, it is difficult to make a value change smoothly through a keyframe when the keyframe is set to Linear interpolation, but you can switch to Bezier interpolation at any time, which provides a smooth change through a keyframe. If you use Bezier interpolation, you can adjust the rate of change even more precisely using direction handles. Linear interpolation top causes sharp changes; Bezier interpolation bottom creates smoother changes. Control speed between keyframes without using the speed graph In the Composition or Layer panel, adjust the spatial distance between two keyframes on the motion path. Increase speed by moving one keyframe position farther away from the other, or decrease speed by moving one keyframe position closer to the other. More spatial distance between keyframes increases layer speed. In layer bar mode or in the Graph Editor, adjust the time difference between two keyframes. Decrease speed by moving one keyframe farther away from the other, or increase speed by moving one keyframe closer to the other. Shorter temporal distance between keyframes increases layer speed. Apply the Easy Ease keyframe assistant, which automatically adjusts the speed of change as motion advances toward and retreats from a keyframe. About the speed graph You can fine-tune changes over time using the speed graph in the Graph Editor. The speed graph provides information about and control of the value and rate of change for all spatial and temporal values at any frame in a composition. In the speed graph, changes in the graph height indicate changes in speed. Level values indicate constant speed; higher values indicate increased speed. Speed graph controls A. Direction handle controls speed By adjusting the rise and fall of the speed graph, you can control how quickly or slowly a value changes from keyframe to keyframe. You can control the values approaching and leaving a keyframe together, or you can control each value separately. The incoming handle increases the speed or velocity when you drag it up, and decreases the speed or velocity when you drag it down. The outgoing handle influences the next keyframe in the same way. You can also control the influence on speed by dragging the handles left or right. Direction handles in speed graphs A. Outgoing direction handle Note: If you want a handle to have influence over more than one keyframe, use roving keyframes. Control speed with the speed graph In the Timeline panel, expand the outline for the keyframe you want to adjust. Using the Selection tool, click the keyframe you want to adjust. Optional Do one of the following: To join the direction handles, Alt-drag Windows or Option-drag Mac OS a split direction handle up or down until it meets the other handle. Do any of the following: Drag a keyframe with joined direction handles up to accelerate or down to decelerate entering and leaving the keyframe. Drag a split direction handle up to accelerate or down to decelerate the speed entering or leaving a keyframe. To increase the influence of the keyframe, drag the direction handle away from the center of the keyframe. To decrease the influence, drag the direction handle toward the center of the keyframe. When you drag a direction handle beyond the top or bottom of the Graph Editor with Auto Zoom Graph Height on, After Effects calculates a new minimum or maximum value based on how far you dragged outside the graph, and it redraws the graph so that all the values you specify for that layer property are visible in the graph by default. Create a bounce or peak Use direction handles to simulate the type of acceleration seen in a bouncing ball. When you create this type of result, the speed graph appears to rise quickly and peak. In the Timeline panel, expand the outline for the keyframe you want to adjust. Click the Graph Editor button and display the speed graph for the property. Make sure the interpolation method for the keyframe you want to peak is set to Continuous Bezier or Bezier. Drag the desired keyframe with joined direction handles up until it is near the top of the graph. Drag the direction handles on either side of the keyframe toward the center of the keyframe. Dragging direction handle to create a peak Start or stop change gradually Direction handles can create gradual starts and stops, such as a boat slowing to a stop and then starting again. When you use this technique, the speed graph resembles a smooth U shape. Make sure the interpolation method for the keyframe you want to adjust is set to Continuous Bezier or Bezier. At the desired keyframe, drag the direction handle down until it is near the bottom of the graph. Drag the direction handles on either side of the keyframe away from the center of the keyframe. Dragging the direction handle to make a gradual change Adjust influence of a direction handle on an adjacent keyframe Along with controlling the level of acceleration and deceleration, you can also extend the influence of a keyframe outward or inward in relation to an adjacent keyframe. Influence determines how quickly the speed graph reaches the value you set at the keyframe, giving you an additional degree of control over the shape of the graph. The direction handle increases the influence of a keyframe value in relation to the neighboring keyframe when you drag it toward the neighboring keyframe, and it decreases the influence on the neighboring keyframe when you drag it toward the center of its own keyframe. Using the Selection tool, click a keyframe and drag the direction handle left or right. Change speed numerically You may want to specify speed more precisely than you can by dragging keyframes in the speed graph. In such cases, specify speed numerically in the Keyframe Velocity dialog box. The options and units in the dialog box vary depending on the layer property you are editing and may also vary for plug-ins. Display the speed graph for the keyframe you want to adjust. Enter values for Speed for Incoming and Outgoing Velocity. Enter a value for Influence to specify the amount of influence toward the previous keyframe for incoming interpolation or the next keyframe for outgoing interpolation. To create a smooth transition by maintaining equal incoming and outgoing velocities, select Continuous. By default, the proportions of the current Scale or Mask Feather values are preserved as you edit the values. Automatically ease speed Although you can manually adjust the speed of a keyframe by dragging direction handles, using Easy Ease automates the work. After you apply Easy Ease, each keyframe has a speed of 0 with an influence of When you ease the speed of an object, for example, the object slows down as it approaches a keyframe, and gradually accelerates as it leaves. You can ease speed when coming into or out of a keyframe, or both. In the Graph Editor or in layer bar mode, select a range of keyframes. Do one of the following: Click the Easy Ease.

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3: UFO Test: Animation-time-graph

De Re Atari A Guide to Effective Programming By Chris Crawford, Lane Winner, Jim Cox, Amy Chen, Jim Dunion, Kathleen Pitta, Bob Fraser, and Gus Makreas Table of Contents Preface.

The velocity diagram at h indicates smooth action. The acceleration, as shown at i, is maximum at the initial position, zero at the mid-position, and negative maximum at the final position. A designer can define the function according to the specific requirements in the design. The motion requirements, listed below, are commonly used in cam profile design. We assume that the cam mechanism will be used to realize the displacement relationship between the rotation of the cam and the translation of the follower. Figure A Skeleton Diagram of disk cam with knife-edge translation Below is a list of the essential parameters for the evaluation of these types of cam mechanisms. However, these parameters are adequate only to define a knife-edge follower and a translating follower cam mechanism. The radius of the base circle ; e: The offset of the follower from the rotary center of the cam. The displacement of the follower which is a function of the rotary angle of the cam A parameter whose absolute value is 1. It represents the turning direction of the cam. When the cam turns clockwise: Cam profile design principle: The method termed inversion is commonly used in cam profile design. For example, in a disk cam with translating follower mechanism, the follower translates when the cam turns. This means that the relative motion between them is a combination of a relative turning motion and a relative translating motion. Without changing this feature of their relative motion, imagine that the cam remains fixed. Now the follower performs both the relative turning and translating motions. We have inverted the mechanism. Furthermore, imagine that the knife-edge of the follower moves along the fixed cam profile in the inverted mechanism. In other words, the knife edge of the follower draws the profile of the cam. Thus, the problem of designing the cam profile becomes a problem of calculating the trace of the knife edge of the follower whose motion is the combination of the relative turning and the relative translating. Figure Profile design of translating cam follower In Figure , only part of the cam profile AK is displayed. Assume the cam turns clockwise. At the beginning of motion, the knife edge of the follower contacts the point of intersection A of the base circle and the cam profile. The coordinates of A are So, e , and So can be calculated from equation Suppose the displacement of the follower is S when the angular displacement of the cam is. To get the corresponding position of the knife edge of the follower in the inverted mechanism, turn the follower around the center of the cam in the reverse direction through an angle of. The knife edge will be inverted to point K, which corresponds to the point on the cam profile in the inverted mechanism. Therefore, the coordinates of point K can be calculated with the following equation: When the rotational direction of the cam is clockwise: Suppose the cam mechanism will be used to make the knife edge oscillate. We need to compute the coordinates of the cam profile that results in the required motion of the follower. Figure Disk cam with knife-edge oscillating follower The essential parameters in this kind of cam mechanisms are given below. The radius of the base circle ; a: The distance between the pivot of the cam and the pivot of the follower. The length of the follower which is a distance from its pivot to its knife edge. The angular displacement of the follower which is a function of the rotary angle of the cam It represents the location of the follower. When the follower is located above the x axis: Cam profile design principle The fundamental principle in designing the cam profiles is still inversion , similar to that that for designing other cam mechanisms, e. Normally, the follower oscillates when the cam turns. This means that the relative motion between them is a combination of a relative turning motion and a relative oscillating motion. Without changing this feature of their relative motion, let the cam remain fixed and the follower performs both the relative turning motion and oscillating motion. By imagining in this way, we have actually inverted the mechanism. Figure Cam profile design for a rotating follower In Figure , only part of the cam profile BK is shown. We assume that the cam turns clockwise. At the beginning of motion, the knife edge of the follower contacts the point of intersection B of the base circle and the cam profile. The initial angle between the follower AB and the line of two pivots AO is 0. It can be calculated from the triangle OAB. When the angular displacement of the cam is , the oscillating displacement of the follower is which measures from its own initial position. The knife edge will be inverted to point K which corresponds to the point on the cam profile in the inverted mechanism. When the rotary direction of the cam is clockwise:

4: Solutions for WPF Performance Issue - CodeProject

When you animate a property in the Graph Editor, you can view and adjust the rate of change (speed) of the property in the speed graph. You can also adjust speed for spatial properties in the motion path in the Composition or Layer panel.

Introduction Sometimes we encountered WPF performance issues. TreeListView has been rendering in a real-time mode Be refreshed every second. Application contains rich rendering UI elements. Lot of animations are triggered every 0. Here is a resume of needed acknowledges: Basic knowledges of WPF rendering. How many visual elements will be rendered while you move your mouse through a user control which only a green rectangle you could see. SnapsToDevicePixels provides WPF applications proper scaling for different dpi settings and makes the application automatically dpi-aware. There are two system factors that determine the size of text and graphics on your screen: Resolution describes the number of pixels that appear on the screen. As the resolution gets higher, pixels get smaller, causing graphics and text to appear smaller. A graphic displayed on a monitor set to x will appear much smaller when the resolution is changed to x The other system setting, DPI, describes the size of a screen inch in pixels. Most Windows systems have a DPI of 96, which means a screen inch is 96 pixels. Increasing the DPI can make text easier to read, especially at high resolutions. These artifacts, commonly seen as blurry, or semi-transparent, edges can occur when the location of an edge falls in the middle of a device pixel rather than between device pixels. To address this issue, WPF provides a way for object edges in a visual tree to snap, or become fixed, to device pixels through pixel snapping, eliminating the semi-transparent edges produced by anti-aliasing. Actually, anti-aliased is a better technologiy than aliased. Anti-aliasing is extremely important to making text legible. With few exceptions, anti-aliased text can dramatically reduce eye strain, no to mention that it renders glyphs much closer to their intended design. For more information of Anti-aliasing, i suggest you to read this article The Ails of Typographic Anti-Aliasing With several techniques ex. This property could help activing pixel snapping and improve graphic effects. In most cases, pixel snapping using the SnapsToDevicePixels property will provide the desired outcome. Techniques mentionned in this link will be useful if you continue to read my article. In these applications, as the resolution of display device increases, the resulting image decreases. When the DPI of the system is 96, the two are equivalent. But if you just want to have a short conclusion of Windows Graphics Rendering, here it is the conclusion - whatever looks like your UI control displayed, all its inner visual elements will be rendered while you might just move your mouse cross over it. Thinking in this case: We have a ListView with more than rows and 30 columns inside. You customized the cell templates for each columns. Some of these cell templates have the complexe visual tree for example, a ComboBox. What will be happened if you scroll your ListView? In the case of non-virtualized your ListView: Image above shows a part of code of Xaml. When you explicitly reference a control, you implicitly reference its visual hierarchy. The anwser is No. But related with what i described above about ComboBox, I have to say Yes, the ComboBox will be fully redrawed if you do somthing on it. WPF uses vector graphics as its redering data format. For example, TrueType fonts are outline fonts that describe a set of lines, curves, and commands, rather than an array of pixels. One of the key benefits of vector graphics is the ability to scale to any size and resolution. Unlike vector graphics, bitmap graphics store rendering data as a pixel-by-pixel representation of an image, pre-rendered for a specific resolution. One of the key differences between bitmap and vector graphic formats is fidelity to the original source image. For example, when the size of a source image is modified, bitmap graphics systems stretch the image, whereas vector graphics systems scale the image, preserving the image fidelity. The WPF Performance Suite enables you to analize the run-time behavior of your WPF applications and determine performance optimizations that you can apply. Perforator in the Performance Profiling Tools is a performance profiling tool for analyzing the rendering behavior of your WPF application. The Perforator user interface displays a set of graphs that enable you to analyze very specific rendering behavior in parts of your application, such as the dirty rectangle addition rate and frame rate. WPF uses a rendering technique called dirty rectangle, which means that only the portions of the screen that have changed are rendered on a new rendering pass. In addition, Perforator also reports the software rendering targets and a slider to control the duration of the graphs. Detecting Software Render The WPF hardware rendering pipeline is significantly faster that its software rendering pipeline. Too much software rendering typically indicates a problem. Perforator allows drawing all areas rendered by using the software rendering pipeline with a purple tint. Software rendered BitmapEffect classes are slow and should be avoided. Perforator draws legacy software rendered bitmap effects with red tint. Some my WPF applications run on the machines non graphic card. But my develop machine has a graphic card on the board. RenderMode to software, i used preforator to ensure that my application was running on the Software mode. Frame Rate reports the rate at which the application is rendering to the scree. For applications without animation, this value should be near 0. Dirty rectangle refers to a rendering technique where only the portions of the screnn that have changed are rerendered. A high value indicates that a lot of regions are changing. If this number is high for example, greater than 5 , it indicates that the WPF runtime is performing a large amount of work to render your application. On a computer that supports hardware acceleration, this number should be 0. Otherwise, this number indicates that some of your scene is rendered by using the slower software pipeline. In this case, you will have to analyze all areas of your code that use the previously mentioned elements. This metric does not track memory allocations to the video driver or memory allocations for compiling and loading pixel and vertex shaders. Exceeding the available amount of texture memory will usually cause WPF render logic to fall back to software, and that multiple displays multi-monitor have a multiplicative effect on the amount of video memory that is required for an application. Especailly the computers cost less than 1, euros. Performance issue exists in our daily life. Esepcially your application is a financial real-time trading application, the most important objectif of your application should be robust and fast enough for refreshing real-time trades. In this case, the beauty of this app cannot help you earn more money. Set this property to true on your root element allows you enable pixel snap rendering througout the UI. For devices operating at greated than 96 dots per inch dpi , pixel snap rendering can minimize anti-aliasing visual artifacts in the vicinity of single-unit solid lines. Anti-Aliased also could be changed to Aliased. Some articles on the internet disccused how it works in WPF application. Make the trade-off between pixel snapping and non pixel snapping for your application. RenderOption RenderOptions class provides options for controlling the rendering behavior of objects. You can use the attached properties of the RenderOptions class to specify options for the rendering of text and visual elements in your WPF application. These options enable you to optimize rendering for speed or quality. When animating the scale of any bitmap, the default high-quality image re-sampling algorithm can sometimes consume sufficient system resources to cause frame rate degradation, effectively causing animations to stuffer. Fant, Use very high quality Fant bitmap scaling, which is slower than all other bitmap scaling modes, but produces higher quality output. HighQuality, Use high quality bitmap scaling, which is slower than LowQuality mode, but produces higher quality output. The HighQuality mode is the same as the Fant mode. Linear, Use linear bitmap scaling, which is faster than HighQuality mode, but produces lower quality output. LowQuality, Use bilinear bitmap scaling, which is faster than HighQuality mode, but produces lower quality output. The LowQuality mode is the sae as the Linear mode. NearestNeighbor, Use nearest-neighbor bitmap scaling, which provides performance benefits over LowQuality mode when the software rasterizer is used very useful in Remote Desktop. This mode is often used to magnify a bitmap. WPF disable ClearType when it detects that the buffer into which text is drawn could have a transparent background. Do this only when you can be certain that the text is rendering to a fully opaque bakcground. When an element in the subtree introduces transparency, you can enable ClearType, however, rendering issues may occur. If a portion of the subtree introduces more intermediate rendering targets, you must set ClearTypeHint again on the children of that subtree. ClearType is a software technology developed by Microsoft that improves the readability of text on existing LCDs Liquid Crystal Displays , such as laptop screens, Pocket PC screens and flat panel monitors. ClearType works by accessing the individual vertial color stripe elements in every pixel of an LCD screen. Before ClearType running on an LCD monitor, we can now display features of text as small as a fraction of a pixel in width. The extra resolution increases the sharpness of the tiny details in text display, making it much easier to read over long durations. By using the pixel shaders and video memory of a graphics card. But maybe one day they will install a graphics card without tell me. EdgeMode Use the EdgeMode attached property to improve rendering performance by specifying that a visual object should be rendered with aliased edges. Text objects are always displayed with anti-aliasing, and are unaffected by setting the edge mode value.

5: Graphics Card for high speed 3-D rendering - [Solved] - Graphics Cards

Purpose: Records deviations in animation timing. This helps diagnose problems with web browser motion fluidity. Wait until the graph fills up, and then take a screen shot of this web page.

Catapult Physics Catapult physics is basically the use of stored energy to hurl a projectile the payload , without the use of an explosive. The three primary energy storage mechanisms are tension, torsion, and gravity. The catapult has proven to be a very effective weapon during ancient times, capable of inflicting great damage. The main types of catapults used were the trebuchet, mangonel, onager, and ballista. These types of catapults will be described, and pictures and illustrations will be included. Catapult Physics â€" The Trebuchet Source: ChrisO A trebuchet is a battle machine used in ancient times to throw heavy payloads at enemies. The payload could be thrown a far distance and do considerable damage, either by smashing down walls or striking the enemy while inside their stronghold. Among the various types of catapults, the trebuchet was the most accurate and among the most efficient in terms of transferring the stored energy to the projectile. In addition, it allowed greater consistency in the throws due to the fact that the same amount of energy could be delivered every time, by way of a raised counterweight. A trebuchet works by using the energy of a falling and hinged counterweight to launch a projectile the payload , using mechanical advantage to achieve a high launch speed. For maximum launch speed the counterweight must be much heavier than the payload, since this means that it will "fall" quickly. The physics behind a trebuchet is fairly complex. A detailed explanation of it is given on the page on Trebuchet Physics. In some designs a guide chute is used to guide the sling along and support the payload until the speed is great enough to hold it in the pouch alone. The beginning of the launch is illustrated in the figure below. As you can see, the counterweight pivots around a much shorter distance than the payload end. The advantage of this is that the payload end of the beam reaches a much higher linear velocity than the counterweight end of the beam. This is the principal of mechanical advantage, and is what allows the payload to reach a high launch velocity. However, because the counterweight pivots around a much shorter distance, its weight must be much greater than the weight of the payload, to get a high launch velocity. However, increasing the mass of the counterweight beyond a certain point will not help, since the limiting speed of the falling counterweight is free-fall speed. At this point the ring which is connected to the sling and loops around the finger for support slips off and the payload is launched. The figure below illustrates the trebuchet at the release point. As the beam rotates clockwise due to the falling counterweight , the payload experiences centripetal acceleration which causes it to move outwards since it is unrestrained. This results in a large increase in linear velocity of the payload which far exceeds that of the end of the beam to which the sling is attached. This is the heart of the physics behind a trebuchet and is the reason why a trebuchet has such great launching power. For a more in-depth explanation on how a trebuchet works see Trebuchet Physics. In this page the basic equations describing the physics of a trebuchet will be introduced. To assist you in building a trebuchet you can use this simulator to help you come up with the design that throws the payload the farthest. This is very useful for helping you come up with the winning design in a trebuchet competition! In the next section we will look at the mangonel. Catapult Physics â€" The Mangonel Source: ChrisO The above picture of the mangonel is what people are most familiar with when they think of catapults. The mangonel consists of an arm with a bowl-shaped bucket attached to the end. In this bucket a payload is placed. Upon release, the arm rotates at a high speed and throws the payload out of the bucket, towards the target. The launch velocity of the payload is equal to the velocity of the arm at the bucket end. The launch angle of the payload is controlled by stopping the arm using a crossbar. This crossbar is positioned so as to stop the arm at the desired angle which results in the payload being launched out of the bucket at the desired launch angle. This crossbar can be padded to cushion the impact. The mangonel was best suited for launching projectiles at lower angles to the horizontal, which was useful for destroying walls, as opposed to the trebuchet which was well suited for launching projectiles over walls. However, the mangonel is not as energy efficient as the trebuchet for the main reason that the arm reaches a high speed during the launch. This means that a large percentage of the stored energy goes into accelerating the arm, which is energy wasted. This is unavoidable however, since the payload can only be launched at high speed if the arm is rotating at high speed. So the only way to waste as little energy as possible is to make the arm and bucket as light as possible, while still being strong enough to resist the forces experienced during launch. The physics behind a mangonel is basically the use of an energy storage mechanism to rotate the arm. Unlike a trebuchet, this mechanism is more direct. It consists of either a tension device or a torsion device which is directly connected to the arm. The figure below illustrates a mangonel in which the energy source is a bent cantilever, which is a form of tension device. This can consist of a flexible bow-shaped material, made of wood for example. The point P in the figure is the pivot axle, attached to the frame, about which the arm rotates. The figure below shows the mangonel at the launch point. To launch the payload the restraining rope is released. The other type of energy storage mechanism is a torsion device, which can consist of twisted rope. This allowed for greater throwing power than the tension device, in ancient catapults. The figure below illustrates the torsion device. The twisted rope is commonly referred to as a torsion bundle. It consists of several lengths of rope with the arm inserted in between them. The rope is then twisted manually on both sides of the arm using levers. Upon release, the torsion bundle rotates the arm at high speed, launching the payload. The figure below illustrates how a torsion bundle is twisted. The video below shows how to wrap the rope on a torsion catapult. The fact that a mangonel uses an energy storage device that consists of a deforming material, like wood or rope, means that its throwing distance will not be as consistent as a trebuchet. This is because these materials unlike more modern materials , naturally wear and lose elasticity during their use. This is something that needs to be constantly monitored during a battle, with replacement materials made readily available, if necessary. In the next section we will briefly discuss the onager. Catapult Physics â€” The Onager The onager catapult is almost identical to the trebuchet, but instead of a falling counterweight, it uses a torsion bundle to rotate the arm similar to the mangonel, described previously. Because of its design, it allowed for greater throwing distance than the mangonel comparable to that of a trebuchet. Lastly, we will look at the ballista. Catapult Physics â€” The Ballista Source: Scigeek The ballista is similar in principle to a crossbow, but much larger. Like the torsion powered mangonel, it used twisted rope as the energy source. The picture above shows the torsion mechanism consisting of twisted rope, located at the pivot location of the two side arms. In the ballista, the bow string would be winched back and the tension set. It would be used to launch darts, bolts and spears with deadly force and accuracy. It could also be used to launch stone projectiles of various sizes. Plus get a free 30 minute tutoring session.

DIFFICULTIES WITH HIGH-SPEED ANIMATION pdf

6: High-speed camera - Wikipedia

After some technical difficulties, I have finally got this to render for you guys! Hope you all enjoy my first non-sprite animation! I will be working on som.

Look how the bytes that make up the image are scattered through the RAM. To erase them, your program must calculate their address. This calculation is not always easy to do. This is certainly not the most elegant or fastest code to solve the problem. Certainly a good programmer could take advantage of special circumstances to make the code more compact. The point is that accessing pixels on a screen takes a lot of computing. The above routine takes about machine cycles to access a single byte on the screen. To move an image that occupies, say, 50 bytes, would require accesses or about 10, machine cycles or roughly 10 milliseconds. This may not sound like much, but if you want to achieve smooth motion, you have to move the object every 17 milliseconds. What this means is that this type of animation called "playfield animation" is too slow for many purposes. You can still get animation this way, but you are limited to few objects or small objects or slow motion or few calculations between motion. The trade-offs that a programmer must make in using such animation are too restrictive. In order to understand player-missile graphics, it is important to understand the essence of the problem of playfield animation: The solution was to create a graphics object that is one-dimensional on the screen as well as one-dimensional in RAM. This object called a player appears in RAM as a table that is either or bytes long. The table is mapped directly to the screen. It appears as a vertical band stretching from the top of the screen to the bottom. Each byte in the table is mapped into either one or two horizontal scan lines, with the choice between the two made by the programmer. The screen image is a simple bit-map of the data in the table. If a bit is on, then the corresponding pixel in the vertical column is lit; if the bit is off, then the corresponding pixel is off. Thus, the player image is not strictly one-dimensional; it is actually eight bits wide. Drawing a player image on the screen is quite simple. First you draw a picture of the desired image on graph paper. The image must be no more than eight pixels wide. You then translate the image into binary code, substituting ones for illuminated pixels and zeros for empty ones. Then you translate the resulting binary number into decimal or hexadecimal, depending on which is more convenient. Then you store zeros into the player RAM to clear the image. Next, store the image data into the player RAM, with the byte at the top of the player image going first, followed by the other image bytes in top to bottom sequence. The further down in RAM you place you place data, the lower the image will appear on the screen. Vertical motion is obtained by moving the image data through the player RAM. This is, in principle, the same method used in playfield animation, but there is a big difference in practice; the move routine for vertical motion is a one-dimensional move instead of a two-dimensional move. The program does not need to multiply by 40 and it often does not need to use indirection. It could be as simple as: If high speed is necessary, the loop can be trimmed to move only the image bytes themselves rather than the whole player; then the loop would easily run in about microseconds. The point here is that vertical motion with players is both simpler and faster than motion with playfield objects. There is a register for the player called the horizontal position register. The value in this register sets the horizontal position of the player on the screen. All you do is store a number into this register and the player jumps to that horizontal position. To move the player horizontally simply change the number stored in the horizontal position register. Horizontal and vertical motion are independent; you can combine them in any fashion you choose. The scale for the horizontal position register is one color clock per unit. Thus, adding one to the horizontal position register will move the player one color clock to the right. There are only color clocks in a singe scan line; furthermore, some of these are not displayed because of overscan. The horizontal position register can hold positions; some of these are off the left or right edge of the screen. Position 47 corresponds to the left edge of the standard playfield; position corresponds to the right edge of the standard playfield. Thus, the visible region of the of the player is in horizontal positions 47 through Remember, however, that this may vary from television to television due to differences in overscan. A conservative range of values is from 60 to This coordinate range can sometimes be clumsy to use, but it does offer a nice feature: There are a number of embellishments which greatly add to its overall utility. The first embellishment is that there are four individual players to use. These players all have their own sets of control registers and RAM area; thus their operation is completely independent. They are labelled P0 through P3. They can be used side by side to give up to 32 bits of horizontal resolution, or they can be used independently to give four movable objects. Each player has its own color register; this color register is completely independent of the playfield color registers. This gives you the capability to put much more color onto the screen. However, each player has only one color; multicolored players are not possible without display list interrupts display list interrupts are discussed in Section 5. Each player has a controllable width; you can set it to have normal width, double width, or quadruple width with the SIZEP X registers. This is useful for making players take on different sizes. You also have the option of choosing the vertical resolution of the players. You can use single-line resolution, in which each byte in the player table occupies one horizontal scan line, or double-line resolution, in which each byte occupies two horizontal scan lines. With single-line resolution, each player bit-map table is bytes long; with double-line resolution each table is bytes long. This is the only case where player properties are not independent; the selection of vertical resolution applies to all players. In single-line resolution, the first 32 bytes in the player table area lie above the standard playfield. The last 32 bytes lie below the standard playfield. In double-line resolution, 16 bytes lie above and 16 bytes lie below the standard playfield. These are 2-bit wide graphics objects associated with the players. All four missiles are packed into the same table four missiles times 2 bits per missile gives 8 bits. Missiles can move independently of players; they have their own horizontal position registers. However, missiles cannot be set to different sizes; they are all set together. Missiles are useful as bullets or for skinny vertical lines on the screen. If desired, the missiles can be grouped together into a fifth player, in which case they take the color of playfield color register 3. Note that missiles can still move independently when this option is in effect; their horizontal positions are set by their horizontal position registers. The fifth player enable bit only affects the color of the missiles. You move a missile vertically the same way that you move a player: This can be difficult to do because missiles are grouped into the same RAM table. To access a single missile, you must mask out the bits for the other missiles. You can mix them with any graphics mode, text or map. This raises a problem: Which image has priority? You have the option to define the priorities used in displaying players. If you wish, all players can have priority over all playfield color registers. Or you can set all playfield color registers except background to have priority over all players. Or you can set player 0 and player 1 henceforth referred to as P0 and P1 to have priority over all playfield color registers, with P2 and P3 having less priority than the playfield. This capability allows a player to pass in front of one image and behind another, allowing three-dimensional effects. This is primarily of value for games. You can check if any graphic object player or missile has collided with anything else. Specifically, you can check for missile-player collisions, missile-playfield collisions, player-player collisions, and player-playfield collisions. There are 54 possible collisions, and each one has a bit assigned to it that can be checked. If the bit is set, a collision has occurred. These bits are mapped into 15 registers in CTIA only the lower 4 bits are used and some are not meaningful. These are read only registers; they cannot be cleared by writing zeros to them. All collision registers are cleared by this command. In hardware terms, a collision occurs when a player image coincides with another image; thus, the collision bit will not be set until the part of the screen showing the collision is drawn. This means that collision detection might not occur until as much as 16 milliseconds have elapsed since the player was moved. The preferred solution is to execute player motion and collision detection during the vertical blank interrupt routine see Section 8 for a discussion of vertical blank interrupts. In this case, collision detection should be checked first, then collisions cleared, then players moved. Another solution is to wait at least 16 milliseconds after moving a player before checking for a collision involving that player. There are a number of steps necessary to use player-missile graphics.

7: Toyota Parts | Figure Out Why Your Toyota is Overheating - Toyota Parts Blog

High Speed! -Free! Starting Days- English Dub Casts Lee George, Christopher Llewyn Ramirez the power of animation and what to expect from season 2! It's the same quality and difficulty.

A high-speed camera can be classified as: A high-speed film camera which records to film, A high-speed video camera which records to electronic memory, A high-speed framing camera which records images on multiple image planes or multiple locations on the same image plane [3] generally film or a network of CCD cameras , A high-speed streak camera which records a series of line-sized images to film or electronic memory. High-speed film cameras can film up to a quarter of a million frames per second by running the film over a rotating prism or mirror instead of using a shutter , thus reducing the need for stopping and starting the film behind a shutter which would tear the film stock at such speeds. Using this technique one second of action can be stretched to more than ten minutes of playback time super slow motion. High-speed video cameras are widely used for scientific research, [4] [5] military test and evaluation, [6] and industry. Today, the digital high-speed camera has replaced the film camera used for Vehicle Impact Testing. Nathan Boor, Aimed Research. Television series such as MythBusters and Time Warp often use high-speed cameras to show their tests in slow motion. Saving the recorded high-speed images can be time consuming because as of [update] , consumer cameras have resolutions up to four megapixels with frame rates of over 1, per second which will record at a rate of 11 gigabytes per second. Technologically these cameras are very advanced, yet saving images requires use of slower standard video-computer interfaces. To reduce the storage space required and the time required for people to examine a recording, only the parts of an action which are of interest or relevance can be selected to film. When recording a cyclical process for industrial breakdown analysis, only the relevant part of each cycle is filmed. Monochromatic black and white filming is sometimes used to reduce the light intensity required. In researchers built a camera exposing each frame for two trillionths of a second picoseconds , for an effective frame rate of half a trillion fps femto-photography. Uses in television[edit] The show MythBusters prominently uses high-speed cameras for measuring speed or height. Time Warp was centered around the use of high-speed cameras to slow things down that are usually too fast to see with the naked eye. High-speed cameras are frequently used in television productions of many major sporting events for slow motion instant replays when normal slow motion is not slow enough, such as international Cricket matches. The move from film to digital technology has greatly reduced the difficulty in use of these technologies with unpredictable behaviors, specifically via the use of continuous recording and post-triggering. With film high-speed cameras, an investigator must start the film then attempt to entice the animal to perform the behavior in the short time before the film runs out, resulting in many useless sequences where the animal behaves too late or not at all. In modern digital high-speed cameras, [16] the camera can simply record continuously as the investigator attempts to elicit the behavior, following which a trigger button will stop the recording and allow the investigator to save a given time interval before and after the trigger determined by frame rate, image size and memory capacity during continuous recording. Most software allows saving a subset of recorded frames, minimizing file size issues by eliminating useless frames before or after the sequence of interest. Such triggering can also be used to synchronize recording across multiple cameras. The explosion of alkali metals on contact with water has been studied using a high-speed camera. One of the basic analysis techniques is to use high-speed cameras in order to characterize events which happen too fast to see, e. Similar to use in science, with a pre- or post-triggering capability the camera can simply record continuously as the mechanic waits for the breakdown to happen, following which a trigger signal internal or external will stop the recording and allow the investigator to save a given time interval prior to the trigger determined by frame rate, image size, and memory capacity during continuous recording. Some software allows viewing the issues in real time, by displaying only a subset of recorded frames, minimizing file size and watch time issues by eliminating useless frames before or after the sequence of interest. High-speed video cameras are used to augment other industrial technologies such as x-ray radiography. When used with the proper phosphor screen which converts x-rays into visible light, high-speed cameras can be used to capture high-speed x-ray videos of events inside mechanical devices and biological specimens. Pulsed x-ray sources limit frame rate and should be properly synchronized with camera frame captures. Army at Aberdeen Proving ground, invented a super high-speed camera that took frames at one-millionth of a second, and was fast enough to record the shock wave of a small explosion. In high speed digital cameras with 4 megapixel resolution, recording at fps, were replacing the 35mm and 70mm high speed film cameras used on tracking mounts on test ranges that capture ballistic intercepts.

8: Apply and control speed changes in After Effects

This is unavoidable however, since the payload can only be launched at high speed if the arm is rotating at high speed. So the only way to waste as little energy as possible is to make the arm and bucket as light as possible, while still being strong enough to resist the forces experienced during launch.

9: De Re Atari - Chapter 4

A high-speed camera is a device capable of capturing moving images with exposures of less than 1/1, second or frame rates in excess of frames per second. It is used for recording fast-moving objects as photographic images onto a storage medium.

DIFFICULTIES WITH HIGH-SPEED ANIMATION pdf

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