
# MCCC News

Fort Worth | November 2018 | Dallas

## New Meeting Location

Beginning this month, we will be meeting at the Burleson Public Library. This change was brought about when the Grand Prairie Municipal Airport suddenly decided to charge rent for their meeting space at a cost the MCCC cannot afford. MCCC member Steve Eggers, a Burleson resident, has arranged for us to meet at the library at no charge.

Please note that the meetings have been moved from Sunday to Saturday and from 2:30 to 2:00. Meetings will be held on the second Saturday of the month from 2:00 to 4:00 pm.

The Burleson Public Library
248 SW Johnson Ave.
Burleson, Texas 76028

## Why Nvidia Ray-Tracing is Exciting

Nvidia recently announced new high-end graphics cards with an RTX designation attached to the model numbers—that RTX indicates the card's enhanced ray tracing abilities, which could bring a whole new level of realism to games. Here's what you need to know about ray tracing and how it's going to feature on the graphics cards of the future.

The name is a giveaway as to what ray tracing actually is: Trying to determine the path of photons of light in virtual environments, so those virtual environments look as realistic as possible. Being able to work out how light should fall in a scene requires a lot of computing power, even more so as objects and light sources start moving (as they tend to do in games and movies).

Ray tracing is nothing new. Coders have been experimenting with it since the very first days of computer graphics. What has changed over time is how realistic and detailed ray tracing can be, and how fast it can be computed, and with Nvidia's new cards the technology is taking another jump forward.

**How ray tracing works**

Ray tracing attempts to work out the path of light by imagining the eye looking at a scene and working backwards to the light source. The color of each pixel must be figured out based on the objects in a scene, their relationship to each other, and the number, type, and position of the scene's light sources—not a straightforward set of calculations at all.

The way that light falls on a black cloth is different to how it falls on a chrome sphere, of course, and ray tracing algorithms need to take into account all these properties for every object in view, and every light source hitting them. Light bounces and reflects too, making the process of figuring out the colors of a few million pixels even harder.

As a result, it takes a huge amount of processing power. We've seen high quality ray traced scenes for years now, but it's been largely restricted to static images or scenes that can be rendered a long time in advance—movie CGI has been able to deploy ray tracing a long time before video games because huge banks of computers can spend days calculating the physics of a scene.

Pixar even published a paper about how it used ray tracing in the movie Cars. "Adding ray tracing to the renderer enables many additional effects such as accurate reflections, detailed shadows, and ambient occlusion," explains Pixar. (Ambient occlusion is a technique used to better work out where light is blocked in a scene, and how that's represented on screen).

A lot of the impressive effects that ray tracing brings—reflections, shadows, refractions—already exist in computer games, but the details of these effects are mostly fudged or estimated by graphics artists. Moving to true, real-time ray tracing has been compared to moving from graphics painted by artists to graphics calculated by physics.

Up until now, games have solely relied on a rendering technique called rasterization, where instead of bombarding a scene with millions of rays of virtual light bouncing around in every direction, graphics processors calculate how the millions of triangles that make up 3D models should look when converted to pixels and flat 2D images—but just one at a time. Simulated light rays coming straight from a virtual light source influence the color and brightness of those rendered pixels, but multiple triangles can't affect each other, requiring shadows, indirect illumination, and reflections to all be cleverly simulated.

On the best games of today, on the best hardware, it looks fantastic—but it's still not quite like looking at the real world. Real-time ray tracing promises another step in that direction.

Lighting is particularly hard to get right with rasterization: It's treated more or less as moving in a straight line, brightening up the sides of objects closest to the light and casting a shadow on the other side, but lighting in the real world doesn't quite work like that.

Thanks to the engineers at Nvidia, Microsoft, and others, we've now gotten to the stage where ultra-realistic lighting can be mapped out without being pre-rendered. You should see the difference most clearly in complicated lighting setups, where there's a row of frosted glass doors, or a stained glass window, or a waterfall.

**Ray tracing on Nvidia cards**

With the switch to the RTX moniker from GTX, Nvidia is making a big noise about the ray tracing capabilities of its new series of cards. Those cards and the Turing GPUs contained within have been engineered especially to cope with the kinds of advanced, demanding calculations ray tracing requires.

If you think about how light travels through a scene—literally at the speed of light—and how shadows, reflections, and refractions are formed (such as when light passes through water), it's perfectly understandable why consumer graphics cards have taken all this time to get to a stage where real-time ray tracing is possible.

Check out the Shadow of the Tomb Raider demo from Nvidia below, for example. We've seen lighting tricks like this before, but not in the same detail or with the same level of realism: Note how strong backlight is enough to turn objects and people into complete silhouettes, something that needs the power of ray tracing to properly work.

https://youtu.be/k12cf15VvV4

It's something engineers and researchers have been working towards for half a century, both in computing and movie-making. The best CGI in films now looks like it's part of the real world, reflections and refractions and all, and now Nvidia's new cards promise to bring the same realism to games.

"Real-time ray tracing replaces a majority of the techniques used today in standard rendering with realistic optical calculations that replicate the way light behaves in the real world, delivering more lifelike images," says Nvidia.

Another example shown below comes from an Unreal Engine demo of the technology published back in March. Look at the detail and the quality of the reflections in the scene—suddenly it's barely distinguishable from live action (though this demo required a hugely powerful PC setup and some background rasterization to work).

https://youtu.be/J3ue35ago3Y

The new cards actually split ray tracing up into two components—ray casting (tracking the paths of rays) and shading (determining the final appearance of objects). The RT cores on the new RTX cards are designed to speed up ray casting specifically, so performance increases and visual improvements will vary depending on the geometry of a scene and how much other work there is to do.

Being the first consumer graphics cards to include specific hardware for ray tracing, the RTX 2000 series represents another milestone in real-time rendering. Of course shadows, reflections and other lighting tricks have been in games for years, but now they don't have to be fudged or approximated—they can be finely calculated.

It is still a nascent technology though, and games will have to be written specifically to take advantage of the RTX hardware. At the moment, the list of games supporting the new standards is relatively thin, but it should grow and grow over time. As we've said, the ray tracing revolution won't start overnight, but it is beginning.

...https://gizmodo.com/why-ray-tracing-on-nvidias-new-gpus-is-so-exciting-1828964418

# The Latest and a Personal Paint Update

There has been some news in the Amiga arena. A new version of "classic" Amiga OS3 is available from Hyperion, version 3.1.4, which fixes some long-standing bugs from 3.1 and adds a handful of new features, some of which users of 3.5 or 3.9 are familiar with. The update involves an updated ROM, though I'm not sure exactly what options are available so far putting the ROM to chip for use in actual hardware.

Over the weekend of October 11 thru 14, we had the 2018 AmiWest show. Undoubtedly news, pictures, and videos from the event will be trickling out between this writing and the time of our meeting.

For a third thing, I'll share a link of Youtube series "The Guru Meditation" featuring a demo of the new Vampire V4 (the particular hardware on display being for the Amiga 500). It's worthy of note for the showing of features coming to V4 and current Vampire cards, such as recreation of the AGA chipset, allowing Amiga-mode video over the HDMI display. The implementation isn't perfect, with a few visual glitches seen in the demo, and info that interlaced modes don't get along well with HDMI video (so far). Still, I found it most interesting to see, and a good look at what's to come to Amiga.

Guru Meditation Vampire V4 Demo:
https://youtu.be/9zaDLI19RTU

At the last meeting, I showed off my recent copy of the new(er) Personal Paint version 7.3b from Aeon after they bought the rights from Cloanto. For the uninitiated, Personal Paint, or PPaint, is a paint program for color-mapped images or animations (up to 256 colors in the palette). What set PPaint apart from its predecessors and contemporaries is, while it works very similar to mainstay Deluxe Paint in terms of interface style, it gets along well with RTG and video cards for the most part, making it useful in ways that programs limited to Amiga chipset only modes like Deluxe Paint or Brilliance weren't. Thus PPaint, which made it to version 7.1 under publisher Cloanto, became popular with many users of expanded Amiga systems, especially when it was released for free distribution after Cloanto shifted focus to its Amiga emulator packages.

While PPaint 7.1 did a fine job, it had a few quirks and issues. One such problem appeared in systems other than classic Amigas, such as those running OS4, MorphOS, or running a Vampire accelerator, for example. The software had small deviations from standard Amiga OS programming that hitched on these newer systems, resulting in graphical glitches, freezes, or painted filled shapes not working properly. Users clamored for ports to OS4 and MorphOS, which didn't amount to much for years, until Aeon started buying up rights to various Amiga software packages with the purpose of updating them with an aim toward the Amiga OS4 systems they produce, non-committaly promising updates for legacy OS3 and MorphOS as well.

Personal Paint 7.3 was one of their first to bear fruit, so to speak. Versions were produced for OS3 and OS4 Amigas, available via CD or online distribution. A direct MorphOS port is not apparently planned, as the OS3 version should work with that. I bought the OS3 version of Personal Paint from AmigaKit (approx. $17 without shipping) with a certain amount of blind faith that issues plaguing version 7.1 on MorphOS systems would be fixed. I've only had limited hands-on experience with the new 7.3 Personal Paint so far, but I would list it as a mixed bag currently, at least for the uses I wish to get out of it. Firstly, PPaint requires some Amiga library files not included on the disc to run properly, mainly the font-handling "bullet.library." This is only a problem for operating systems that don't include it, such as MorphOS, so be prepared to move some files over from an Amiga installation if need be. As to be expected, performance on most things are pretty snappy on a PowerPC or Vampire system, notably faster than my 68060 Amiga at least. One of the larger problems running PPaint 7.1 on MorphOS (and a Vampirized Amiga. I discovered) is creating a filled shape, either by freehand or polygon drawing, did not work correctly, giving either an unfilled shape or an error message. I was happy to find this was apparently no longer a problem on 7.3, with fills of all types working fine on Vampire and MorphOS systems.

A separate issue, however, did carry over from old to new. On MorphOS at least, there are strange behaviors when modifying colors in the palette. Moving the sliders for the RGB components of a color seem to work fine, but doing the same for the HSV values result in strange behavior in the color you're working on, from overshooting the mark to a full-on freak out. Finally, I did run into some circumstances which froze up the program, from attempting to play an animation using an HD graphics mode (Vampire, though to be fair no version of Personal Paint handled animation via video card too smoothly) and, perhaps most unforgivably, the program froze on MorphOS, using up nearly all available CPU according to the monitor, immediately after saving the image I was working on. I plan to do further testing depending on available time, finding out exactly which errors affect which platforms. I also hope to bring the Vampire 600 in for some hands-on PPaint 7.3 testing at the meeting. As it stands now though, I'd rate Personal Paint 7.3 as not quite ready for prime-time, at least not if you hope to use it on a MorphOS machine. Perhaps tests will show it faring better on Amiga/Vampire. Time will tell.

...by Eric Schwartz
From the AmiTech Gazette,
October 2018

# November Calendar

November 10 — MCCC Meeting
2:00 PM — Burleson Public Library
248 SW Johnson Ave., Burleson

November 10 — Board of Director's Meeting
Approximately 4:00 PM — Location TBD

December 1 — Newsletter Deadline — 8:00 AM