Pixel Art and the World Wide Web

By Patty Ho
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Executive Summary

Pixel Art was born in the digital age. It existed in the very first old 8-bit computer graphics. Today, many artists have been motivated by the fact that Pixel Art is retro, addictive, and small in file size. Everyone can make Pixel Art because the only tool that you really need to create Pixel Art is a basic tool that can draw single pixel on the screen, ie-Pencil Tool in Photoshop. People use Pixel Art to create icons, fonts, artworks, graphics, and game characters. Pixel Art can be widely used but is most situated for on screen purposes. In this research, we will briefly cover a tutorial on “How to create your own Pixel Art,” which will guide you from creating a simple basic line, to creating an isometric building. In this research paper, we will also cover several e-mail interviews with artists from eboy.com, mrwong.de, and mesedilla.com..etc.

Introduction

The first time I saw Pixel Art is actually from the Brazil website, “Gworka! Pixel Art Playground.” The designer who took the retro style of Pixel Art that is common to old videogame console’s amazed me. After going through the portfolio section of the website, the artwork amazed me. The first thing that crossed my mind was, “Wow, this is amazing!!! How did they do it? Is there some kind of program that actually builds it?” And through the website’s link section, I had a chance to get in touch with other sites that also create Pixel Art. After going through the websites, they really motivated me to do Pixel Art. For two main reason,
one, they are graphically pleasing compared to the anti-aliased website that are typical among today’s websites. Secondly, the file sizes for these pixel-generated images are small. I visited many Pixel Art websites to look for Pixel Art Tutorials. After much research, the only thing I found out one needs to create Pixel Art is the “Pen tool” and some “Patience.” Pixel Art is a very time-consuming work process compared to the vector work I used to create. Drawing an image pixel-by-pixel and limited to a certain number of colors, what’s left is patience in creating your Pixel Art world. On the other hand, vector artwork is easy to create. It creates artwork by using anchor point to make Bezier curves. The computer will calculate all the information, and fill the pixel in between the points. Vector Artworks makes everyone’s life so much easier but why are Pixel Artists so stubborn in drawing their work pixel by pixel? My only guess is that Pixel Art provides a different working environment vector-based artwork. Pixel Art is small in size, and it can be used to create icons, logos, and interfaces for website development. It is just very labor intensive. In a recent interview with XFun Magazine Taipei, Kai Vermehr from Eboy.com was quoted as saying, “Why are they so Sexy? Maybe because working this way you’re moving into a world where many restriction are promoted by this technique.”
Research Content

What is Pixel Art?

In technical terms, Pixel Art is artwork that is created based on solid, aliased outline pixel by pixel with a restriction in color. There are no certain restrictions on how to create the artwork. However, according to Pixelfreak.com’s tutorial, there are several rules of creating “perfect pixel lines.” This is achieved when the lines are created and joined pixel by pixel and made up of 26 degree, 45 degree or 75 degree lines. They are great for making isometric views by repeating the same angle of the lines. Color selection is very critical in selecting the various shades of an object. Most pixel-based artworks colors are solid based.

How Pixel Art started?

There is no actual proof of whom or where the Pixel Art was created. However, it certainly tied in with the digital age. Many said the style came from the old early 8-bit computer graphics. Many Pixel Artists had been inspired by old Atari games, Commodore 64 games, Gameboy, etc. Those game designers had to visualize objects such as spaceships, characters, and jets with a very limited amount of pixels. It is because when the graphics are developed in the early stage, due to limited technology on processor speed and screen resolution, early graphic artist had to work with the artwork under certain
restrictions and conditions. Today, new media age had been introduced with the population of Anti-aliased artwork. It is because of the higher resolution of the screen, and graphic card. Machine can do the artwork by filling extra pixel and blur the edges, so it gives an illusion that the edges are smooth. However, there are always people who want to maintain the same style and refuse to work with anti-alias style. They form their Pixel community on the Internet, and inspire many other web designers to join them. And this is why there are many websites such as eboy.com, electroland.com, gawzu.idv.tw that have a large link resource section.

Vector Vs. Pixel
Today, computers offer higher resolution with millions of color with processors that can handle more color depth. Vector artwork is using anchor points and bezier curves and the computer calculates the distance and fills the pixels in between. However, once they are brought into the web application, they still have to re-save it as a bitmap image. In order to make the line nice and smooth, a machine will anti-alias it by blurring the line edges with extra pixels. On the other hand, Pixel Art is created by pixels only and the machine adds no extra pixels. Therefore, without those extra pixels information, the file size of Pixel Art is extremely small. And it is extremely web safe because the limit use of the color. With pixels, you can make the smallest thing, and still be
recognizable, but with vector, you can’t render it less than 32x32, because it will be so blurry and fail to recognize.

Where can you find Pixel Art?

Pixel Art can be found everywhere. In your hand digital watch, TV, Monitor, Mobile Phones, Palm Pilot, Washing machine, Gameboy, Videogames, digital camera, etc. Pixel Art is tightly associated with screen. In this digital age, screens are the most important part of the interface between humans and machines. And everything on screen is made up of pixels. It is just the Pixel Artist producing the artwork without the machine doing the work. The artist plans each pixel on the work, and constructs a world with their imagination.

How Pixel Art are used on the World-Wide-Web?

Pixel Artists use Pixel Art to create Icons, Graphic interface, Game Sprites, Backgrounds, Mini-world artwork. Icons and graphic interfaces are used on the World-Wide-Web because they are small in file size, and they increase visual excitement on the website design. Pixel Art is also an essential part of constructing game sprites or game character in the game development. It is also beneficial for creating online games using Pixel Art because the image can be dynamically generated, and still maintain a small file size. The total byte size for the whole game is so small that whoever is using a slower connection like a 36.6k modem, will still be able to download in a fast and prominent speed. Another use
for Pixel Art is to create background tiling on HTML pages. It is the same reason for the small file size while creating interesting patterns. And many others use Pixel Arts to create buildings, landscapes, characters, and some create it for its enjoyment.

**Where are those Pixel Art websites?**

There are many websites that use Pixel Art, have many different focuses. Website like “K10k.net” and “db-db.com” use Pixel Art as graphical interface. Website like “Eboy”, “Lovepixel”, “Pixeldevient”, and “Pixelfreak” create their own artwork using Pixel Art technique for fun. There are also websites like “HobboHotel”, “Do It yourself” which creates an interactive area where users can interact with each other, or leave their own artwork on the database. There are also some, which focus on making pixel fonts like “Lindkvist”, and “Atomicmedia”. Websites like “Iconfactory” and “Pixture” make icons for fun, and for people to download and incorporate into their operating system. And of course there are many more sites use Pixel Art for different purposes. And those Pixel Art website has links to other Pixel Sites. It is like a community that is growing everyday, and every minute, they inspire more and more people to get in touch with Pixel Art.

**Why People are madly in love with making Pixel Art?**

According to eBoy’s interview with Xfun Magazine, “Doing pixels gives the artist 100% of control on what will appear on screen. It is
assembling communication just from the very scratch. Every single dot on the screen becomes intentional and this is lots of fun and a huge advantage.” And indeed, it is also very addictive because it is so small even though it takes up so much effort. After hours of hard work, and seeing a beautiful final piece, it is a pride that lives in many Artists that they believe they can create anything pixel by pixel.

What method and tools are involved?

With programs like Photoshop, the pencil is the only tool that you need to create Pixel Art. The convenience of layer option in Photoshop makes coloring easier. And makes the work much easier to deal with. And the only method of creating a nice piece of Pixel Art is Patience. A lot of artists don’t have strong drawing skills, but they have the will to face error and be able to spend time to correct the mistake. Over time, everyone can create his/her own masterpiece. And of course, the rest is up to your imagination.

Analysis and Outcomes

The technique involved in Pixel Art

The technical part behind Pixel Art is using the pencil tool to draw pixels. Always work under zoomed condition but also have a zoomed out preview to make sure it looks right in the normal size. There are also outline techniques, color techniques and isometric techniques. Outline techniques are how you construct the object
first with outlines. Secondly, comes the color technique where shading takes part to make up the whole image. This involves a basic understanding of the use of color and lighting. Many artists started using isometric view on their Pixel Art because it adds depth to an image. Isometric view is great for buildings, office places, schools and city scenes. And it involves a lot of patience to build up the whole scene by correcting the outline and color pixel by pixel.

**Pixel with Flash**

Many artists have even started using Pixel Art in their Flash animations. Compared to traditional GIF animation, Flash gives more perspective than just simple frame-by-frame animation. They can create animation, special effects, and incorporate buttons. It is another great program for Pixel Artist to something more than static image.
Tutorial on Painting Basic Pixel Lines

1. Choose the right tool.
   Choose pencil tool, and choose square brush with 1 pixel size

2. 45-degree lines
   Create a 45-degree line, by connecting every single pixel at the corner.

3. 26-degree line
   a 26-degree line by drawing two pixel in a row, and then move up a pixel, and draw another two pixel in a row.

4. Flip and Flop
   Of course you can always flip the lines and make different angle, and create those perfect pixel lines. No overlapping the pixels, each pixel is connected with another corner of another pixel.
Tutorial on Painting a Basic Object

The most basic object of the Pixel Art is probably box shape object. In this tutorial, we will draw a basic box shape object.

1. Outline:
Use the basic line concept to create the box by copy the same line with the same angle.

2. Color/Lighting
Choose a color and have the shading from light to dark. And decide where is your light source. And the closet panel closet to the light source has the lightest color shading. And then there are the mid-tone color, and the darkest color.

3. Fix Up
Only have outline as black, and have the outline inside with white because of the highlight
Tutorial on Painting a isometric building scenes

I borrowed a tutorial example from Pixel-zone.net

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1. “As a brief example, I have just created the outline of an oddly shaped structure.”

2. “Then, I have simply block filled the areas of it.”
3. “Next, I removed the inner black lines and replaced them with highlights and occasionally a darker shade. Notice that I have only put a highlight line down convex corners. For the concave ones I have just used the darker of the two shades on either side.”

4. “Then I added some windows as block color, again, using a darker shade for the right facing sides.”
“Highlighting was then added to the edges of the windows to give them a little depth.”

5. “Finally, I added some grass around it for effect, and added a shadow on the grass.”

6. “And, at actual size.”
Conclusion

My Prediction toward Pixel Art in the future.

And why everyone can make Pixel Art?

I think Pixel Art will be more and more popular in the future. Even though Pixel Art is a labor-intensive process, the major benefit is still the file size. And it is not only produced for the web, it can also be widely used in mobile systems, PDA’s, and of any machine that comes with the screen. It is something vector or 3D can’t do because the file sizes are just too big. And why everyone can make Pixel Art? It is because you only need the basic tool and you can create your masterpiece. No extra hard work on understanding complicated program like 3D max, or illustrator, or even Photoshop. And all you need is your computer, a program that does the basic drawing, and your patience.
Appendices

E-mails and feedback from the Pixel Artists

Jared Smith from pixeldeviant.com

----- Original Message ----- 
From: Jaz
To: 'Patty Ho' 
Sent: Saturday, February 01, 2003 1:51 AM 
Subject: RE: History of Pixel Art

Hi Patty,

Thanks for your mail and comments, good to hear from you.
As for your questions - blimey!

Stream of thought begins:

I don't really know the answers, I suppose the style really comes from old 8 bit computer games. With the advent of devices such as Gameboy the technique is fairly current in the games industry. As for the web I think groups such as Eboy.com and the Habbo hotel/Mobiles Disco people were the first that I was aware of - although they weren't necessarily first.

When I was a kid we used to make User Defined Graphics on Sinclair ZX Spectrum, these were 8x8 pixel grids and I think you could have about 20 individual grids. Each grid could have 2 colours and by assembling the grids you could make a reasonably large graphic. We used to spend hours with graph paper drawing out grids and designing spaceships etc.

There is the problem of defining Pixel Art as by it's nature most computer artworks are pixelbased. I often look at forums where there is the ongoing debate to what is allowed and what isn't. For many it would seem that Pixel Art is games style sideways sprite designs, for others it is the isometric approach. Gradients and anti-aliasing are frowned upon etc. I don't know if Pixel Art is taking on the form of a 'movement' in the arts sense, but there doesn't seem to be general concensus on the meaning and techniques involved. History wise I reckon things like tapestry and Mosaic probably fit in quite well and may well be an interesting angle.

There is a book due to come out in March I think called '1x1 matrix design' which is about grid based design. Shameless plug because the publisher asked me to contribute some stuff! I don't know what it will be like or if it will ever appear but it maybe useful for your project work. It's supposed to be published worldwide in english although it is a Spanish company that is publishing it. There is also the Eboy book which is just amazing although it is all artwork and doesn't offer much in the way of text - I would recommend that to anyone as a really cool coffee table book!

Of course you are right that file size and the addictive nature of constructing the drawings are probably the main reason. I've even got my brother in law doing it! He's drawing a robot!

I hope this has been of some help, I would be interested in reading your results if possible? Please feel free to contact me if you think I may be of more help.
Good luck and best wishes,

Jared

p.s. Just checked out your Flash travel guide, very cool!

www.pixeldeviant.com
jaz@pixeldeviant.com

-----Original Message-----
From: Patty Ho [mailto:patty_ho@hotmail.com]
Sent: 31 January 2003 17:48
To: jaz@pixeldeviant.com
Subject: History of Pixel Art

Hi, Jared:

I have been to your website for couple times now. For sure, it is a very cool website plus all the pixel graphics that you have made!!!!

Anyway, Let me introduce myself, I am a interactive multimedia student in Sheridan college in Canada. My background was a graphic designer. And right now, I am taking Interactive Multimedia postgrad program as next step to my design. And this semester, I have to do a research on a topic that relates to multimedia. So I choose Pixel Art as my topic. It is because I had been looking at the art works from many websites for a while now. And I truly LOVE Pixel Art. hopefully, I can make something with Pixel Art through this research project.

And, my question is , do you know anything about the history of Pixel Art? Is it related to the early stage of computer graphics/videogames? And how it started?? And how long has Pixel Art been around?? I had been looking through the websites and try to find out the answers. But apparently, everyone's answer to Pixel Art is because they are addictive plus small in file size.

I was hoping if you know anything about the questions, please e-mail me back.

I hope I didn't take up too much of your time. But your help is truly appreciated.

Thanks ^_^

sincerely,

Patty Ho

www.pattyhodesign.com
Hi Patty,

well, first of all I want to thank you for visiting my website. It's a pleasure to see how many people from so different countries get to see it.

I'd love to add an apartment made by you to my building. Take your time, the project will be online for a while.

Well, I can't tell actually where Pixel Art originates but I'm sure it must have something to do with all the old video and console games which were all based on low pixel resolution. The designers of these games had to visualize spaceships, jets, gorillas and stuff with a very limited amount of pixels, which is surely a challenge.

I love all the old game-consoles like atari and such and I tried to make tiny pictures with as less pixels as possible. I took cool websites like eboy.de and quickhoney.com as my role models and after some time worked out my own style. As my tool I only use Photoshop and Microangelo for the icon conversion. Actually all one would need is the most simple paint program available since all you do is set pixel by pixel. Any paint prog should be good for that. And that's what I find amazing: You can make real cool art with very simple tools. Basically you need the "pen" tool.

By pixel gradient you mean the perspective thing? Pls. explain to me what you mean by that. :)

By the way: My name isn't Mr.Wong at all. Call me Mathias. ;)

Just let me know if there are more questions...

Bye

Mathias

----- Original Message ----- 

From: Patty Ho

To: chickensoup@mrwong.de

Sent: Sunday, February 02, 2003 11:04 PM

Subject: Hi, Mr.Wong

Hi, Mr.Wong:
I don't know if Mr. Wong is your real last name, but sure it is very interesting. I am an interactive Multimedia student in Sheridan college in Canada. I am currently working on a research project regarding to Pixel Art. And as a Pixel fan myself, I hope I can create a Pixel product at the end. so I can add myself to your apartment too. :)

There are some questions that I would like to ask regarding to Pixel Art. I hope I didn't take up too much of your time. Do you know the history of Pixel Art? Like where it actually started? What makes you want to create Pixel Art? And where is your inspiration come from?

And what tools are you using to create Pixel Art?

And one last question is the technical one, I am trying to create pixel gradient. I've see you been using gradient a lot in your site. May I ask how you did it? Because I am working on mine with Photoshop. and I don’t know how to convert the gradient into the aliased one.

okay, that's it for my questions. If you know the answers, please e-mail me back. Your help is truly appreciated.

Thank you very much

sincerely,

Patty Ho

www.pattyhodesign.com

http://imm.sheridanc.on.ca
Hi Patty,

we don't really know very much about the history of pixels, but I've attached a foreword for Xfuns magazine we wrote some months ago. Hope it helps ... 'K:)

eBoy FOR XFUNS MAGAZINE TAIPEI:

What is so magic about Pixel Art? Why have so many people become adepts of this technique? The answer seems to be difficult but it's not: This not so new technique has been spreading for some few years now because of the internet revolution and digital lifestyle. But its origin is closely tied with the digital age.

Many people think pixels are sort of a style or more specific a retro-style that has been going hype for some time now and will possibly die sooner than later. Well, at first view this might seem reasonable. But it's just wrong. Of course results remember us to the old Commodore 64 games that many of us used to play, and of course there are lots of Pixel Artists that are possessed by this heritage. But in reality pixels have become popular because they are the essence of the virtual world. All new media can be declined to pixels. If it is digital it is pixels. Everything on our monitors is constructed out of pixels. The only single thing screens can do is pixels (in manifold variations of course). And screens are everywhere: hand watches, mobile phones, washing machines, laser guns, kids toys, etc, etc. Screens are becoming essential part of the interface between humans and
machines.

So it is quite simple: everyone does pixels. But most of us are not aware of this and it is good we don't have to be. We use tools that produce them in one or another fashion -- tools that combine pixels to letters, to photos and graphical elements. These tools do the ‘dirty’ time consuming work and liberate the writer from assembling his letters out of black and white pixels himself. Digital cameras transform reality to a digital pattern based on pixels. And operating systems provide whole working environments building their GUI (graphical user interface) out of pixels.

So what about people that actually handle them piece by piece? Are they strange freaks unable or unwilling to use the proper tools? Obviously not. Doing pixels gives the artist 100% of control on what will appear on screen ... it is assembling communication just from the very scratch. Every single dot on the screen becomes intentional and this is lots of fun and a huge advantage. Tools tend to fail working on very small pixel constraints. They are to dumb up to date. If you draw an apple with vectors and try to render it in 16x16 pixels, the result most likely will be hardly recognizable. If you wanted it to be good you would need more parameters than just making it small. Maybe you can blur it a little, and this often helps a bit. But you can do better -- draw it with the pen tool -- pixel by pixel. Use your brain interpreting an apple and results will be as good as possible (if you're a master of course).

So doing pixels by hand/pen tool is a necessity for those that do icons and other stuff on very limited space. But there seems to be more about pixels -- why are they so sexy? Maybe because working this way you’re moving into a world where many restrictions are promoted by this technique. Take a diagonal line. You can do a 20° line but most probably you will restrict your inventory of lines to a bunch of angles where they look sharp on the screen. One of those is around 30° (one up, two to the side) another is 45° (one up, one to the side), you’ll for sure take 90° and 180° too.

These constraints are not dictated by pixels but they make working easier. And results often are better if you stick with them. And they force the artist to permanently abstract in a very resolute way. This abstraction is
what has leaded to the look, most of hand pixel based work has been identified with. This abstraction reveals that it is human -- it is not a machine algorithm. And there is something about human generated abstraction that catches me -- maybe because in the human mind so many more parameters play a role. And those parameters are in one ore another way familiar to everyone.

Again ... a machine can't do this -- yet.

And that might be the magic about Pixel Art.

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Resources

Websites I had surfed for information.

Gworka! Pixel Art Playground


Mesedilla

http://www.mesedilla.com/

Pixel Deviant

http://www.pixeldeviant.com/
HabboHotel
http://www.habbohotel.com/

Eboy
www.eboy.com

PixelFreak
http://www.pixelfreak.com/

Mr. Wong
http://www.mrwong.de/

@Pixel
http://www.gawzu.idv.tw/

Love Pixel
http://www.lovepixel.idv.tw/

Kaliber 10000
http://www.k10k.net/

Lindkvist
http://www.lindkvist.com

Atomic
http://atomicmedia.net/
Emptydome
http://www.emptydome.com

Pixture
http://www.pixture.com/

Do It yourself
http://www.distorter.net/

Referenced website for Tutorials.
Pixel-Zone.net
http://www.indie-rpg.net/pixel-zone/shtml/tutorials.shtml

Pixel Freak’s Tutorial
http://www.pixelfreak.com/

Our Call
http://www.ourcall.org

Pixel Nascimpact
http://pixel.nascimpact.com/tutoriaux.php
Assessment Track:

Jan 24th, 2003: Project Proposal

The week of Jan 26th, 2003: Start searching for the definition of “Pixel Art” from Google.com

Jan 31st, 2003: Project outline

Jan 31st, 2003: Post a Message on Mesedilla.com forum asking the definition, and where did the artist get the inspiration.

Feb. 1st, 2003: E-mailed Jared Smith @ Pixel Deviant

Feb. 2nd, 2003: E-mailed Mr. Wong @ mrwong.de

Feb. 2nd, 2003: Mesedilla Feedback on the forum

Feb. 2nd, 2003: Found interview with Pixel Artists on emptydome.com

Feb. 2nd, 2003: E-mailed emptydome.com asking permission of referencing the interviews.

Feb. 2nd, 2003: E-mailed Eboy.com

Feb. 3rd, 2003: E-mail feedback from Mr. Wong@mrwong.de

Feb. 3rd, 2003: E-mail feedback from Kai Vermehr @Eboy.com

Feb. 4th, 2003: Found @Pixel site, www.gawzu.idv.tw with many Pixel links

Feb. 5th, 2003: Start looking at every single Pixel Site that is listed on @Pixel

The week of Feb 23rd, 2003: Start looking for Pixel Art tutorials, and found some from Ourcall.org, PixelFreak, and Pixel-Zone.net.

The week of March 2nd: Start testing out drawing the Pixel Art by myself. Using s139 classroom as basis.

March, 21rst: Start compiling the information on the research paper based on the e-mail feedbacks, interviews from emptydome.com, and search results from the pixel websites.

March, 24th: Finish research project