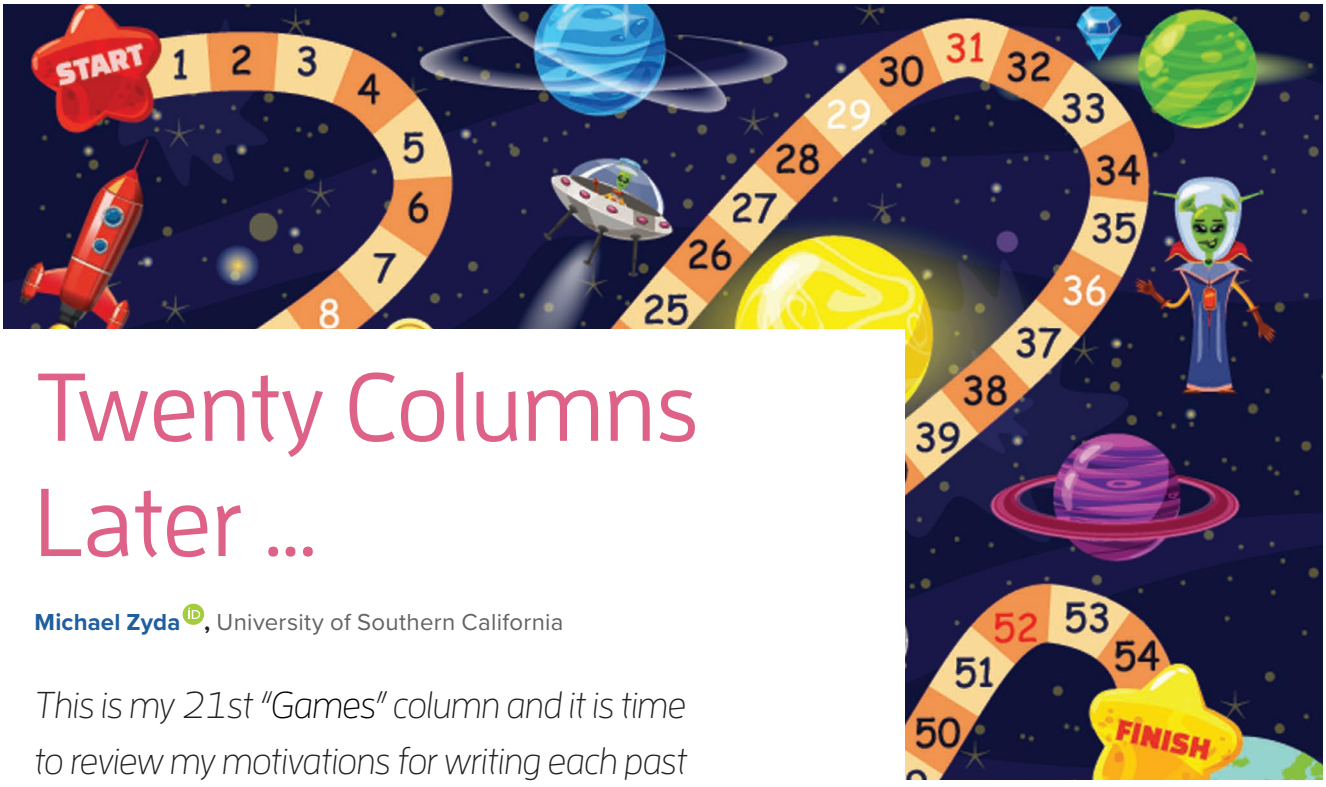

Twenty Columns Later ...

Michael Zyda, University of Southern California

This is my 21st "Games" column and it is time to review my motivations for writing each past column and provide any responses that I have received.

In a weak moment in June 2021, I told the editor of *Computer* that I would write a "Games" column every other month for the foreseeable future, in my mind knowing that if I ran out of ideas or words, that I could just ignore any and all e-mails from the IEEE staff and plea ignorance, laziness, or some other excuse, and no one would care, as who was going to read these columns anyway, is what I was thinking.

IN THE LAST THREE YEARS ...

I needed to turn in the first column in June 2021 for publication in the September 2021 issue of *Computer*. Notice, I said yes in the same month as the column was due and I was thinking "September 2021 is a long way off," and then realized that I needed to write something immediately. I had no idea on what to write, so I started with the title "Why Did I Say Yes to Writing This Bimonthly Column?" cursing myself for taking on this additional burden to my quiet life. So once I had the title, I then thought, "I should try and come up with ideas that might be good for future columns," so I stuffed as many of those ideas into that first column so I would have listed somewhere the great titles I came up with so that I wouldn't have to come up with new ideas the week before the next column was due, which is always a bad idea.

When I took on this role, I was thinking, maybe most of the work I would do was to look for other potential column authors and invite them to this never-ending story, so that I could weasel out of so much writing or at least find someone I could coauthor with whose e-mails I could ignore once the column-handoff was tasked. Well, 20 single-author columns later, I couldn't even make that happen. I did have one helper/proof reader: an attorney, for the column "Patent Litigation in the Games Space," where I wanted to teach our dear readers how to think about drafting patents in the games space, such that they were useful in litigation, as opposed to being "less-than-fully-useless," one of the categories we used to have for rating professors who worked inside the U.S. federal government at a previous place of employ.

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FORWARD TO A BACKWARD-LOOKING COLUMN

I will start with each column's title and try and explain any response I received on that column (Figure 1). First though, the *Computer* audience is made up of computer scientists, electrical engineers, and computer engineers from the entire span of those fields. These dear readers are not all in the games industry, so the goal is to draft columns that are interesting about games and game technologies and culture, somewhat technical though without equations.

If you are interested in drafting a guest "Games" column, please send me the draft title and abstract and I will respond immediately if it looks excellent for *Computer* magazine. I am trying to fill the alternate months with guest columns! So please look at my past columns for examples of what I am looking for. Think: 2,000 words, four to five illustrations/images. Go to https://mikezyda.com/IEEE%20Computer/ for examples of previously published columns to see the style of writing and what we need from you if you decide to say yes to my column acceptance.

Now, on with any responses that I have received and my responses to those responses, if any.

WHY DID I SAY YES TO WRITING THIS BIMONTHLY COLUMN?

The abstract for this column says it all.[1]

> "The "Games" column is a new bimonthly column in *Computer*. The focus of this column is on new technology in and around the development of games."

I am a computer scientist and my interests are in the development of new technologies that can be deployed in games. So that column tries to explain how the games industry really does not do any research (just little "R") but lots of development (big "D"). It also explains how little the research that gets done inside of universities supports the future technologies required for games. Most research funding obtainable inside of universities focuses on "something directly deployable for the warfighter" and/or small projects thought up by whatever research program manager is on rotation for whatever funding agency, with that program manager (and university faculty)

FIGURE 1. The 20 columns.

usually believing that all of the technology for games has been invented and nothing more needs to be invented.

In that column I introduced some of the technologies that I was thinking about as potential future column ideas. So, my motivation for creating that column was to maybe spark interest and discussion on the development of new technologies for the games industry and interest in perhaps the creation of a new research laboratory, with game and game technology development at its focus.

In this very first column, I decided that the only way people would read these columns is if I provided a provocative title along with a YouTube of each column, so that very busy people could get access to the contents earlier than the 65+ days it takes for the IEEE to typeset and proof each column. The YouTube channel now has 12,000+ subscribers and IEEE sends out each column in digital and paper form to more than 100,000 subscribers some two months after the YouTube goes online.

I did not receive any written responses from anyone when this column came out, just a few suggestions that I "just say no" via a back-dated e-mail ...

WILL I SEE SENSOR-BASED GAMES HAPPEN BEFORE I DIE?

The abstract for the second "Games" column says the following[2]:

> "In this, the second "Games" column, we look at the possibility of developing sensor-based games. We do this from a high level, pointing out that all the pieces exist but have not yet been put together."

The motivation for this column was to propose putting together sensors that could be used to determine human physical, emotional, and mental state and plug those determined states into an artificial intelligence (AI) system that could interact with humans. The form of the AI was proposed to be AI characters, that would have authored personalities and have the ability to take in the physical, emotional, and mental states of the humans and interact appropriately based on the AI's personality and goals/strategies. Figure 2 is a nice high-level architecture on what I was proposing.

The origin of my motivation was that I was an advisor for seven years to a startup, Emsense, that had developed a low-cost hybrid electroencephalogram device that could be manufactured for about US$50 that could determine the emotional state of the human wearing the device. It was originally designed to be an input device for game consoles but the response from the games industry was that it could not be used in development until that device automatically came with every console sold. So, this is another issue for a different column, but the deployment of newly developed game technology is something of a chicken and egg problem.

So, no written response on this column but some very nice discussions with Khizer Khaderi MD, Director of Stanford University's Human Perception Laboratory.[26] Khizer and I have had on/off discussions about sensor-based games since about January 2005. The focus of the Stanford Lab is exactly on "Everything we do, we believe in improving the human condition," which means they are not using computers. Just kidding!

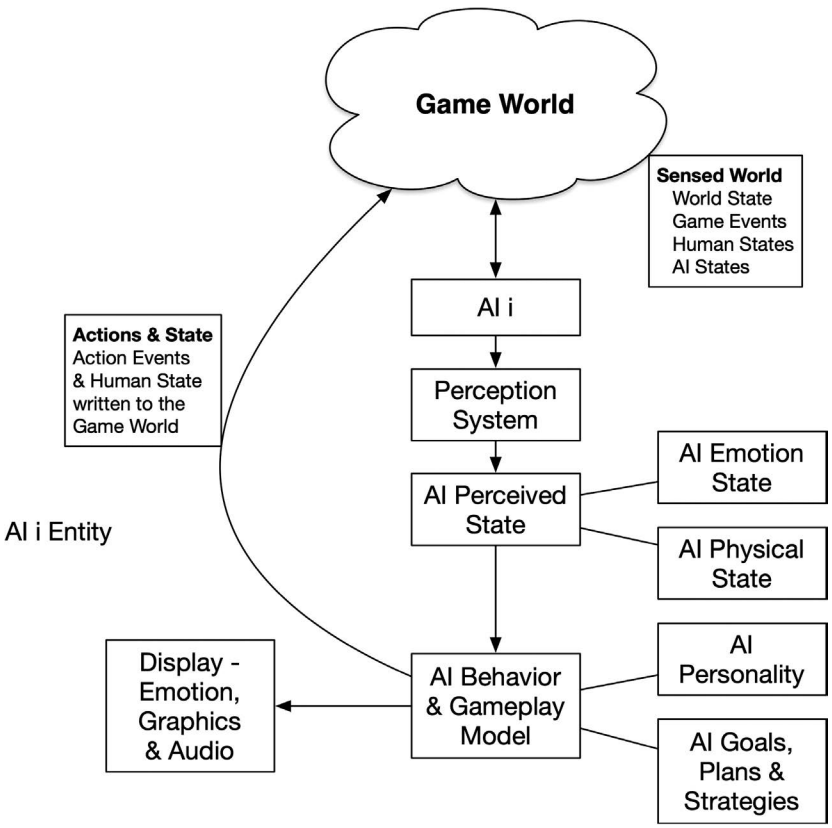


FIGURE 2. AI I entity.

CAN WE REPLACE ALL, OR MOSTLY ALL, IN-CLASS TEACHING WITH EDUCATIONAL GAMES?

When I directed the development of the *America's Army Game* and parents discovered that their children knew everything about the U.S. Army, many parents asked me if it was possible to teach other curricula with games (Figure 3).[3]

And this reaches all the way back to 2002 when the *America's Army Game*

was released. In 2009, I gave a talk at Educational Testing Service, titled "How to Replace all Teachers With Game-Based Education," to an audience of some 500 teachers, most of whom agreed with me! In the "Can We Replace all, or Mostly all, In-Class Teaching With Educational Games?" column,[3] I spoke about our experience with Zoom during the COVID-19 pandemic:

> "Now that we have done the great big Zoom experiment during COVID-19 with teaching, we all now know that we don't necessarily need classrooms, that we can do almost everything over the wire with teaching in either synchronous or asynchronous fashion. We likely don't even need synchronous teaching as many of our students this last year have been stuck in China, India, and other places overseas, on a different time zone, due to the xenophobic U.S. government policy of demanding that international students not physically in classrooms stay out of the United States."[3]

So, with Zoom we learned that we could teach via video links in real time to a distant audience and it became again clear to me that if we had the right budget and the right designers and game development team, that we could most certainly replace most all teaching with interactive games. The problem is the cost to do this and the will of the people of the United States to make this happen. There isn't the budget or the will, is what my column said. With recorded Zoom lectures being a lot cheaper, or recorded YouTube videos, we could get close to replacing 80% of in-classroom PowerPoint presentations right now at very little cost.

LET'S RENAME EVERYTHING THE *METAVERSE*!

In early 2022, it seemed like everyone working in 3D suddenly changed the name of what they were building to be a *metaverse*. We even had to come up with a plural for metaverse: metaversi. In the "Let's Rename Everything the Metaverse!" column,[4] I wrote:

> "The Metaverse is a shared virtual space that people can move through and interact with, using a personalized avatar as they pursue communication and commerce with like-minded virtual friends. Neal Stephenson created this notion and waxed elegantly on it in his 1992 book Snow Crash."[4,21]

People who were building 3D games, 3D virtual environments, or anything related in 3D suddenly started using "Metaverse" instead of what they were originally building under another name. It just seemed worth noting; even one very large company renamed itself *Meta* to join the parade ...

One of the things, though, is that all of the different metaversi currently cannot share your friends list, your avatar, or any in-game experience you have had (Figure 4). This needs to be engineered in from the start for the Metaverse to succeed, and it's still not there. We mostly just have walled gardens, is the message from this column.

The one response I got from this column was from Charles Adelman, the CEO of XRDNA, whose focus is on

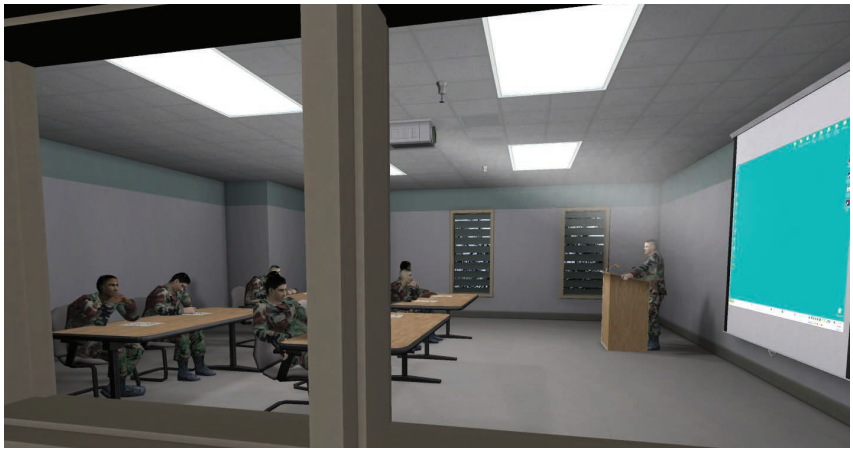


FIGURE 3. *Americas Army* Basic Combat Life Saving Class.

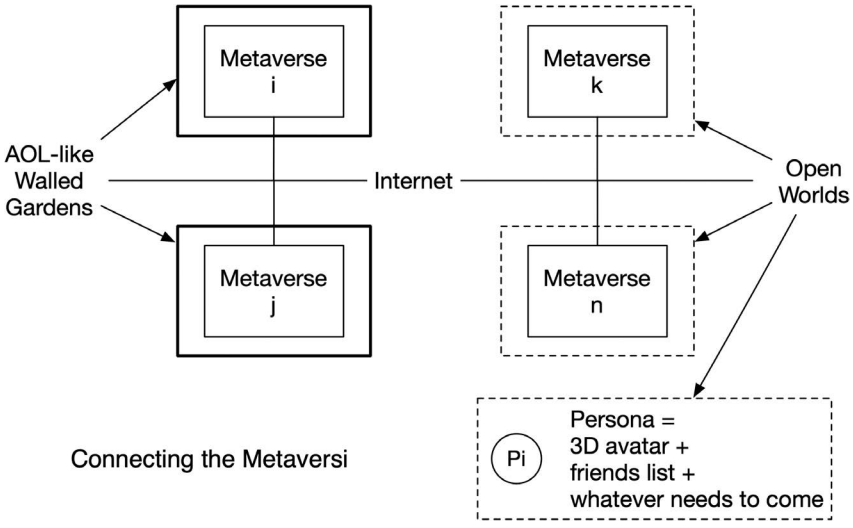


FIGURE 4. Connecting the metaversi.

> "XRDNA is XR + AI platform that is built for the next generation of immersive experiences, communication and visualization. With its core wayfinding, search and indexing guide M.O.E. [Map of Everything], and a patented volumetric domain and IP addressing system, XRDNA creates interoperability and unification across spatial and metaversal walled gardens."[27]

So, XRDNA kind of wants to solve the interoperability problem so eventually there are not any walled gardens between metaversi. BUT, there is "a patented volumetric domain and IP addressing system" in there, which they plan to place into a nonprofit somewhere, is my understanding.

WE NEED SOMETHING LIKE "BELL LABS" FOR THE GAMES INDUSTRY

As I have stated many times, there is not really any large place for basic research in new technologies for games and game development; work in these areas happens at various universities, usually universities divorced from having a game development degree program of any kind.[5] In my career, I have created the research directions plan and/or founded several research entities, including the Naval Postgraduate School's NPSNET Research Group (founded, drafted research agenda, operated, and raised the funding), the University of Southern California's Institute for Creative Technologies (USC ICT) (created the operating plan and research agenda to found), and the Naval Postgraduate School's Modeling, Virtual Environments, and Simulation Institute (founded, drafted research agenda, operated, and raised the funding).

Three of the research institutes that formed many of my opinions on how to found and create such organizations were Bell Laboratories,[22] the Massachusetts Institute of Technology Media Laboratory,[23] and the Xerox Palo Alto Research Center.[24] All of these laboratories/institutes/centers were places where computer scientists of my age dreamed of ending up. We all wanted to be at a place where there was sufficient funding and sufficient freedom to explore some basic ideas that could potentially change the world eventually.

What I wanted to create was a research institute focused completely on the next-generation technology for developing and building games. In Figure 5, I used a mindmap to show the scope that I was thinking for this Bell Labs-like version of the Games Research Institute.

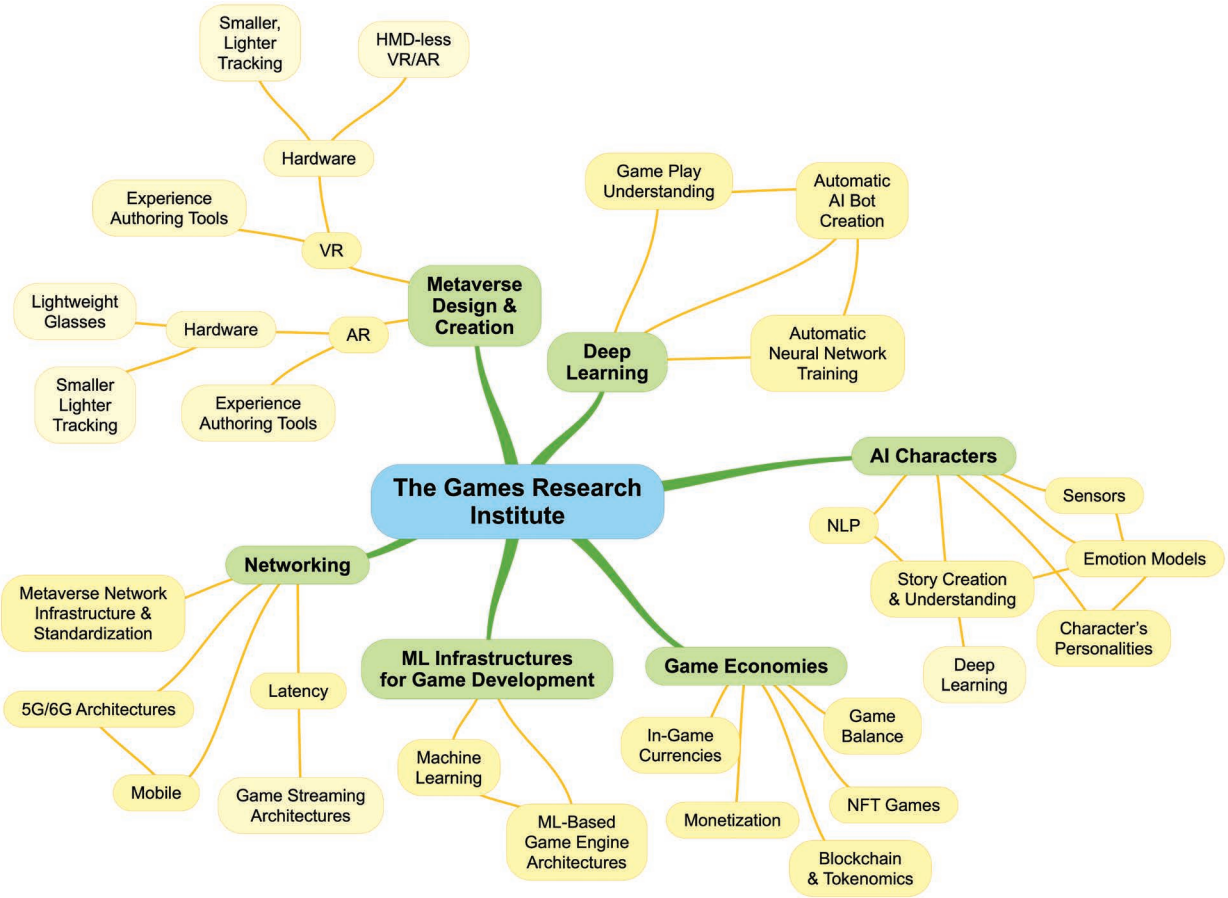


FIGURE 5. The Games Research Institute.

I received many comments asking me where this Games Research Institute would be but, to this date, I have still not found an interested funding party.

HOW DO I GET A POSITION IN THE GAMES INDUSTRY? THE FAQ

Once I founded the games program at USC, the most often asked question became "How do I get a position in the games industry?" or, more often, "How do I get my son/daughter a position in the games industry?" If I tried to answer each of these queries individually, it usually turned into a 90-min explanation of what the program at USC looked like and how it funneled our students through the right courses into end of semester fall and spring Demo Days that were attended by game industry hiring people, there to see what games our students had built. This was an amazingly successful pathway for getting our students into positions in the games industry. My course rosters show that I have placed some 4,000 students into positions in the games and computing industries in my more than 18 and a half years at USC.

Figure 6 shows what the games program ought to really be from the high level: USC has never created the game art and design part of Figure 6, but I put it in the "How Do I Get a Position in the Games Industry? The FAQ" column[6] as a placeholder for the future.

I still receive messages from computing industry people that have read this article to help point their child in the right educational direction for a career in the games industry. I also receive a large number of requests from parents who sent their children to a school without a games program asking for help to get their child into a position in the games industry. I usually hand them this article and point them toward YouTube as well.

WEAPONS OF MASS DISTRACTION: THE *AMERICA'S ARMY GAME* AT 20

In February 2022, the U.S. Army decided to shut down the *America's Army Game* after 20 years of support for the Army's recruiting efforts (Figures 7–9).[7] In the 20 years since this game was put online, I did something like 200+ interviews about its development and its operation. With that era coming to an end, I thought maybe one more time I should detail why the Army wanted to build it, what were the internal discussions the development team had with the Army to make the game, the game's impact on basically making the serious games field happen, and the discussions about the potential for the use of games for education. I wanted to collect into the column some of the most interesting and critical imagery from that project.

I had collected much of this information inside of many technical publications but realized that putting out a commemorative column on the game to highlight some of the key decisions and experiences the development and operations team had with the game needed to be somewhere. This column, and its companion YouTube videos, are a great package of knowledge for the

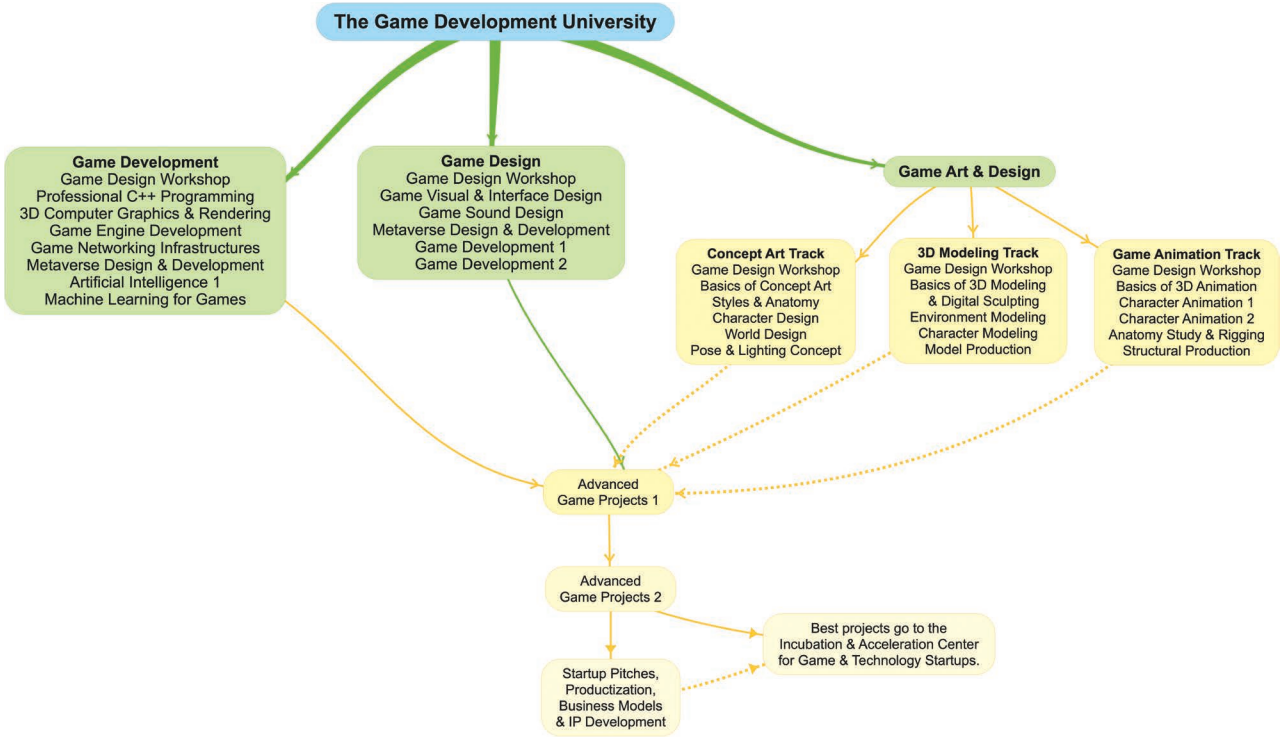
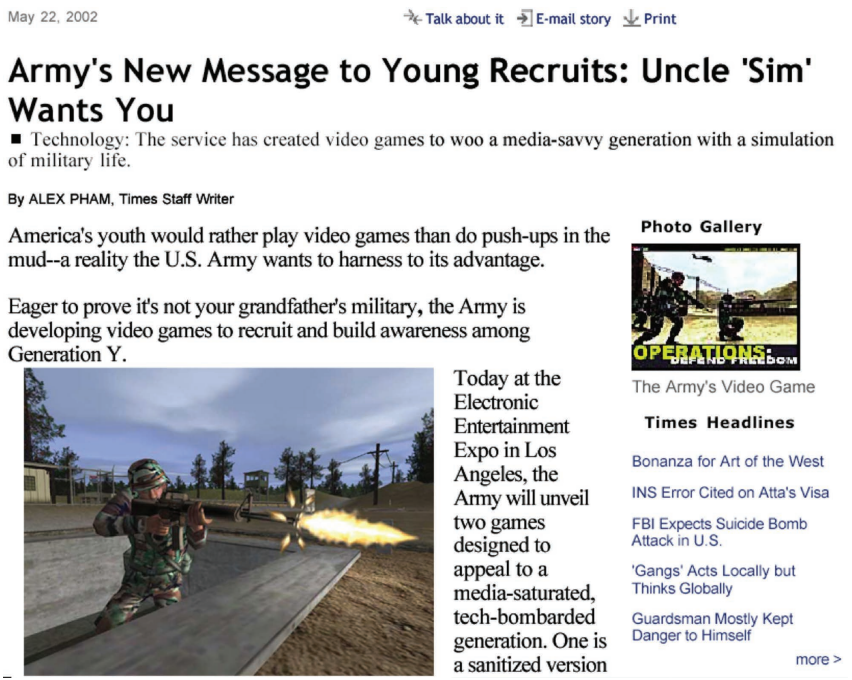


FIGURE 6. The Game Development University.

future desires of those interested in recruiting via online gaming.

This column had a huge response: Many of the people involved in developing, operating, marketing, and playing the game sent me nice notes about the memory book. That felt great!

The U.S. Army failed to meet its recruiting numbers after the game was taken offline in February 2022. I saw an article quoting a general officer stating that perhaps the Army ought to get the game back online. I drafted an e-mail to that general officer and did not receive any response. The cost of building a top-5 online game May 2000–March 2004 was approximately US$17 million. A top-5 game today is probably on the order of US$150 million.



May 22, 2002

Talk about it | E-mail story | Print

Army's New Message to Young Recruits: Uncle 'Sim' Wants You

■ Technology: The service has created video games to woo a media-savvy generation with a simulation of military life.

By ALEX PHAM, Times Staff Writer

America's youth would rather play video games than do push-ups in the mud--a reality the U.S. Army wants to harness to its advantage.

Eager to prove it's not your grandfather's military, the Army is developing video games to recruit and build awareness among Generation Y.

Today at the Electronic Entertainment Expo in Los Angeles, the Army will unveil two games designed to appeal to a media-saturated, tech-bombarded generation. One is a sanitized version

Photo Gallery

The Army's Video Game

Times Headlines

Bonanza for Art of the West

INS Error Cited on Atta's Visa

FBI Expects Suicide Bomb Attack in U.S.

'Gangs' Acts Locally but Thinks Globally

Guardsman Mostly Kept Danger to Himself

more >

FIGURE 7. *Los Angeles Times* front page story on *America's Army* 22 May2002.

FIGURE 8. *America's Army 2.0*.

BUILDING A HUMAN-INTELLIGENT METAVERSE

This column created a research plan for a computational human perception laboratory.[8] Computational human perception has the potential to be the core of a human-intelligent Metaverse, a sensed world that interacts with our physical, emotional, and mental states (Figures 10–12).[8] I cannot put all of the illustrations in from that column. Figure 10 shows the research scope proposed for that laboratory, not unlike Stanford University's Human Perception Laboratory, but perhaps with more of a computational focus. The column focused on creating a master's degree in computational human perception, so the next two illustrations (Figures 11 and 12) show the syllabi for two potential courses: the Biosignals, Sensors, and Modalities course (Figure 11) and the Human Behavior Models course (Figure 12). We still have not seen anyone stand up this master's degree program, but I believe it has great potential, especially at a university that has a computer science-focused games degree program.

PATENT LITIGATION IN THE GAMES SPACE

I wrote this column for two reasons: One was to teach the reader how to draft a patent through an understanding of the component parts of a typical patent, and the second was to teach the reader a little bit about patent litigation such that the reader could become a writer of patents that could survive litigation.[9] I have a lot of experience as an expert in patent litigation and have been in some 49 cases of patent litigation for some 58+ game and computing companies and some 36 law firms. Figure 13 shows a distilled version of the various cases I have worked on from my personal perspective.

I have had many attorneys read this article to think about hiring me as an expert witness for patent litigation, patent prosecution, intellectual property, or Federal Trade Commission cases. Attorneys that I have worked with before have read this and responded favorably and I have consequently kept quite busy.

THE METAVERSE UNIVERSITY

The purpose of this column was to take my knowledge of what a game development university was and extend that into what a Metaverse University might look like (Figure 14).[10] At the time I was drafting the column, it looked like our success in creating low-cost head-mounted displays was going to drive up the demand for hires in the Metaverse creation industry. Unfortunately, Apple came out with their Vision Pro headset with a cost "starting at US$3,499" and basically destroyed most all interest in the Metaverse development space. Had Apple thought about this a bit before they created such a costly device, they could have easily workshopped out that most

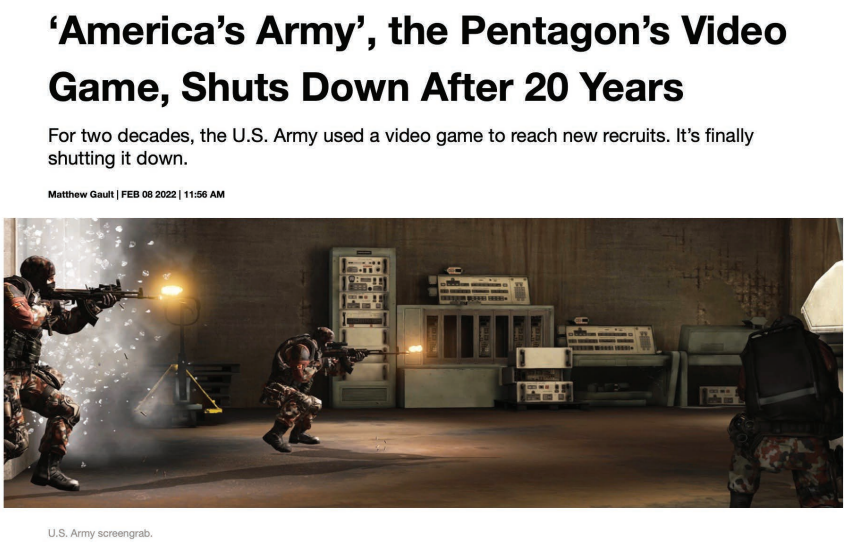


FIGURE 9. "America's Army," the Pentagon's Video Game, Shuts Down After 20 Years, 8 February 2022.

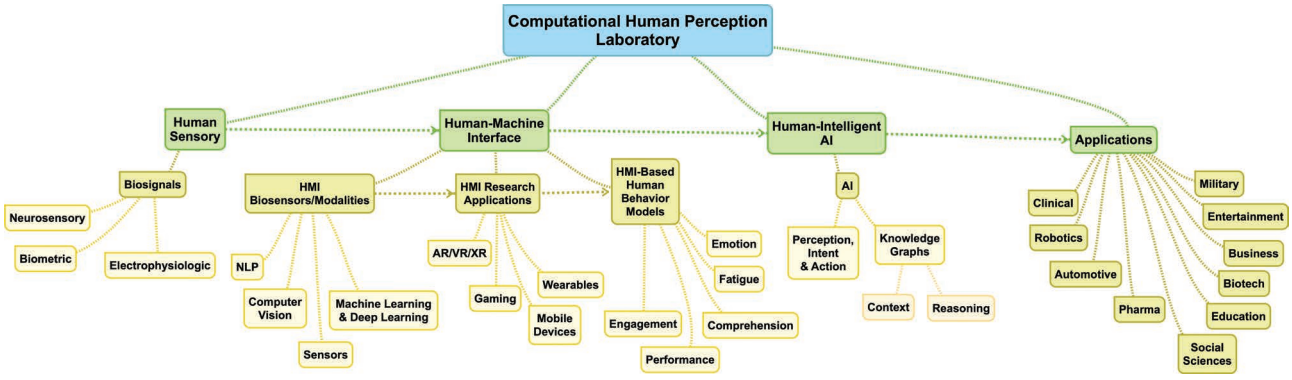


FIGURE 10. The research directions for the Computational Human Perception Laboratory.

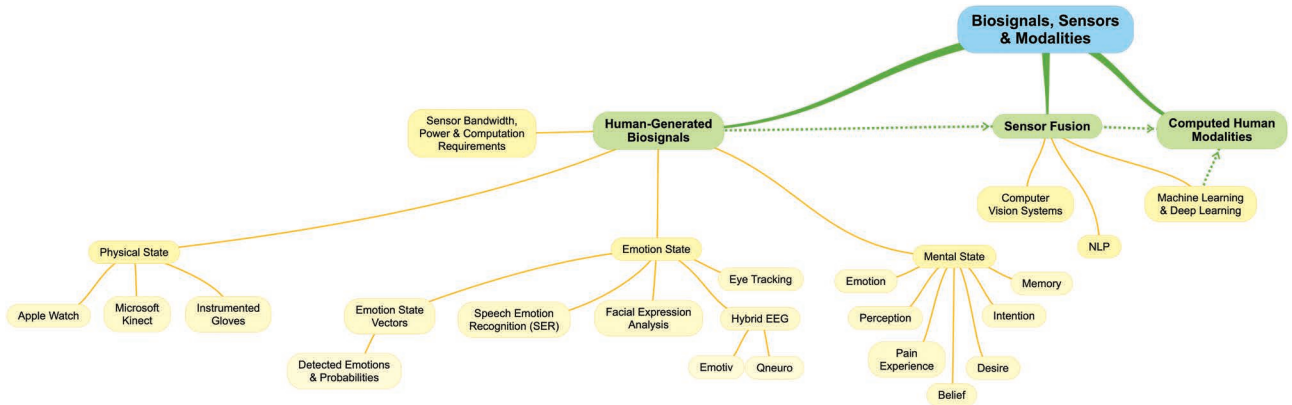


FIGURE 11. The topics for the Biosignals, Sensors, and Modalities course. EEG: electroencephalography; NLP: natural language processing.

people's fear is that they might drop their laptop off the dining table or desk and onto the floor, destroying a US$1,500 marvel of technology, with "all those data moments lost in time, like tears in rain … time to die."[25] Apple did not think through that putting the computer onto someone's head with the vision occluded might lead to a *Blade Runner* kind of moment.

Most of the responses that I have received on this column have been from the Middle East—Dubai, Saudi Arabia, and Türkiye—places where there is the wealth to support a focus

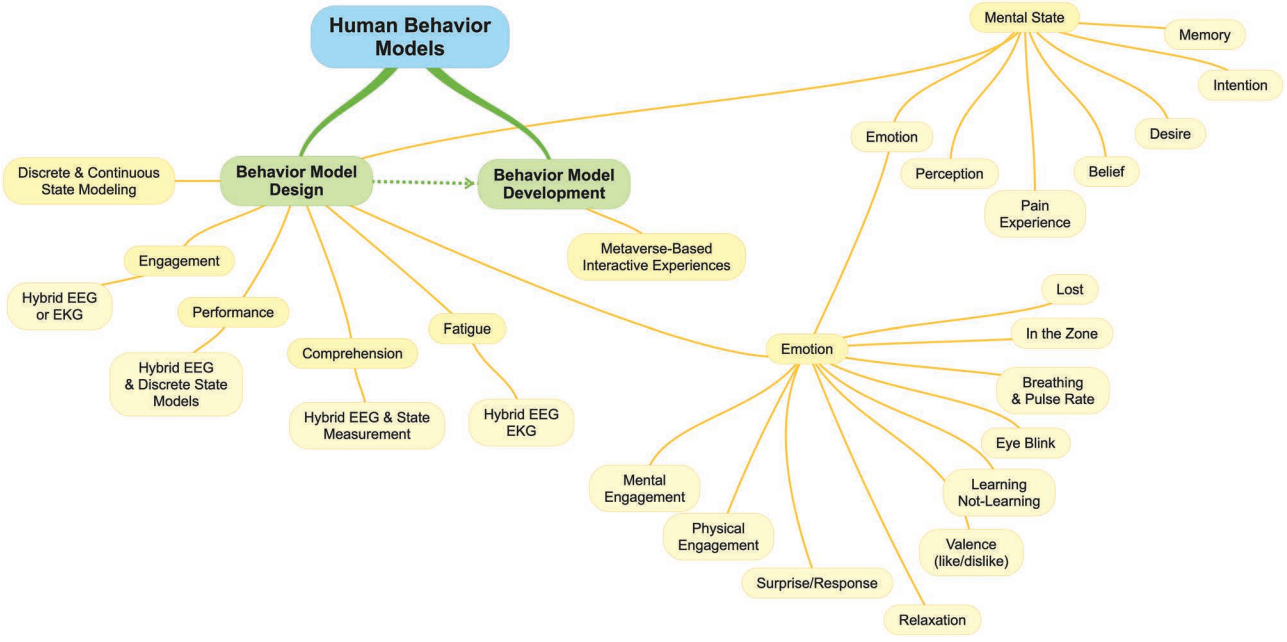


FIGURE 12. The topics for the Human Behavior Models course. EKG: electrocardiograph.

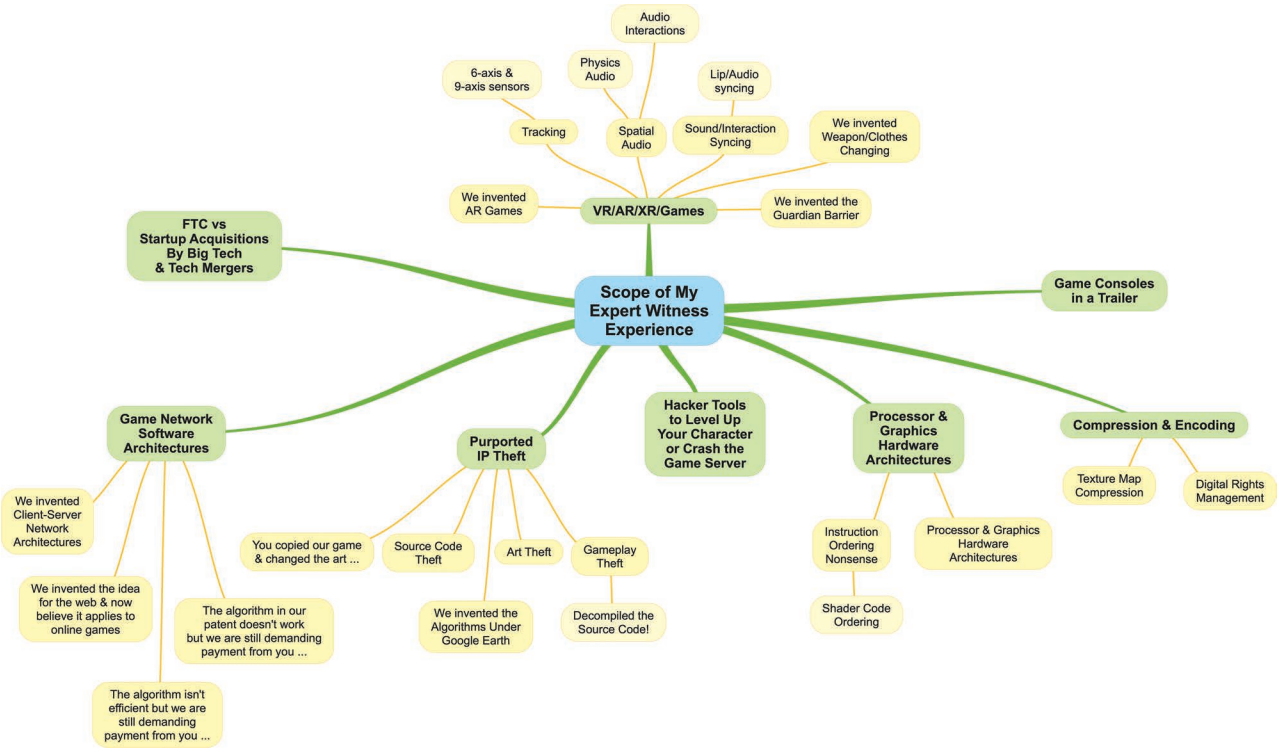


FIGURE 13. Scope of my expert witness experience.

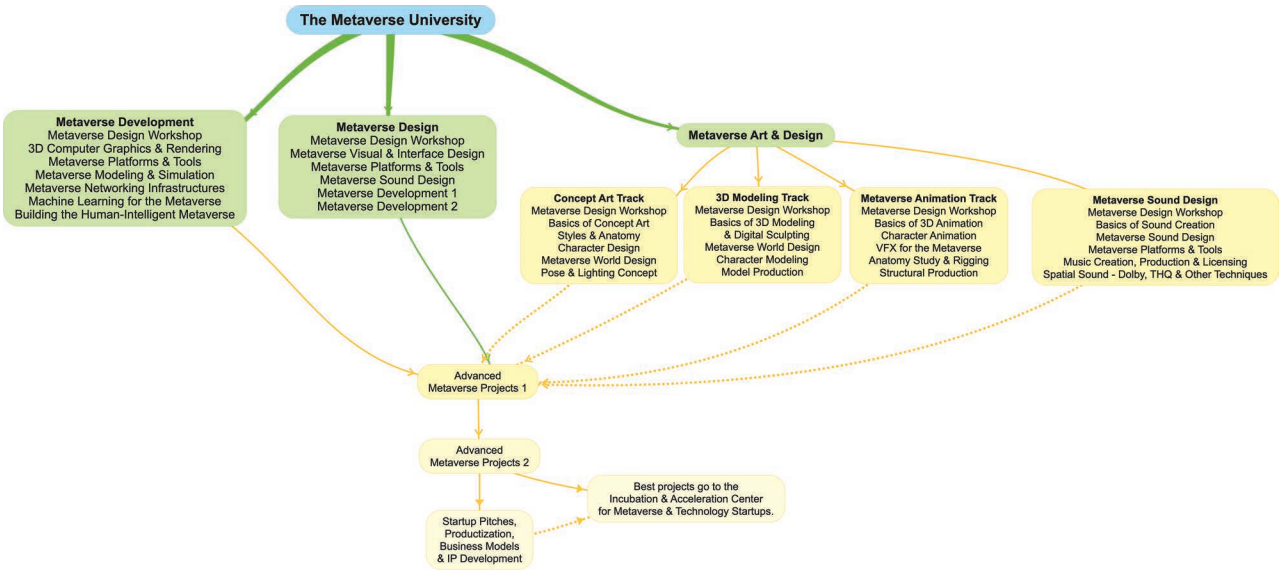


FIGURE 14. The Metaverse University.

on virtual reality (VR)/augmented reality/extended reality. None of those responses has resulted in the creation of a Metaverse University, mostly just small programs of a single class that teaches 10 people how to build a Metaverse application in Fortnite.

AMERICAN PROFESSOR

In March 2017, I was invited to the IEEE VR conference to receive the IEEE Virtual Reality Technical Achievement Award "for fundamental work in virtual reality networking, body tracking, and institutionalizing the application of virtual reality." I was asked to prepare an hour-long talk on how I got there in my career. I wrote the 88 slides for that talk and arrived at IEEE VR to find that there were four other people in the session with me, and I really only had 10 min for my talk. I used all 88 slides and gave my entire talk in 10–12 min and must have seemed like someone on speed. I decided later on to turn that talk into this column after I had used the original slides to give a 90-min talk at the Naval Postgraduate School.[11] Figures 15 and 16 are part of that talk, which was on my biography as an American professor.

I did receive a number of responses from former research colleagues who loved to reminisce about our successes in an earlier era of VR. Figure 16 shows the report of a National Research Council committee that I chaired: *Modeling and Simulation – Linking Entertainment and Defense*. That study had a huge impact as it moved defense simulation away from defense contractors with crazy-large budgets to smaller contractors that started by using a commercial game engine. The USC ICT was created from a distillation of this report, written by me at the request of the chief scientist of the U.S. Army.

August 2024 is the 25th anniversary of USC ICT and this column fetched me an invite to the 25th anniversary celebration.

FIGURE 15. NPSNET iPort Demo.

DO WE NEED UNIVERSITIES ANYMORE?

The motivation for this column was provided by experience with Zoom and YouTube.[12] The idea was, could we replace some significant parts of in-classroom lecturing with online live lectures

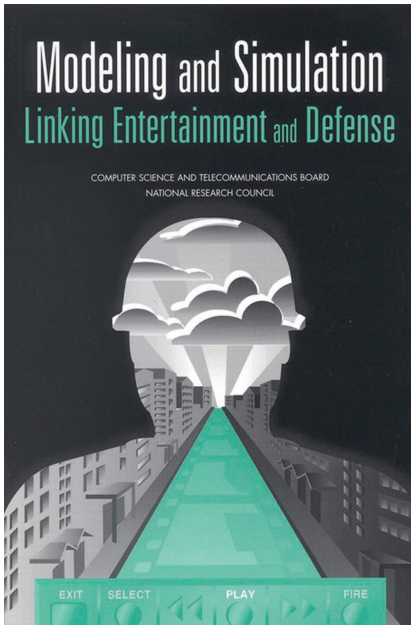


FIGURE 16. Modeling and simulation: Linking entertainment and defense.

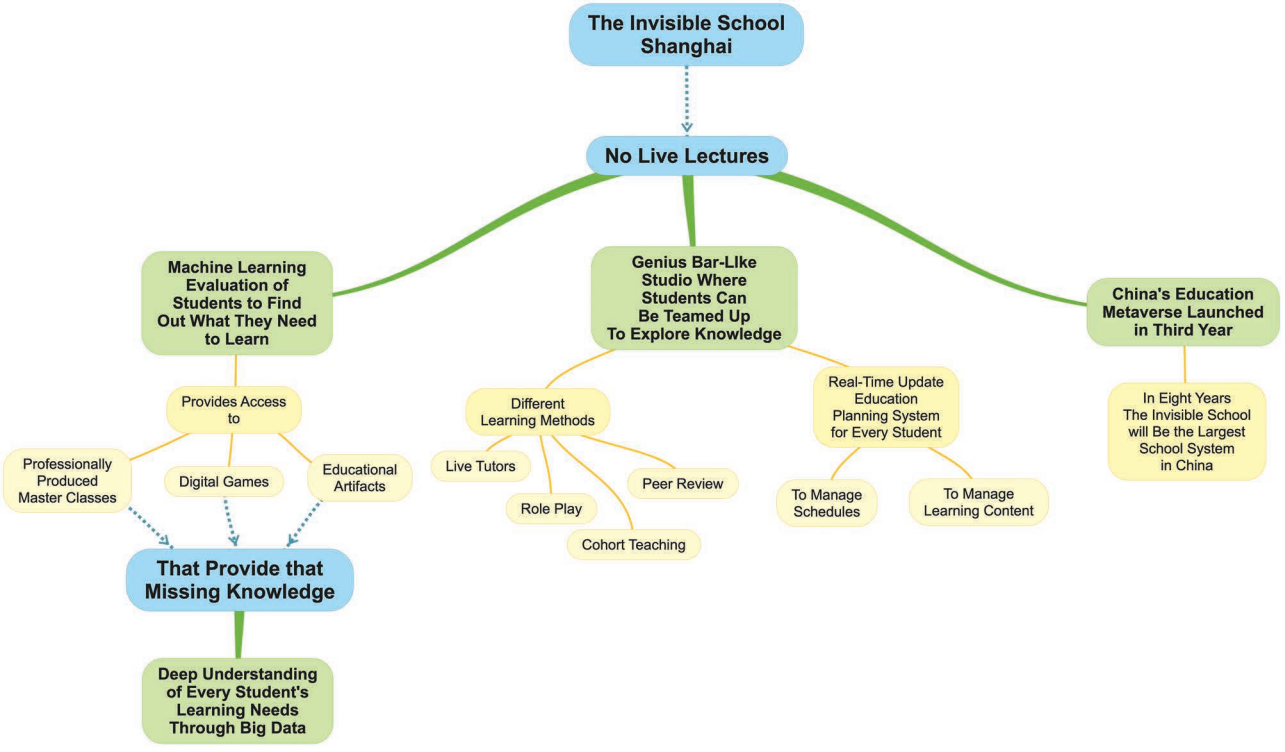


FIGURE 17. The Invisible School Shanghai.

or recorded video of those lectures? The answer is yes, and you can probably replace about 80% of in-classroom PowerPoint lecturing in this fashion. Figure 17 shows one slide from the Shanghai Invisible School project, which smashes together ideas extracted from our Zoom experience with the ideas behind Apple's Genius Bars. Figure 18 shows a simpler structure of how we teach now and how we could teach in the future. We all did this experiment during the COVID-19 pandemic and understand that this is how we could go if universities eliminated the "socialization with other people" part of the education that universities provide so well.

Of course, I sent this to my dean and several former computer science department chairs, to no response. I did hear back from the Shanghai Invisible School project people: They told me that their focus has turned to vocational education with respect to this project and that they are building a schoolplant that can support 10,000 students working with tools, machine tools, with all educational support provided digitally. Three of my former students are working in Shanghai for this effort.

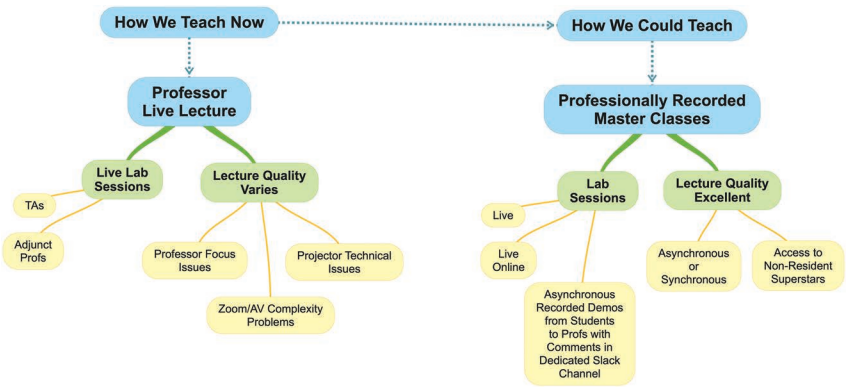


FIGURE 18. How we teach now and how we could teach.

HUBRIS: FROM THE METAVERSE TO CHATGPT TO TIKTOK'S TIME OF TRIBULATION

This column was a collection of three topics that were boiling around at the time, the Metaverse, ChatGPT, and TikTok.[13] With respect to the Metaverse, I tried to deal with the perception that the Metaverse had died a long-overdue death and tried to explain that it was the "wheel of reincarnation" effect that brought technology forward, only to be knocked down for a later time when the technology was perhaps better, cheaper, and better-regarded so that it could be reincarnated again (Figure 19).

ChatGPT had come out and it was the "bomb diggity" at the moment I wrote the column. Large language models (LLMs) provided exciting results and it looked like everyone who invented some technology in this

space was going to be considered for a Turing Award. We now know better and the stock market has told us so.

Tiktok's "time of tribulation" came up when it became clear to everyone that the U.S. Congress was not getting anything done and that Congress needed a red-flag they could wave in front of us, a red-flag such as TikTok, that they could perhaps unify and attack. With that attack, the lack of passed appropriations could be buried under the "We killed Tiktok" banner.

The responses I received on this column were that perhaps the Congress-people wanted to meet some of the influencers so that they could learn how to better campaign.

THE METAVERSE IS JUST A SOFTWARE LAYER ...

The purpose of this column was to point out that, with the perception that the Metaverse was dying, that perhaps we just needed to consider the Metaverse as a software layer instead of a piece of hardware (Figure 20).[14] If we just made the Metaverse a software layer, then we could participate in the Metaverse with a head-mounted display, a flat screen television, or perhaps an Apple Vision Pro, a device introduced over a two-hour presentation without the word "Metaverse" ever being used.

There were just a couple of responses to this column, most from friends who were acquiring Apple Vision Pros, and asking me when I would get mine ... Sniff ...

GAMES TECHNOLOGY TAKES OVER THE FILM INDUSTRY

I drafted this column to record my experience interviewing to be chief scientist for one of the largest film/streaming studios in the city of Los Angeles.[15] What I learned right away is that none of the people I was interviewing with had ever drafted a position description for the chief scientist position. So, in typical form, I drafted the mindmap in Figure 21 and kicked it to the people I was interviewing with. They all got excited and I ended up doing nine interviews with this studio. At the end of the process, the human resources (HR) candidate-runner told me that I was the first candidate and that they needed to interview nine more people before they were allowed to settle on someone. Right ...

So, I took the mindmap that I WROTE and turned it into this column to memorialize what a chief scientist ought to be thinking about for the modern film/streaming industry. I turned it into a YouTube, as always, and when the column came out in print, I kicked the pdf to the HR candidate-runner, who reminded me that I had signed a nondisclosure agreement with the studio! I reminded him that I had drafted their position description for them as they DIDN'T SEEM TO KNOW WHAT THAT POSITION ENTAILED. I suggested that perhaps I ought to send them an invoice for the three months of time the interview consumed.

Anyway, the responses I received from other studios was that they too were thinking about creating such a position. Sometimes with writing, all you can do is to get people to think, which is a big win!

HOW TO CREATE A GAMES INDUSTRY IN YOUR COUNTRY

A frequently asked question to me is: How can a game development

FIGURE 19. Seventy-five different VR headsets in Jiangsu (17 December 2018).

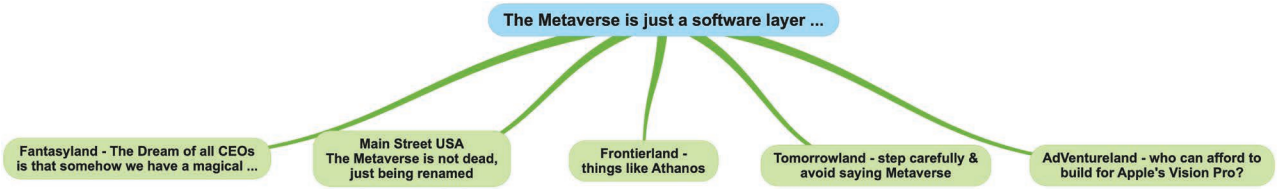


FIGURE 20. The column outline.

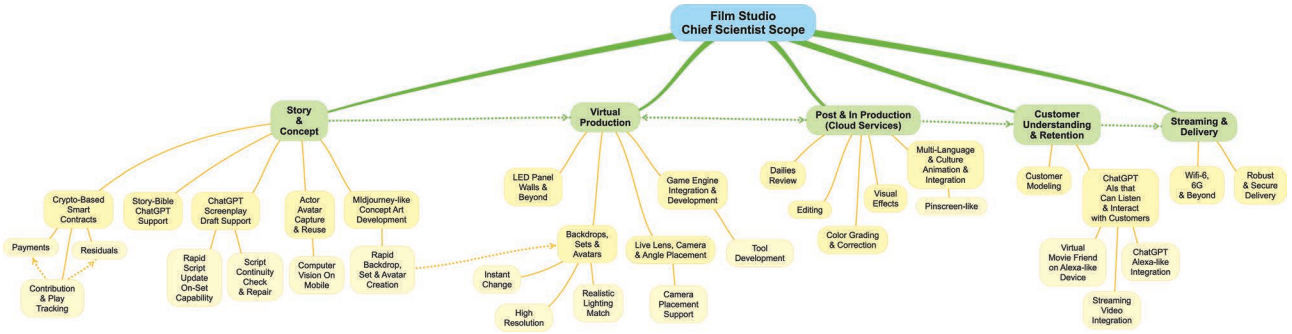


FIGURE 21. Film studio chief scientist scope.

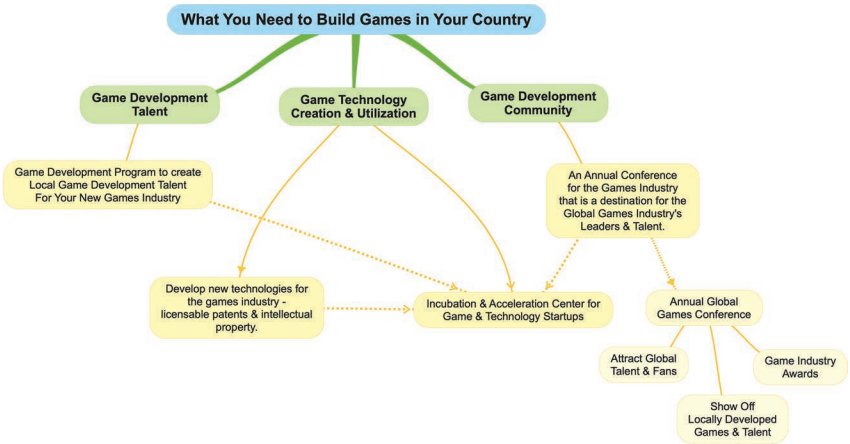


FIGURE 22. What you need to build games in your country.

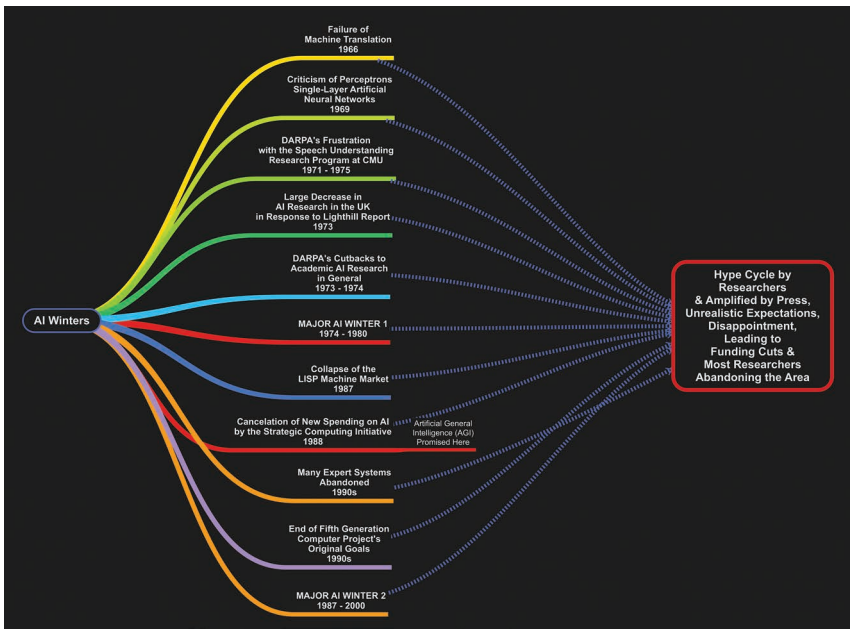


FIGURE 23. AI Winters.

industry be created in some far distant country? This question has been asked of me by people in China, Dubai, Saudi Arabia, and Türkiye. I ended up spending quite a bit of time developing this plan for the Dubai Future Foundation (DFF), the foundation that invests in new business directions for Dubai, businesses their people can work in when they completely run out of oil. Figure 22 shows the component parts of that plan for developing game talent, game technology, and a game development community with connections to the global games industry. The DFF sent me an e-mail on 28 December 2023, indicating they needed a proposal from me by 12 January 2024. I drafted the proposal and got it in early, as I had all of the pieces and parts. Only to discover that the DFF only had US$1 million to invest in four proposals, which is just a ridiculously low amount of money for the task at hand. So I memorialized this plan in this column for other countries to consider. Figure 2 of that column[16] has a completely revised game development university plan that is excellent and I recommend reading the original column.

I am still waiting for responses from other countries that wish to get into this space, should there be any!

LARGE LANGUAGE MODELS AND GENERATIVE AI, OH MY!

In this column, I wanted to start out by explaining the historical AI-hype cycle that has infused the field of AI since the beginning (Figures 23 and 24).[17] I was worried that readers without the prior history of the field of AI would take generative AI too seriously. That is why my example of using Midjourney was to make Thanksgiving place cards. I wanted

to show people that even in the simple task of making place cards for your dinner guests with Midjourney, that it was relatively easy to violate copyright! I try and make place cards for every meal that has five or more dinner guests, place cards designed individually using what I know about each guest.

Most of the responses were from people who wanted to attend next year's Thanksgiving at my home in Carmel by the Sea ...

TODAY GENERATIVE AI IS JUST A PARLOR TRICK ...

My motivation in this column was to show where we are now with generative AI and where we want to go using that technology (Figure 25).[18] Again, my background is to draft plans that create research institutes! So the mindmap of Figure 25 shows the tools we need to create to get beyond the parlor trick we currently see with LLMs. By the way, it is my belief that these technical issues are going to be solved fast and get deployed even faster.

Responses from readers to this article asked me if I yet had access to OpenAI's Sora, which I still do not.

> Sometimes with writing, all you can do is to get people to think, which is a big win!

CAN OPENAI'S SORA GENERATE PIXAR'S *TOY STORY*?

With this column, my motivation was to try and understand the computational requirements needed to use OpenAI's Sora to generate the complete Pixar *Toy Story* film.[19] The reason I chose *Toy Story* is that it is the first feature film made completely digitally. I imagined that if I needed access to the digital assets for this project, I could, perhaps, make a plea to Disney/Pixar for access to try this out. Figure 26 shows my thoughts on how to come up with an amount of computation time to carry this out across the entire span of Nvidia hardware from the A100 to the B100.

This article had the strangest responses from my readers. Most people

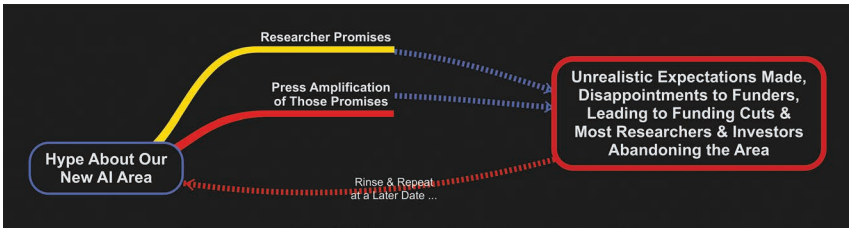


FIGURE 24. Hype cycle about our new AI area.

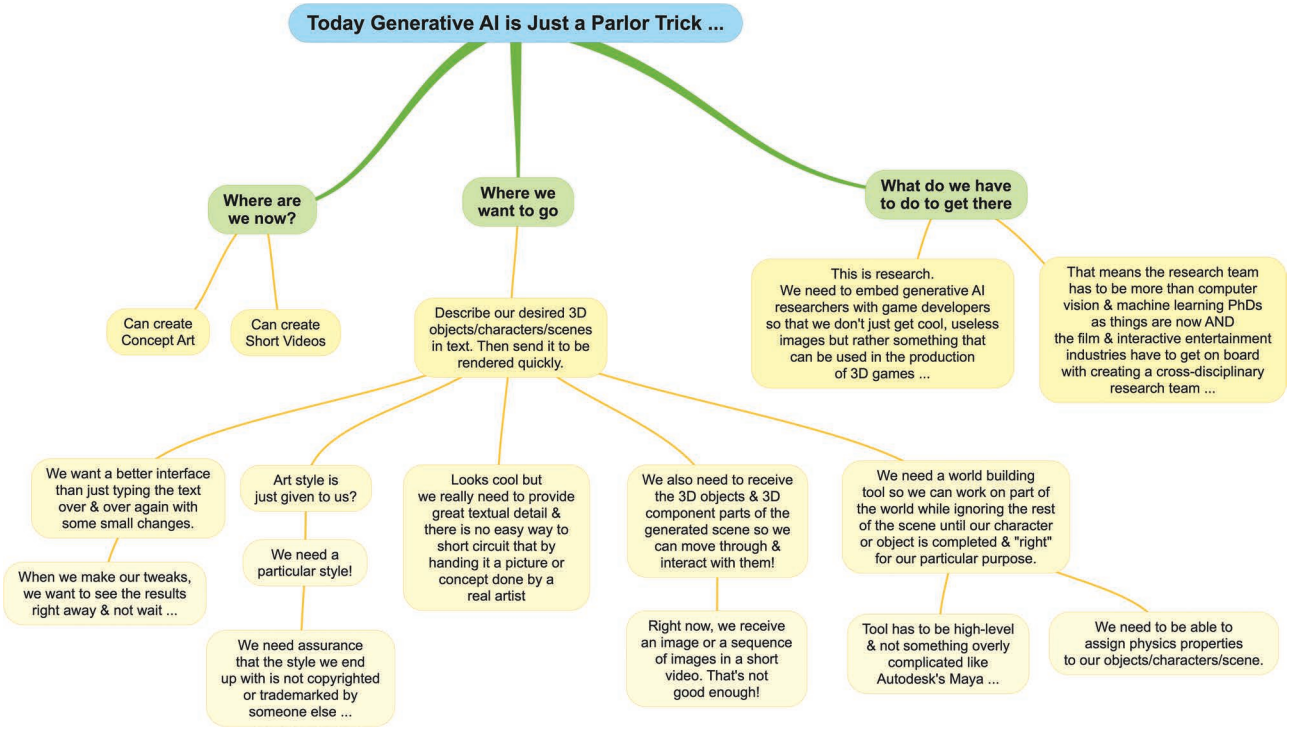


FIGURE 25. Today generative AI is just a parlor trick.

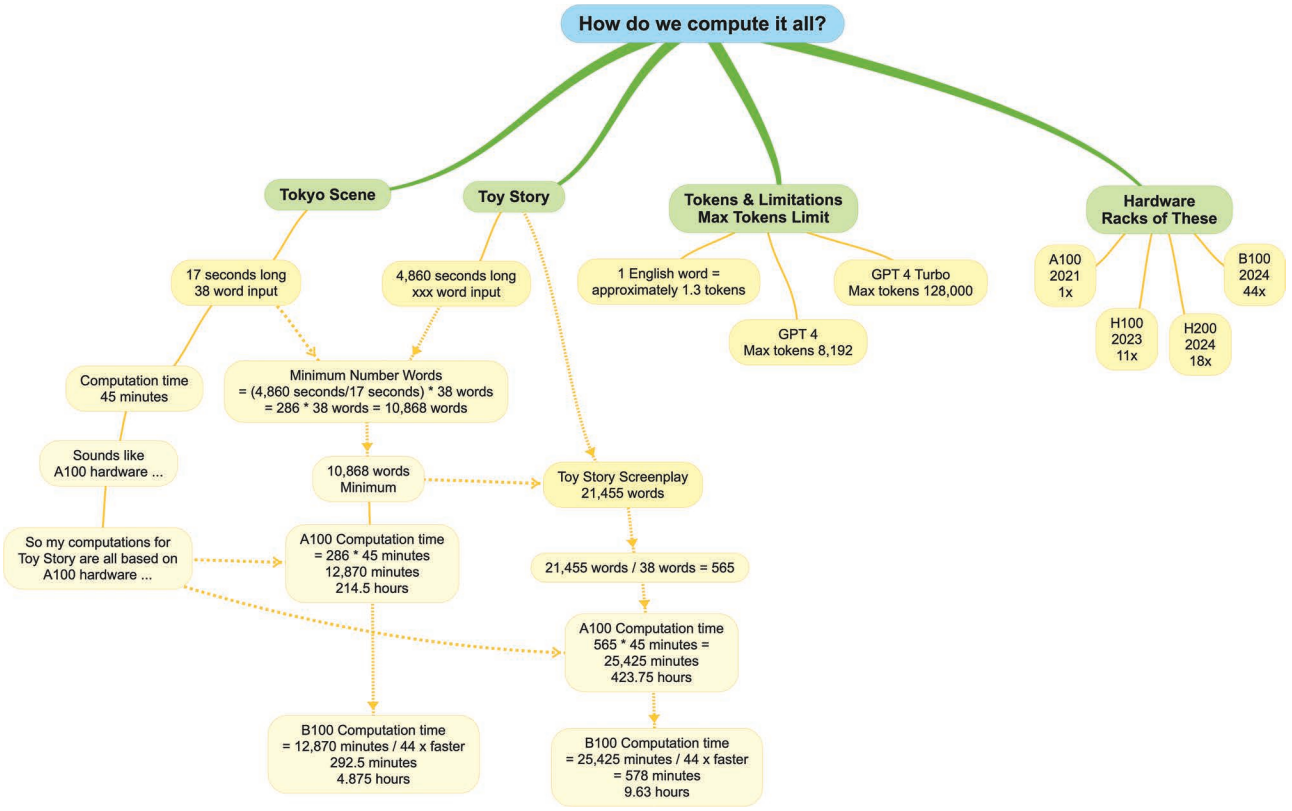


FIGURE 26. How do we compute Pixar's *Toy Story* with OpenAI's Sora?

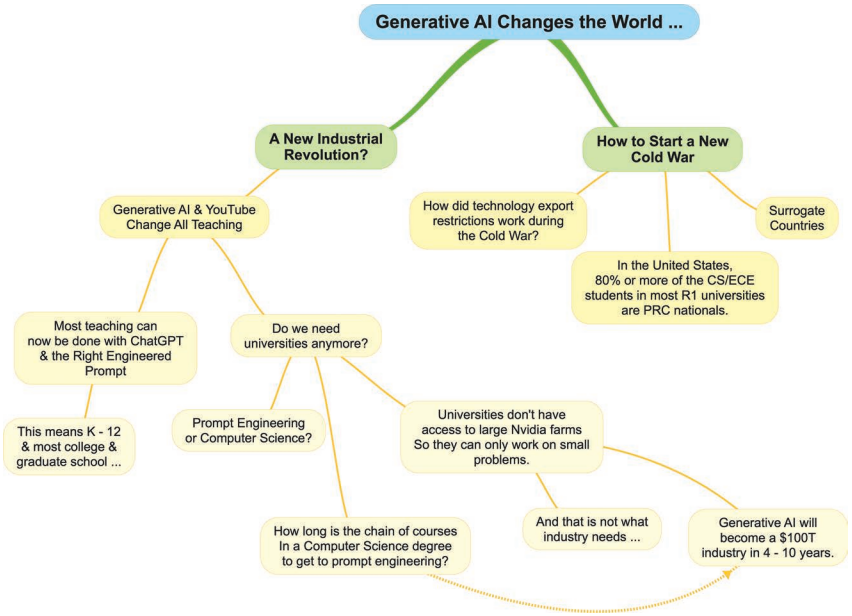


FIGURE 27. Generative AI changes the world, maybe ...

wanted to know how much power it would take to run the Nvidia farm to do the computation. Now, that is perhaps something I need to put into a different column, as I will need to include air conditioning for that Nvidia farm as well.

The readers were concerned, primarily, if we would end up with power brownouts with such computations. I responded back indicating that Elon Musk has decided to move from California to Texas SpaceX, X (forever known as Twitter), and xAI, his AI company. Musk is purchasing some 100,000 Nvidia H100s for the computation infrastructure of the companies in Texas and "sizing for about 130 MW of power and cooling this year (2024), but will increase to >500 MW over next 18 months."

GENERATIVE AI CHANGES THE WORLD, MAYBE

The grand promises of the generative AI community points toward an Industrial Revolution event, with LLMs leading the way.[20] My motivation for this column was to talk a little bit about what Industrial Revolution means via having ChatGPT create the course syllabus for my readers (Figure 27). I also wanted to point out that with serious technology export restrictions being placed on generative AI-capable

COMMENTS?

If you have comments about this article, or topics or references I should have cited or you want to rant back to me on why what I say is nonsense, I want to hear. Every time we finish one of these columns, and it goes to print, what I'm going to do is get it up online and maybe point to it at my Facebook (mikezyda) and my LinkedIn (mikezyda) pages so that I can receive comments from you. Maybe we'll react to some of those comments in future columns or online to enlighten you in real time! This is the "Games" column. You have a wonderful day.

compute hardware, that we were rapidly moving into Cold War 2.0 with China and that it was easier to say "put technology restrictions on" than to actually carry out those restrictions.

This column is not yet out so I do not yet have any comments on it!

I hope you have read this far into this summary of my motivations for the previous 20 columns (Figure 1)! We really are trying to get guest submissions for the alternate months in which I do not write, so if you have an excellent title and abstract, send it my way so I can approve it and have you join this never-ending journey!

ACKNOWLEDGMENT

I thank all of the people who have read my columns and sent me comments and/or suggestions for next columns!

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