



UNITED
SCENIC
ARTISTS

TECH & INNOVATION COMMITTEE

AI/ML RESOURCES & DEVELOPMENTS FOR DESIGN

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AI/ML in Design

In 2022, with the release of Midjourney, DALL-E and Stable Diffusion, Artificial Intelligence (AI) / Machine Learning (ML) took a significant step forward, producing rapid generative concepts that have won fine arts contests. AI/ML has also asserted itself as a powerful tool for streamlining mundane tasks & achieving useful enhancements. Adoption in mainstream commercial software has been slow, but continues to accelerate.

Herein are pertinent key developments and workflow ready solutions for members, outlined in one line summaries under AI Tools & Tech Overview, with select tools further addressed in subsequent sections.

A separate document - [Statements on AI](#) - provides perspectives on AI concerns, and guidelines on AI use and development from various parties.

New Document Pending...

AI Tools & Tech Overview

Generative Image AI: MidJourney, DALL-E, Stable Diffusion & More

Creates images from textual descriptions. Most services provide free AI generations monthly.

Gen AI expert Matt Wolfe has compiled a [Figma board](#) that compares results using the same prompts.

- [Midjourney](#) Leader in generative AI. Strongest 'artistic' flair. Requires free Discord account.
- [Stable Diffusion](#) Excellent open source leading Generative AI with unique strengths. [SD3 in beta](#).
- [Flux](#) From three Stable Diffusion engineers with same flexibility but output quality rivaling Midjourney 6.
- [Dall-E](#) Nuanced generative AI with streamlined interface from ChatGPT creators, OpenAI.
- [Kandinsky](#) First multilingual model (100+ languages) from SberAI. Open source. Numerous art styles.
- [Leonardo](#) Multiple models with high granular/creative control. Includes 3D Texture Generation.
- [Phoenix](#) Leonardo's new next gen text to image AI that follows text input closely.
- [Firefly](#) Adobe. Inc. 3D to Image, Generative Fill & Recolor, Text & Vector Effects. Multilingual.
- [Imagen](#) & [ImageFX](#) Google. Beta. Generative video & inpainting capable. Unique models.
- [Ideogram](#)
- [Mystic](#) Freepik's new highly realistic generative image AI.
- [Grok](#) Based on Flux, Grok is X's (formerly Twitter) native generative image AI. Surprisingly strong.
- [Emu](#) From Meta. Of note is Emu Edit.

Generative Video AI

- [Runway Gen-3](#) First to market text to video AI gen with advanced camera control & director mode.
- [Open AI Sora](#) Out mid Feb. '24. Strong results that with intervention could be used for establishing shots.
- [Veo \(In Test Kitchen\)](#) Google's video generation model. 1080p video generation in excess of 1 minute.
- [DomoAI](#) /Animate turns images into video. /Video converts animation into realistic video.
- [Krea](#) Among their apps is one for video generation.
- [Luma Dream Machine](#) Generates 5 second clips. Striking results. Limitations denoted on site.
- [Morphic Studio](#) "AI powered platform to create controlled videos"
- [Emu Video](#) From Meta.
- [Kling](#)

Specialist Generative AI & Tools

- [Cuebric](#) Create segmented, inpainted, integrated virtual environments for art & virtual production.
- [UE5 Dream](#) Stable Diffusion in Unreal Engine. Text to Image also uses camera angles & scene geometry.
- [Interior AI](#) Interior design mockups and virtual staging. Uses only preset styles & references to generate.
- [Promethean AI](#) Virtual set dressing/world building assistant and 3D asset management.
- [Cadeera AI](#) Furniture & Home Decor Visual Search.
- [LookX AI](#) AI Tool for designers & architecture lovers trained on architecture.
- [DreamPose](#) Fashion Image-to-Video Synthesis via Stable Diffusion. Costume Designers, take note.
- [Gamma.app](#) Generates pitch decks.
- [PentoPix](#) Script to Automated Storyboard & Previz in real time. Excessively expensive.
- [MARZ Vanity AI](#) Aging/Deaging tool. VFX tool, but could be useful for graphic & concept artists. Nov. '23.
- [Poly](#) Top AI PBR material & texture map creation tool up to 8K; plus seam removal, delighting of textures.
- [Vizcom](#) Uses AI to turn sketches and basic renders into detailed renders.
- [Wonder](#) AI automatically animates, lights & composes CG characters into live action. Maya plugin.
- [SkyboxAI](#) Blockade Labs tool that creates 360 skyboxes from text prompts. Provides HDR & Depth Maps.
- [Krea](#) Realtime AI Gen with Image2Image; works well guided by 3D. Other apps: upscale, patterns, logo.
- [ToonCrafter](#) Generative Cartoon interpolation with a good buzz. Maybe useful for storyboard artists.
- [Magnific](#) AI Image upscaler and enhancer with ability to creatively detail enhancements.

- [Rendair](#)

AI Platforms & Large-Scale Developers

- [Runway](#) AI tools inc. rotoscoping, inpainting, sound design. First video gen AI. See their AI/ML Lab.
- [NVIDIA](#) Visual AI leader with experimental AI tools, some incorporated into their Omniverse platform.
- [Autodesk](#) AI Labs research division & acquisition of Spacemaker AI caters to urban design & CAD.
- [Adobe](#) Generative AI Firefly. AI tools integrated into Photoshop, Dimension, etc. World's first Vector AI.
- [Stability AI](#) Stable Diffusion makers: ClipDrop AI tools for artists & Stable Audio to generate music/sound.
- [LG AI EXAONE Atelier](#) Ideation AI platform that supports collaborative work between AI and designers.
- [DGene](#) AI actors. AI tools that simplify VFX, film restoration & virtual production.
- [Topaz Labs](#) Vanguard AI visual enhancement software: VideoAI, GigapixelAI, DenoiseAI, SharpenAI.
- [VanceAI](#) Image enhancement, product design generation, stylization tools, etc.
- [PromoAI](#) AI tools targeting interior designers & architects inc. photo/sketch to rendering & vice versa.
- [Freepik](#) Free broad AI tools from Reimagine to Retouch.

Generative 3D AI

3D models from text prompts & single images avoiding the need for photogrammetry are being developed by over a hundred companies. Tech still in infancy and of limited production use.

- [Gaudi](#) Apple's upcoming immersive scene generation AI that creates 3D interiors & camera moves.
- [Lumine AI](#)- Instaverse, explorable 3D environments from text input. In alpha as of July, '23.
- [Get3D](#) Nvidia Generative AI that creates 3D textured models based on a 2D image. Requires compilation.
- [Instant NeRF](#) Nvidia. Turns a set of static 2D images into a 3D rendered scene. Requires compilation.
- [Magic3D](#) Creates 3D textured models based on text prompt. Improves on [Dreamfusion](#). Released Paper.
- [LumaAI](#) NeRF (AI based photogrammetry) iOS app.
- [Aritize3D](#) AI generated 3D models.
- [Kaedim](#) 3D Combines machine learning and an in-house art team to rapidly create game ready 3D assets.
- [SloydAI](#) AI based 3D models based on procedural generators (i.e. chair, bike, etc.)
- [Mirage](#) - Creates 3D objects from text prompts. Nascent, objects are low res, not aesthetically pleasing.
- [Meshy](#) Text or Image to 3D.
- MetaGenAI

Sound/Music AI

- [Deepdub](#) Multi-language localization dubbing.
- [Soundraw](#) Music and music video generation.
- [Synthesizer V Studio](#) Music Vocals Generation
- [MusicFX](#) Google Text to music engine based on their MusicLM Paper.
- [PlayHT](#) Text to Voice and Voice Cloning

Notable Technology Developments

- [AI/ML in CAD](#) A look at the status of AI for CAD drafting.
- [ADOP | LiDAR Point Cloud Rasterization](#) Potential future gamechanger for virtual scouting.
- [3D Guided AI](#) New tools enable designers to explicitly guide AI using sketches & basic 3D scenes.
- [AI Texture Map & Material Generation](#) Overview of software for automated material generation.
- [Pose Estimation](#) Programmable solutions for application on 2D & 3D for concept/previz artists.
- [ChatGPT in Graphics Software](#) Control or get help with your graphics software through text interface.
- [Protection Against AI Training](#) New tools allow one to 'protect' art from AI training.

Generative Image AI: Midjourney, DALL-E, Stable Diffusion & More

Midjourney

<https://midjourney.com/>

Midjourney tends to do best using simple prompts and more often produces better looking, compelling output with greater artistic flair compared to other AI image generators.

Midjourney requires a Discord account and is provided on a subscription basis. Once in the Midjourney server on Discord (sailboat icon) select a channel/room/bot - commonly 'Newbies-####' - type in '/imagine' and in the subsequent prompt field enter your desired image description.

4 concept variations will be provided within a minute. As public forums, other people's prompts can offer inspiration, yet these overwhelm your screen; it's easy to lose sight of your own prompt results. Your prompt history is however always viewable at <https://www.midjourney.com/app/> and with a paid subscription you can direct message a Discord bot for concepts instead.

With the release of V5 in mid March, 2023, photorealism is stronger while retaining strong aesthetics. You can utilize different models for different styles, and some models do better than others. V4 does better at creating images that look like paintings than V5-5.2

/describe command allows you to upload an image and generate four possible prompts based on that image

You can now use the pan and zoom out features to do what is called outpainting your image, or adding more graphical realstate to the image.

Stable Diffusion/DreamStudio

<https://stability.ai/> | <https://beta.dreamstudio.ai/> | <https://github.com/Stability-AI/stablediffusion>

Stability AI's Stable Diffusion offers the most robust capabilities with fewest constraints. Results tend to be a middle ground between Dall-E 2's realism and Midjourney's strong artistic aesthetic. Available open-source and via Dreamstudio web app with limited image editing and added slider based image customization.

Stability AI maintains Clippedrop: a user friendly ecosystem of web based AI apps for artists at <https://clippedrop.co/>

These tools include [Stable Diffusion XL](#), [Uncrop](#), [ReImagine XL](#), [Stable Doodle](#), [Cleanup](#), [Remove Background](#), [Relight](#), [Image Upscaler](#), [Replace Background](#), [Text Remover](#), [Sky Replacer](#).

A [Stable Diffusion plug-in is available for Photoshop](#), as is [Lexica: The Stable Diffusion Search Engine](#). A third party has also setup a web & app GUI [Stable Diffusion Web](#).

A new AI structure for Stable Diffusion, [ControlNet](#), solves the problem of spatial consistency and allows for more precise control that is key for designers iterating concepts.

Stable Diffusion plug in for Unreal: [Unreal Dream](#), which essentially uses your viewport as a img2img generation.

As it is open source, Stable Diffusion is the basis for many other generative AI software listed under [Specialist Generative AI & Tools](#).

Several web based GUI (graphical user interface) systems for developing & fine tuning imagery through Stable Diffusion, and also deploying Stable Diffusion in an isolated environment, exist. These are key tools for professional users seeking to maximize Stable Diffusion and include:

- [Automatic1111](#) ([Beginner's Guide](#), [Deep Dive](#)) Most popular, industry standard.
- [ComfyUI](#) ([Beginner's Guide](#)) Node based GUI.
- [InvokeAI](#) Also see their [Github](#).

Stable Diffusion 3 now in beta produces results that appear to adhere very closely to the text input and renders actual graphic text accurately. Base SD3 still doesn't seem to rival Midjourney in terms of aesthetics.

DALL-E

<https://openai.com/dall-e-2/> | <https://openai.com/dall-e-3>

Open AI's DALL-E results lean toward a rendered look (earlier versions were more photorealistic vs Midjourney's artistry, but this has since changed)). Nuances in prompts tend to yield a greater variety of results and sometimes clarity compared to other generators, though more trial and error is usually required to attain stronger aesthetics, but ultimately it can produce superlative output. Seemingly leader in image generation featuring text/signage.

Interface is pleasantly streamlined & elegant with select image editing capabilities - akin to Stable Diffusion - allowing the addition & removal of objects. Unlike Midjourney, image upscaling is not built in. Dall-E usage is provided via credit packs and is also incorporated into Shutterstock, available to Shutterstock subscribers.

A new version, DALL-E 3 released October 2023 to ChatGPT Plus and Enterprise customers.

Google Imagen

<https://imagen.research.google/>
<https://aitestkitchen.withgoogle.com/tools/image-fx>

Very limited non-public release late 2022. Imagen is capable of generating videos and image inpainting.

On Google's restricted AI testing platform - AI Test Kitchen - they have released Imagen based City Dreamer which generates elements of a city around simple prompted themes, visualized in isometric form akin to SimCity.

In early 2024, Google released ImageFX in their AI Test labs based on Imagen 2 which has been getting good feedback compared to competitors. Photorealistic, though not as hyperreal as Midjourney. Its results appear to match text descriptions closer than other generators?

Adobe Firefly Image

<https://firefly.adobe.com/>

Trained on Adobe's Stock. It's the engine behind Generative fill in Adobe Photoshop.

V1 has a DALL-E 2 feel with Adobe's automagical shine. Easy to generate good looking images with prebuilt styles. V2 is now in beta.

Firefly will automatically attach a tag in the embedded Content Credentials to make AI-generated art and content easily distinguishable from work created without generative AI." Adobe has established the [Content Authenticity Initiative](#) (CAI) with Twitter & The New York Times.

Adobe Firefly is a broader generative AI than others, exemplified by Adobe Firefly Vector, first to market vector based generative AI. For a deeper look at Adobe Firefly tools, see [AI Platforms & Large-Scale Developers - Adobe.](#) for more

Specialist Generative AI & Tools

Cuebric

<https://seyhanlee.com/> | [Co-Founder Cuebric Article](#)

Cuebric is an A.I. image generation tool by Seyhan Lee that creates fully segmented, inpainted, integrated virtual environments in near real-time, and exports 2.5D backdrops to Unreal Engine for projection in virtual production volumes.

Designed for filmmakers, concept artists, matte painters, and production studios, it's a cost effective alternative to 3D unreal engine scenes or specialized plate photography and is available as an on set tool with [XR Studios](#), though since image generation requires text prompts, people with over 50,000 prompt experience are required for on set work.

Automated environment segmentation and rotoscoping is solid, can be combined with artist created work and features simple Photoshop style editing capabilities. Image generation leverages Stable Diffusion and can be used to alter select environment segments. In beta since December 2022 with a public release in summer 2023, future versions will include AI animated generation.

Interior AI

<https://interiorai.com/>

Interior design mockups and virtual staging. No descriptive support; generates concepts & variations based on thirty four styles including architectural/interior design styles, seasonal holidays and by mixing references.

Results currently are problematic if the camera shot is overly angled or uses a very wide lens.

PrometheanAI | Automated Virtual Set Dressing & 3D Asset Management

<https://www.prometheanai.com/> | <https://www.youtube.com/watch?v=czV1aIKNn2c>

Virtual set dressing/world building assistant and 3D asset management. Able to fill spaces intelligently with 3D props and provides assistance to accelerate asset handling. As the quality of 3D asset libraries featuring real world elements & furniture - from Megascans to Design Connected - have matured and grown, this tech is key to rapid conceiving and virtual set dressing.

Software available for free with paid subscription tiers. Fully featured versions are only accessible at the enterprise level with higher custom pricing.

Cadeera AI | Furniture & Home Decor Visual Search

<https://www.cadeera.com/>

Cadeera "combines intelligent visual & semantic search and personalisation to change the way we explore,

discover, and get inspired. A preference engine that understands people.”

Their efforts have been focused on furniture & home decor, leveraging computer vision to auto-tag images.

Though not yet public, demos can be scheduled.

Poly | Material & Texture Generation

<https://withpoly.com/>

Artists seeking AI assisted automated PBR material creation and texture map creation, including upscaling, tiling, seam removal, delighting, text to texture generation, etc. should check out web based AI tool Poly.

Results are convincing, though don't quite rival the best photo texture libraries (i.e. Megascans, Texture Supply, etc.). It's however a particularly invaluable tool for those hard to find textures & for design prototyping. A patch tool variations generated from uploaded images are also useful for creating modeled tiled surfaces.

Includes a large library of materials. Capable of generating 8K 32-bit EXR texture maps as of March 2023.

Poly Free will not output key roughness or metalness maps, nor ambient occlusion. Free generations are also public and available to other users. The issues can be circumvented with a \$20/month Poly Infinity subscription. Glossiness maps for a PBR specular workflow vs a PBR metallic workflow are currently not supported..

Plugins for automated material creation in 3D software (i.e. Megascans Bridge) are pending. A useful style matching feature is also in development.

AI Platforms & Large-Scale Developers

Runway

<https://runwayml.com/> | <https://app.runwayml.com/models>

Runway is a rapidly growing Brooklyn company developing web-based AI/ML tools with whom the committee has established a relationship. Their real-time browser based video editor incorporates effective AI/ML based rotoscoping & inpainting with a clean audio tool and Soundify that automatically matches sound effects to video.

They are first to market with AI generative video. Gen1 is a video to video generation tool requiring existing video. [Gen 2](#) generates novel videos with text, images or clips. Other AI magic tools include Text to 3D Texture, Text to Color Grade, and many more.

Runway's AI ML Lab also has a tool of interest for numerous member categories:

- Automatically generate design variations.
 - Included datasets: buildings, brutalist architecture, skylines, sneakers, landscapes, gargoyle statues and more.
- Overlay image analysis results with object detection commonly used in motion graphics security footage.
- Human motion imitation and appearance transfer for previsualization and costume design.
- Generate depth maps, upscale images, enhance lighting, etc. for concept art.

NVIDIA AI

Visual AI leader NVIDIA maintains a set of experimental AI software, [AI demos](#) via their [AI Playground](#), and their [Omniverse](#) platform. Capabilities include:

- [Nvidia Canvas](#). Use AI to turn simple brushstrokes into realistic landscape images inc. 360 images. Public beta software. Based on [GauGAN360](#) and [GauGAN2](#)
- [NVIDIA Instant NeRF](#) turns a set of static 2D images into a 3D rendered scene in seconds. Requires compilation, available on [github](#).
- [Lumos](#), an AI relighting tool. Though, limited to video conference portraits, a glimpse of what's to come.
- [GET3D](#). Generative AI that creates 3D textured models based on a single 2D image. Requires compilation.
- [Magic3D](#). Creates 3D textured models based on text prompt. Improves on [Dreamfusion](#). Released Paper.
- [Nvidia Image Inpainting](#).
- [Machinima](#) - AI Pose Estimation. Footage can be used to animate 3D characters, useful for previs.
- AI Toybox: [Animal Explorer](#). Prototype unique 3D animal meshes.
- AI Toybox: [GANVerse3D](#). Take photos of cars & create virtual replicas with lights, physics models & PBR.
- Omniverse also hosts third party AI tools including:
 - [Move.ai](#) - Capture high quality motion data from video in any environment using mobile phones.
 - [Lumirithmic](#) - Affordable High end facial scan and performance capture.
 - [Elevate3D](#) - The first commercial solution to automatically produce photorealistic 3D visualizations of products from 360° recordings. Note: Pricing is geared toward corporate clients, not individuals.

In late March 2023, Nvidia announced [Picasso](#), "a cloud service for building and deploying generative AI-powered

image, video, and 3D applications” that includes pre-trained text to image, video or 3D capabilities. In the near term, this could be the best option for generating 3D models. Picasso is used by Runway, Seyhan Lee, Adobe, etc.

Autodesk

Beyond Autodesk’s acquisition of Spacemaker AI (Urban site proposal software designed for architects, urban planners and real estate developers), their AI work focuses on BIM & CAD.

AutoCAD’s Markup AI, provides context-aware suggestions by reading handwritten & digital markups.

Their AI Labs, a division of [Autodesk Research](#), has led to several papers centering on automated CAD assembly.

A sample:

- [CLIP-Forge](#) - 3D voxelized (Minecraft style) model generation based on spoken words.
- [JoinABLE](#) - Learns how CAD parts connect to form joints, automating assembly from furniture to robotics.
- [Fusion 360 Gallery Assembly Dataset](#) - Multi-part CAD assembly for training.
- [Point2Cyl](#) - Reverse engineers CAD models from raw geometry/point clouds.
- [CAPRI-Net](#) - Input 3D objects which are decomposed into primitive shapes and as a CAD model.
- [UNIST](#) - Learns designs styles and transfers styles to new objects.
- [SkexGen](#) - Sketch and extrude generative model AI.

Adobe Firefly

<https://firefly.adobe.com/>

Based on Adobe’s Sensei AI platform and their generative Firefly AI models, several individual AI tools have been introduced into their software from content-aware fill in Photoshop & After Effects, to object selection in Photoshop.

Photoshop AI tools include:

Unique to their AI portfolio is Dimension’s Match Image, which uses AI to automatically match camera position & focal length, and generate estimated HDR lighting from a single photo. Though using a 360 camera with bracketed exposure is still recommended, it is a useful substitute that is also leveraged with a live camera feed via [Adobe Aero](#), their AR tool.

On October 10th, 2023, Adobe released [two new Firefly AI models](#):

- “Firefly Vector Model, the world’s first generative AI model for vector graphics, powers new Text to Vector Graphic in Illustrator.”
- “Adobe Firefly Design Model instantly generates stunning template designs, powers new Text to Template in Express.”

Topaz

<https://www.topazlabs.com/>

Topaz produces a line of AI enhancement products. Their GigaPixel software, an AI based image upscaler was the best of eight solutions tested in 2020 and is extremely effective in transforming low resolution images including thumbnails into beautifully high resolution images. Ideal for developing look books to sampling in concept art & graphic design.

Other products include DenoiseAI and Sharpen AI (now bundled with Gigapixel as PhotoAI) and VideoAI.

VideoAI handles not only denoising & upscaling for video, but also deinterlacing and stabilization.

LG AI EXAONE Atelier

<https://www.lgresearch.ai/>

LG AI Research's Exaone is provided for informational purposes and is not directly usable by membership.

Its massive dataset model - among the largest - is being used by Shutterstock and they have established a partnership with Parsons School of Design.

It can among other things, convert images into high quality descriptions & keywords, vital for searching, asset libraries.

"EXAONE Atelier is an ideation AI platform that supports collaborative work between AI and designers and artists... expand their creativity in their professional practices." Focus and marketing centers on how their AI can work in collaboration with designers as outlined by [AI persona Tilda](#)'s contribution to a fashion collection.

Generative 3D AI

Over a hundred developers from Microsoft & Google to OpenAI are working on AI that creates 3D models from text prompts or even just a single image avoiding the need for photogrammetry.

AI leader Nvidia's (see below) [Get3D](#), [Instant NERF](#) and [Magic3D](#) are examples. Some user-friendly services & apps include: [LumaAI](#), [Aritize3D](#), [Kaedim 3D](#), [SloydAI](#).

Still in their early infancy, these AI's generate low polygon meshes which may or may not be textured. Services, the costly Kaedim for example, use manual labor to quickly fix issues and guarantee quality (within 15 minutes from Kaedim) as the AI develops. Given their infancy, the value for art departments remains in question.

Generated models may be useful as a starting point or for quick set decoration where stock models do not exist, but will likely take some time to mature.

Notable Technology Developments

AI/ML in CAD

Adoption of AI in CAD is lagging. AI/ML requires datasets for training which have been lacking for CAD, but was addressed with the July 2020 release of SketchGraphs from Princeton and Columbia University researchers. Within the next several years this will help enable more efficient drafting through predictive and corrective measures and sets the stage for eventual automated drafting.

Also see developments by [Autodesk](#).

[CADGPT](#) powered by Elaine CAD Bot, ChatGPT and AmazonAWS designed to support AutoCAD users in daily tasks for an annual subscription. At this time, usefulness appears highly questionable.

- <https://developer.nvidia.com/blog/ai-helps-predict-and-sketch-computer-aided-design-models/>
- <https://arxiv.org/pdf/2007.08506v1.pdf>

ADOP | LiDAR Point Cloud Rasterization

LiDAR scans and photogrammetry 3D data appear as a cloud of points and for clearer viewability or practical application, it must be meshed, a slow process subject to degradation. While one can even view raw LiDAR scanned point cloud environments in the Unreal Engine in real time, it can be difficult to make out details or fully grasp what you're seeing as points are spaced apart.

ADOP (Approximate Differentiable One-Pixel Point Rendering) is an AI based rendering system that automatically fills the space between points, in essence rasterizing point cloud data. "The efficient one-pixel point rasterization allows us to use arbitrary camera movement and display scenes with well over 100M points in real time."

This will allow for superior virtual scouting and should transform future scouting via street view Google Earth.

Released as an academic paper with accompanying code, viewer, and video samples, practical adoption has been limited, curtailed in part by the computer resources required for AI processing. A new paper released in January 2022 puts forth a method for near instantaneous processing on a single GPU.

- <https://github.com/darglein/ADOP>
- <https://arxiv.org/pdf/2110.06635.pdf>
- <https://www.youtube.com/watch?v=j8tMk-GE8hY>

3D Guided AI

Designers will commonly struggle to have text to image generative AI capture their vision with sufficient precision. New tools enable designers to guide AI by building on sketches and basic 3D scenes. In this sense AI

truly becomes a collaborative partner.

[Vizom AI](#) turns sketches and basic renders into more detailed renders and has already proven popular among some established designers. Unreal Engine users can install the free plug-in [UE5 Dream](#) and use any imported geometry and the camera perspective to guide Stable Diffusion in generating concepts.

A similar 3D to Image tool is pending for Adobe's Firefly.

AI Texture Map & Material Generation

Material & texture map generation tool [Poly](#) is covered in the section Specialist Generative AI & Tools.

[Runway also has a texture generation tool](#). Alternatives include [Adobe Substance Sampler](#) and [Unity ArtEngine](#) which use some AI. Unity ArtEngine, while still available, has been discontinued. Substance Designer alternative [InstaMAT](#) incorporates AI for style transfer, up-resolution and inpainting.

Unity employee Keijiro Takahashi has created [AIShader](#), integrating ChatGPT into Blender for material creation.

As of late 2023, no notable advances in AI based automated UV unwrapping.

Pose Estimation

Several tools exist for guiding poses in generative AI imagery and applying to 3D models. Most popular are [OpenPose](#), [AlphaPose](#) and the animal centric [DeepLabCut](#). Aforementioned RunwayML, MoveAI, etc. also utilize such technology useful for concept and previz artists, though these are programmable solutions.

ChatGPT in Graphics Software

It has become increasingly commonplace to have scripts integrating ChatGPT into graphics software. Apart from aforementioned examples, CADGPT & AIShader, there is also [BlenderGPT](#), [MaxGPT](#), [Unity AICommand](#), etc.

While these API integrations are nascent and experimental, it does provide an assistant to help avoid repetitive tasks and offers a new way to interface, where in certain circumstances natural language can be a more efficient or a preferable way to interact.

While 3D software can be driven by ChatGPT then, other experimental integrations for [Photoshop](#) offer a new way to get software help.

Protection Against AI Training

Tools have been developed that prevents AI from training on 'protected' art works, spearheaded by students & faculty at the University of Chicago. See & download: [Nightshade](#) and [Glaze](#).