

## Experimental Visualization Lab

Media Arts & Technology, University of California, Santa Barbara

lab 2611, Elings Hall

Vislab.mat.ucsb.edu



### Applied Research & Projects in:

- Data Visualization
- AI & computational, algorithmic imaging studies
- Computational and Conceptual Photography
- Multi-robotic camera interaction systems
- Interactive Installations and data collection in public venues

Photo by Weihao Qiu

# Fencing Hallucination

Increasing Artistic Control in Interactive Media Arts  
by Merging AI Models with Hand-coded Programs

Weihaio Qiu, George Legrady

Expanded  
Animation

**MAT** Media Arts and Technology  
Graduate Program

UC SANTA BARBARA

EXPANDED 2024

Expanded  
Animation

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Animation

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## George Legrady Area of Specialization

I am an interdisciplinary digital media artist, scholar, and researcher.

The overall focus of my artistic and academic research and practice is based on the study of *how image-generating technologies* (camera, computer imaging systems, software) *inadvertently redefine the data they process*, and how this affects the content and meaning of the images, objects, and time-based media that these image-generating machines produce.

Like the other senior MAT faculty, I belong to the first generation of media artists to integrate computational processes since the mid-1980s for creating “[Born-Digital](#)” visualizations.

### **Areas of specialization:**

- Artistic, research projects and publications that explore algorithmic processes for photographic imaging and data visualization
- through semantic categorization and self-organizing systems
- interactive computational-based art installations, and
- mixed-realities narrative development.
- The approach engages both semantic and semiotic analyses of the optical-machine-software image, building on the longstanding tradition of the cultural critique of photographic representation.
- A key focus is the creative potential of such technologies for aesthetic coherence and expression.

**1972** Documentary photography

**1976** Conceptual photography

**1978** Staged fabricated studio photography

**1981** Introduced to computer programming

**1985** Digital 2D imaging / photography

**1992** Interactive digital installations

**2000** Data Visualization, Neural Networks

**2010** Data, Computational Photography

**2015** Machine-Learning

**2020** Texture Synthesis

**2022** Generative Image Synthesis

**Evolution of Artistic Practice**

1972

1976

1978

1981

1985

1992

2000

2010

2015

2020

2022

**1981** Acquired computer programming in the studio of the AI artist Harold Cohen

**1985** AT&T Truevision Targa Imaging System

**1992** Photoshop

**1992** Multimedia – Quicktime, Scanning

**1994** Internet arrives!!

**2006** Computational Photography

**2014** Convolutional Neural Networks , Style Transfer

**2015** Deep-Learning

**2020** texture Synthesis

**2022** MidJourney, Stable Diffusion

**Technological Access**

# Current ExpVisLab Research

## **Image Complexity & AI (*Advancing Greater Understanding and Control in Generative AI Image Synthesis through ScanPath Analysis*)**

### **Investigators:**

- George Legrady (lab director)
- Weihao Qiu (Senior MAT doctoral student with CS background)
- Shaw Xiao (MAT graduate student with Industrial Design background)
- Grace Feng (UCSB CS undergraduate)

### **Summary:**

Integrates knowledge and methods from three research areas for AI image generation

- 1) Acquisition of visual domain experts' contemporary aesthetics
- 2) Humanities analytical cultural research about how we perceive and understanding AI images
- 3) Development of computational algorithms through custom software enhancing public usage of image creation.

While diffusion models generate photorealistic images across various subjects, they often fail to capture the unique qualities of the full range of possible images as seen in artistic to technical/scientific works. This limitation arises from the models' reliance on datasets which lack a well-thought curation process, resulting in the underrepresentation of visual art and technological complex compositions. We propose an evaluation model through the eye-tracking capture of how visual experts scan images and to integrate the collected data by which to advance innovation in AI generated images.



## **MAT 255 Techniques, Aesthetics of the Computational Image**

Tues-Thurs 3:30pm-5:20pm – Experimental Visualization Lab, 2611, Elings Hall

- A project-based course for creative exploration and
- critical analysis of text-to-image and image-to image production techniques in MidJourney and Stable Diffusion software

*This course does not include software programming (unless you are interested in doing so on your own)*

- The goal is to explore the creative process of readily available AI software and to investigate the impact of AI on how we create and understand the photograph's transformation through weekly presentations of projects, methods and discussion to analyze the impact of diffusion models on the creative process



# **MAT 255 Techniques, Aesthetics of the Computational Image**

## **Course Links & Course Work**

**Course Syllabus:** <https://www.mat.ucsb.edu/~g.legrady/academic/courses/24f255/24f255.html>

**Student Forum:** <https://w2.mat.ucsb.edu/forum/viewforum.php?f=93>(where work is to be posted)

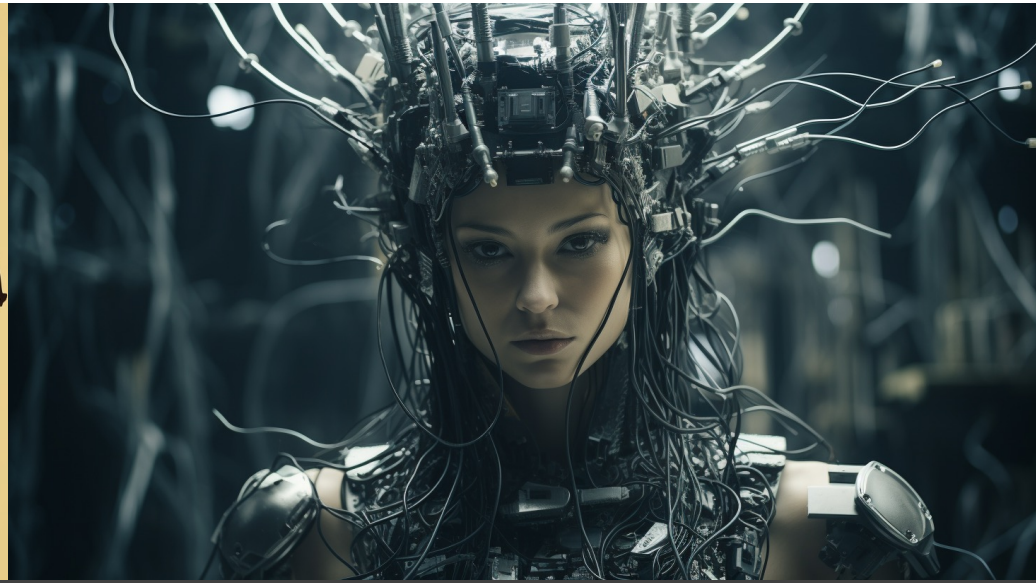
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### **Course Completion:**

- Attendance and participation in class meetings, lectures, etc.
- Posting of weekly assignments at the student forum
- Final Project / Report



**Bryan Serra:** "modern mesoamerican people, indigenous, futuristic technology, spiritual connection to the internet, personification of the internet, CPU motherboard, wires, full-body, neutral pose, fashion runway --ar 16:9 --no portrait, close up, 3/4 shot --style raw --s 250 "



**Bryan Serra:** " modern mesoamerican people, futuristic technology, spiritual connection to the internet, personification of the internet, CPU motherboard, wires, full body photo, neutral pose, fashion --ar 16:9 --style raw --s 250 "



**Bryan Serra:** "modern mesoamerican people, headdress futuristic technology, spiritual connection to the internet, personification of the internet, CPU motherboard, wires, 2010s tumblr flicker blohouse indie sleaze seapunk witch house aesthetic, full-body photo, neutral pose, fashion runway --ar 16:9 --no portrait, close up, 3/4 shot, drawing --style raw --s 250"



**Bryan Serra:** "Midjourney Bot BOT — Today at 3:34 AM modern mesoamerican people, futuristic technology, spiritual connection to the internet, personification of the internet, CPU motherboard, wires, 2010s tumblr flicker blohouse indie sleaze crystal castles witch house aesthetic, full-body photo, neutral pose, fashion runway - -ar 16:9 --no portrait, close up, 3/4 shot, drawing --style raw --s 250"



**Colin Dunne:** Prompt: *kid running for class president, hope style poster from obama campaign --ar 9:16 --s 50*

This did not meet my expectations at all. There was some amount of subversion of my expectations to the benefit of the outcome like the AI interpreting the query of “running” literally. The style seen is depicted as realistic despite the efforts of the query. Something that became clear to me was similar to the cultural code imbued with prompts in general where they typically assume the cultural dominant image of the white man. This particular query with the word “obama” resulted consistently in images of people with darker skin complexions. The norm remained with male representation. I found it interesting that the AI tried to return text in the image. This particular one with the element of text was the best result because the composition hid most of the text’s imperfections. I would rate this a 3 or 4 particularly because of the interesting takeaway of the cultural influence and how it can be navigated in ways other than direct negations to the dominant cultural norm in the prompt



Tinghao Zhou: *Pollens*



*Jack Kilgore: hands first person, angels playing counter strike, first person shooter, photorealistic, 8k --quality 2 --ar 16:9*



*Jack Kilgore: black metal guitarist in the desert; super 8; 2pm; closeup of hands --seed 2083*

Seed: 1

Seed: 2

Seed: 5

Seed: 10

Seed: 100

CFG Scale: 1.0



CFG Scale: 3.0



CFG Scale: 5.0



CFG Scale: 10.0



CFG Scale: 20.0



**Autumn Smith:** Rainy day in Paris, man standing on corner holding a violin and a bottle of wine, with a dalmatian by his side  
 Steps: 34, Sampler: DPM++ 2M Karras, CFG scale: 1.0, Seed: 1, Size: 800x510, Model hash: 6ce0161689, Model: v1-5-pruned-emaonly, Script: X/Y/Z plot, X Type: Seed, X Values: "1, 2, 5, 10, 100", Fixed X Values: "1, 2, 5, 10, 100", Y Type: CFG Scale, Y Values: "1.0, 3.0, 5.0, 10.0, 20.0", Version: v1.6.0



maintain image similarity keep abstract, maintain unevenly distributed texture, imbalance,

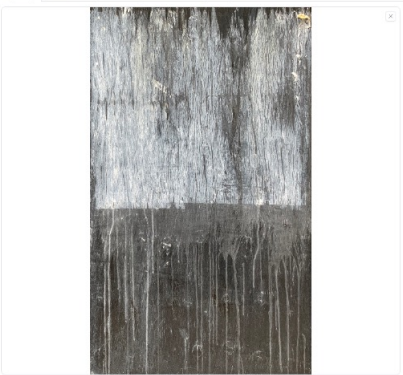

Interrogate CLIP Generate

objects, background, centered lighting, figures, people, evenness

Interrogate DeepBooru

Generation Textual Inversion Hypernetworks Checkpoints Lora

img2img Sketch Inpaint Inpaint sketch Inpaint upload Batch

maintain image similarity keep abstract, maintain unevenly distributed texture, imbalance,  
Negative prompt: objects, background, centered lighting, figures, people, evenness  
Steps: 20, Sampler: DDIM, CFG scale: 8, Seed: 231122, Size: 800x1200, Model hash: 74400420d, Model: sd\_v1\_refiner\_1.0, Denoising strength: 0.75, Version: v1.6.0  
Time taken: 2.4 sec. 9.75 GB, 11.10 GB, 11.823.6394 GB (18.2%)

maintain image similarity keep abstract, maintain unevenly distributed texture, imbalance, maintain uneven coloration

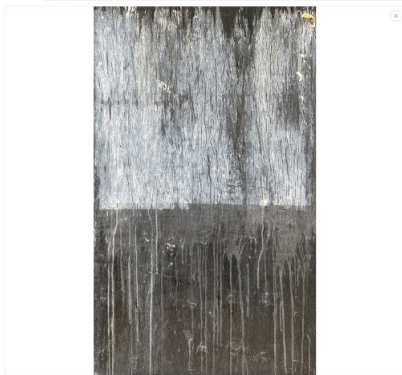

Interrogate CLIP Generate

objects, background, centered lighting, figures, people, evenness, representation, trees, nature, literal, stupid, face, figure, hair, background, lighting

Interrogate DeepBooru

Generation Textual Inversion Hypernetworks Checkpoints Lora

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maintain image similarity keep abstract, maintain unevenly distributed texture, imbalance, maintain uneven coloration  
Negative prompt: objects, background, centered lighting, figures, people, evenness, representation, trees, nature, literal, stupid, face, figure, hair, background, lighting  
Steps: 20, Sampler: Euler a, CFG scale: 7, Seed: 231122, Size: 800x1200, Model hash: 74400420d, Model: sd\_v1\_refiner\_1.0, Denoising strength: 0.75, Version: v1.6.0  
Time taken: 2.9 sec. 9.75 GB, 11.10 GB, 11.823.6394 GB (18.2%)

maintain image similarity keep abstract, maintain unevenly distributed texture, imbalance, maintain uneven coloration

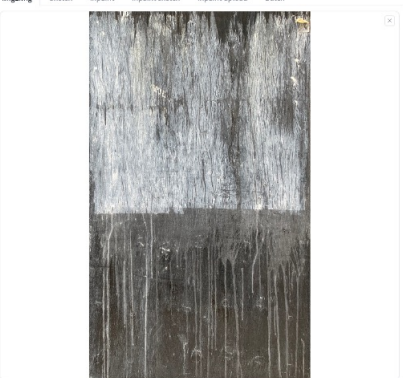

Interrogate CLIP Generate

objects, background, centered lighting, figures, people, evenness, representation, trees, nature, literal, stupid, face, figure, hair, background, lighting

Interrogate DeepBooru

Generation Textual Inversion Hypernetworks Checkpoints Lora

img2img Sketch Inpaint Inpaint sketch Inpaint upload Batch

maintain image similarity keep abstract, maintain unevenly distributed texture, imbalance, maintain uneven coloration  
Negative prompt: objects, background, centered lighting, figures, people, evenness, representation, trees, nature, literal  
Steps: 20, Sampler: DDIM, CFG scale: 7, Seed: 231122, Size: 800x1200, Model hash: 74400420d, Model: sd\_v1\_refiner\_1.0, Denoising strength: 0.75, Version: v1.6.0  
Time taken: 2.8 sec. 9.75 GB, 11.10 GB, 11.823.6394 GB (18.2%)

maintain image similarity keep abstract, maintain unevenly distributed texture, imbalance, maintain uneven coloration

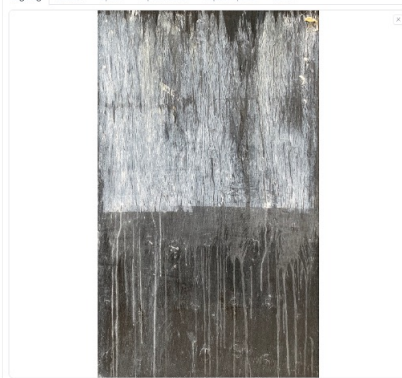

Interrogate CLIP Generate

objects, background, centered lighting, figures, people, evenness, representation, trees, nature, literal

Interrogate DeepBooru

Generation Textual Inversion Hypernetworks Checkpoints Lora

img2img Sketch Inpaint Inpaint sketch Inpaint upload Batch

maintain image similarity keep abstract, maintain unevenly distributed texture, imbalance, maintain uneven coloration  
Negative prompt: objects, background, centered lighting, figures, people, evenness, representation, trees, nature, literal  
Steps: 20, Sampler: DDIM, CFG scale: 6, Seed: 231122, Size: 800x1200, Model hash: 74400420d, Model: sd\_v1\_refiner\_1.0, Denoising strength: 0.75, Version: v1.6.0  
Time taken: 2.6 sec. 9.75 GB, 11.10 GB, 11.823.6394 GB (18.2%)

Stable Diffusion img-to-img Results: Current challenges is how to have greater control of results

Stable Diffusion checkpoint: v1-5-pruned-emaonly/safetensors [6ce11689] | SD VAE: Automatic

bt2img | **img2img** | Extras | PNG Info | Checkpoint Merger | Train | Promptgen | Settings | Extensions

an irregular, complex, robotic machine placed in an enclosed lab space viewed sideways 0/75

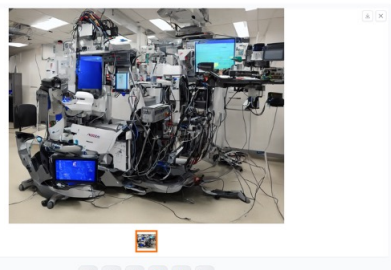
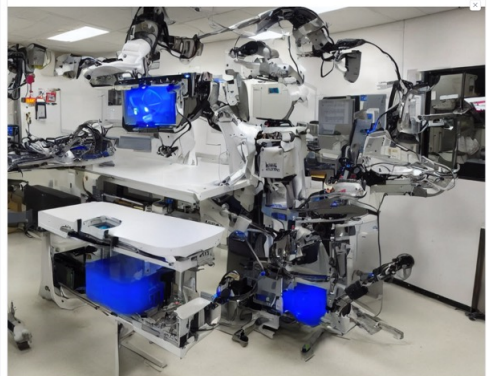
Interrogate CLIP

Interrogate DeepBooru

symmetry, forward perspective 4/75

Generate

img2img | Sketch | Inpaint | Inpaint sketch | Inpaint upload | Batch



an irregular, complex, robotic machine placed in an enclosed lab space viewed sideways

Negative prompt: symmetry, forward perspective,  
Steps: 20, Sampler: DPM++ 2M Karras, CFG scale: 7, Seed: 3262235426, Size: 1024x1024, Model hash: 6ce0161689, Model: v1-5-pruned-emaonly,  
Denoising strength: 0.75, Version: v1.6.0

Time taken: 1.8 sec. | 5.26 GB | 8.43 GB | 9.223.6504 GB (31.9%)

Stable Diffusion checkpoint: v1-5-pruned-emaonly/safetensors [6ce0161689] | SD VAE: Automatic

bt2img | **img2img** | Extras | PNG Info | Checkpoint Merger | Train | Promptgen | Settings | Extensions

an irregular, complex, cluttered robotic machine made of translucent light placed in an enclosed lab space viewed sideways 22/75

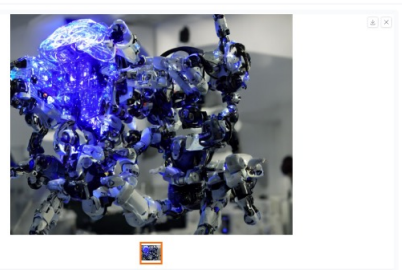
Interrogate CLIP

Interrogate DeepBooru

symmetry, forward perspective, cabinets 6/75

Generate

img2img | Sketch | Inpaint | Inpaint sketch | Inpaint upload | Batch



an irregular, complex, cluttered robotic machine made of translucent light placed in an enclosed lab space viewed sideways

Negative prompt: symmetry, forward perspective, cabinets  
Steps: 20, Sampler: DPM++ 2M Karras, CFG scale: 7, Seed: 811710814, Size: 1024x1024, Model hash: 6ce0161689, Model: v1-5-pruned-emaonly,  
Denoising strength: 0.75, Version: v1.6.0

Time taken: 1.8 sec. | 5.26 GB | 8.43 GB | 9.223.6504 GB (31.9%)



## Image Research: How to Gain Greater Control over Photographic Primitives

- Cultural and ideological visual content
- the sub-division and organization of the image
- Point-of-View: How is the angle of the view determined
- visual tension between forms
- overall simple to complex structures
- foreground / background
- regular to irregular forms (repetition / variation)
- balanced / imbalanced spatial grouping of forms
- what angle directions for forms and lines
- rhythmic variation
- texture range for each form
- light / dark tones for subsections
- the number of light / dark toning areas
- the number of colors, color hue(s), color saturation, color darkness / brightness
- complementary color contrast
- depth perspective (depth of field)
- blur value between visual elements

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