

**MIT 4.562/502 Fall 2024 Architecture in Motion Graphics (Advanced Visualization)**  
Cinematic, Interactive and Narrative of Spatial Experience

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Prepared by: Takehiko Nagakura

**Staff**

Takehiko Nagakura                      takehiko@mit.edu (Associate Professor)  
Xiaoyun Zhan                              xiaoyunz@mit.edu (TA, PhD student)

**Meeting times**

Mondays 12:30-3:00pm: Lectures and reviews (Off-line meeting)

Mondays 7:00-8:30: Demos and hands-on lab (Off-line meeting)

\* 4.562 is for Grad students. 4.502 is for Undergrad students. The classes meet together.

~~\* One required half day weekend session (live video recording practice) and another optional weekend session (VR lab introduction) are planned during the semester.~~

\* One online class is expected during November due to the conference trip of instructors. Date is TBA.

**Grades**

Grades will be based on assignments, participation in class discussions and the final project.

4 assignments (ex1-ex4: see below)      55% (= 5% + 20 % + 15 % + 15 %)

Reading/Discussion/Participation      10%

Final project (presentation required)    35%

**Final Presentation**

Two dates are allocated for the final presentation: the last class (December 11) and the exam day of this class set by the institute. By default, undergrad students are asked to present the final project during the last class, and grad students are asked on the day of the exam. If you like to present on the other date, please let the TA know. Participation to the final presentation is required to complete the class. A team project is allowed upon permission of the instructor.

**Assignments and Final Project (subject to change)**

Each week, one short lecture by the instructor is followed by one lab session that students are required to attend. The lecture time is also used for reviewing student projects. Additionally, there is a set of five reading materials distributed over the semester, and a discussion session on each set takes place during the lecture when each reading assignment is due. A student is expected to attend all lectures, spend time outside the class to complete assignments and the final project, and engage in the discussion sessions and reviews.

- ex1: Digital Storyboard (Video editing: 1 week, small team) 5%
- ex2: Light, Material, Camera and Spatial Experience (Animation: 3+1 weeks, individual) 20%
- ex3: Collaging Reality, Reconfiguring Experience (3D Capturing: 2 week, small team) 15%
- ex4: Event and Spatial Experience (Game Engine or Video Editing: 2 weeks, mid-size team) 15%
- Final Project: There will be an initial pinup, a mid-point check, and a final review (4 weeks)

\* Students deliver their assignments and final projects as video clip/interactive content presentation. All **the digital contents produced by students in this class (video and interactive**

contents) will be publicly reviewed in the class, and submitted for class archive with selected projects given online access for future students and public education as reference. Please attach the full credit of any included contents within the digital material at the time of assignment submission.

\* Graduate Students are asked to make additional work on reading assignments.

### **Reference (Film Technicality)**

The Five C's of Cinematography by J Mascelli.

Michael Rabiger: Directing - Film Techniques and Aesthetics -

Richard Stromgren+Martin Norden : Movies -a language in light

Daniel Arijon : Grammar of the Film Language

### **Reference (Theory and Critique)**

Andre Bazin: What is Cinema?

Eisenstein: Film Form, Film Sense

Rudolf Arnheim: Film as Art

Christian Metz: Film Language : A Semiotics of the Cinema

Tarkovsky: Sculpting in Time

The Architecture of Image - existential space in cinema -

Anthony Vidler: The Explosion of Space (Film Architecture From Metropolis to Blade Runner)

### **Software instruction (You may use any alternative tools you like.)**

Main tools: 3DS Max, Adobe Premiere, Unity 3D, Recap, MIT Design Heritage

Other recommended/alternative tools: Metashape, Blender, V-Ray, Substance 3D Painter

### **Cost**

- All necessary software is available on the public computers in studios and PC classrooms, free for student version, or through floating license distribution on your own computer if you are using them on campus or while connected on MIT VPN. (These licenses are offered with limited numbers.)

- To work on the assignments using your own laptop computers:

a. Autodesk software (3DS Max, Remake, etc.): Student license is free.

b. Adobe Premiere: Adobe Creative Cloud for MIT students is free. (Not confirmed for 2024)

For others, student license is available from Adobe for \$20/month

c. Unity3D: Personal/Student version is free.

x. Please visit STOA website below for details of all software availability and access.

<https://stoa.mit.edu/>

- Purchase of your own headphone is recommended to avoid annoying others while you are working on your assignments.

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<b>date:09-02 Mon</b>		Labor Day holiday
<b>date:09-03 Tue</b>		Registration Day
<b>date:09-09 Mon</b>	Class 01 Lab	Introduction - Telling a story Digital NLE (Premiere/After Effects) Compositing and Editing with Audio Clips <a href="#">Lab Note for Premiere Tutorial</a> * Login as 4.562. Password required.
	<b>Excercise #1</b>	OUT: Imagining Storyboard (Digital Pre-vis) <a href="#">Exercise 1 Handout</a> <a href="#">Audio Clips and Demo ( registration )</a>
	Screening <b>Reading #1</b>	Mr. Jones, My Architect OUT: Mascelli, The five C's of cinematography <a href="#">camera angle (pdf)</a>
<b>date:09-16 Mon</b>	Class 02 Discussion Deadline <b>Excercise #2</b>	Composition and Motion Camera <b>Reading #1</b> [required for 4.562] <b>Excercise #1</b> (in-class presentation) OUT: Opening Sequence -Architecture of Cinematic Reality - <a href="#">Exercise 2 Handout</a> <a href="#">Furniture models (Herman Miller, etc)</a>
	Lab	3DS Max Basics (and Radiosity Intro) <a href="#">Lab Note for Max install/Setup</a> READ THIS FIRST! <a href="#">Lab Note for Max basics and radiosity</a> <a href="#">Lab Note for Max importing files</a>  <a href="#">Radiosity Diagrams</a> <a href="#">MIT 3dsMax2017-selector-classic-design.zip</a>
		Camera Animation (Key framing and motion path) <a href="#">Lab Note for Max Camera animation</a>
		Sample File (3D models) * When you open the models below in 3DS Max, the dialog to perform "scene conversion" may appear. For Radiosity, just close it without conversion. - Set 1 (Citrohan House): <a href="#">3d citrohan v13c2.dwg/max (zipped)</a> <a href="#">image sample</a> - Set 2 (MIT office): <a href="#">rotch d 07b 4562 v01.dwg/max (zipped)</a> <a href="#">image sample</a> <del><a href="#">Lightscape (old tool: for reference only)</a></del>
	Screening	Charade, Psycho, Ginza Walk Through
<b>date:09-23 Mon</b>	Class 03 Lab	Lighting the Scene Illumination Model, Radiosity and Raytracing Daylight Simulation, Photometric Lights in 3DS Max Radiosity Visualization IES Photometric Data, Render Farm/Cloud Rendering <a href="#">Lab Note for Max Photometric Light/IES</a> <a href="#">Photometric Lights Catalogues</a> <a href="#">Sample Photometric Lights</a> <a href="#">Citrohan House Lighting Transformation</a>
		Reference <a href="#">Film Analysis Example, Kyoung KWon (part #1)</a>

Stereographic imaging (See Class 04)  
Vray Introduction (See Class 10)

**Reading #2** [This assignment is moved to later class]  
OUT: Rudolph Arnheim: Film as Art  
[Questions.pdf](#), [FaA1.pdf](#), [FaA2.pdf](#)  
Screening Lumiere Brothers First Film, Ruttmann's Berlin

**date:09-30 Mon** Class 04 Materiality and Tectonics  
Discussion **Reading #2** [moved to later class]  
Lab Texture UV Mapping, Procedural Mapping  
[Lab Note for Max material and texture](#)  
[Lab Note for Max general tips](#)  
[Lab Note for Max rendering checklist](#)  
[Texture Coordinates Illustrations](#)  
  
[3d citrohan model with no glass for texturing](#)  
[MAX Sample Textures \(new\)](#)  
[VIZ4 Sample Textures \(old: only for reference\)](#)  
  
[Adobe Substance 3D Painter \(NEW\) part1 2 3 4 5](#)  
  
Background, Sky, and Environment Map  
[Lab Note for Max sky and ground](#)  
[Examples for Max sky and ground](#)  
[Sample Map for Sky and Ground](#)  
  
Editing/Post-process Animation  
[Lab Note for Importing/Post-process in Premiere](#)  
[HDR Image Example and OpenHDR Viewer](#)  
[Image Gamma Correction](#)(old: for reference)  
  
Stereographic imaging  
[Lab Note for Max stereoscopy](#)  
  
TN Office [stereoscopic animation on YouTube](#)  
(Chrome or FireFox needed to see anaglyphic 3D)  
  
Citrohan House [Anaglyphic images and animation](#)  
  
[3DS Camera Rig by TN 02.max \(zipped\)](#)  
[Stereoscopic Player from 3dtv.at](#)  
  
Vray Introduction (See Class 10)

~~date:10-08 Sat optional VR Lab tour~~

**date:10-07 Mon** Class 05 Scanning Reality, Interactive Viewing  
Deadline **Excercise #2** (in-class presentation)  
**Excercise #3** OUT: Online Gallery  
-Collaging Dislocated Reality, Reconfiguring Experience-  
[Excercise 3 Handout](#)  
  
Reference [Baker House AR \(2021\) \(YouTube\)](#)  
[MIT Machu Picchu Project \(YouTube\)](#)  
[Capturing History Bit by Bit](#)  
[Kangaku-in Villa Desktop VR](#)  
  
Lab Photogrammetric capturing, Lidar  
Example (Use Chrome for viewing)  
[Digital Heritage Workshop 2013 \(i palladio\)](#)  
  
Tutorials 1  
Photogrammetric software and tutorials  
[Recap Photo/Metashape and more](#)

		3D Collaboration Platform <a href="#">Design Heritage Introduction</a>
		Tutorials 2 (for week 2) <a href="#">Baking to Texture in 3DS Max</a>
	<b>Reading #2</b>	OUT: Rudolph Arnheim: Film as Art <a href="#">Questions.pdf</a> , <a href="#">FaA1.pdf</a> , <a href="#">FaA2.pdf</a>
<b>date:10-14 Mon</b>		Indigenous Peoples Day holiday
<b>date:10-15 Tue</b>		Student Holiay
<b>date:10-21 Mon</b>	Class 06	Video Composite, Visualization with Network Model
	Discussion	<b>Reading #2</b>
	Lab	NeRF: Neural Radiance Fields, Gaussian Splatting
		Shot Planning with Premiere/Unity: Chroma key <a href="#">Lab Note for Premiere Chroma Key</a> <a href="#">Example (Firminy Long Lounge)</a> <a href="#">Blue Screen (Chroma Key) demo</a> <a href="#">Blue background session rig files (zipped)</a>
		Camera Motion Capture/Tracking Blender Tracking tutorial(See Dropbox location) SynthEyes (optional for self-learning) <a href="#">Example (Firminy Pepsi Can)</a> <a href="#">Blender home page (free)</a> <a href="#">Blender Tutorial (pointers to videos)</a> <a href="#">SynthEyes home page</a> <a href="#">Syntheyes (Video) Tutorials</a> <a href="#">Syntheyes Manual for v2013</a> <del><a href="#">(Old Manual for v2008+1)</a></del>
		3DS Max Channel rendering, Video post, G-channel (Render by Elements and Video Composite) <a href="#">example</a>
	Reference	<a href="#">Mies van der Rohe's drawings (zipped jpg)</a> <a href="#">Shot examples in pre-vis. format</a>
	Marker-based	Motion Tracking example <a href="#">GE Plugin Smartgird.com</a> <a href="#">AR Media 3DS Plug-in</a>
	Screening	Video: <a href="#">Setting up a Blue Screen Studio at MIT</a>
<b>date:10-28 Mon</b>	Class 07	Interactive Experience vs Linear Montage
	Lab	Game Engine software Setting up a Scene in Unity 3D <a href="#">Download Free Personal Edition of Unity 3D</a>
	Deadline	<b>Excercise #3</b> (in-class presentation)
	<b>Excercise #4</b>	OUT: Virtual Tour of Location X <a href="#">Exercise 4 Handout</a>  <a href="#">Examples (desktop VR and AR)</a>  <a href="#">Mies van der Rohe's drawings (zipped jpg)</a>
	Reference	Automated Cinematographer <a href="#">A Synthetic Moviemaker (Siggraph 2006 paper)</a> <a href="#">Man with the Movie Camera</a> (YouTube link)
	Screening	The Umbrellas of Cherbourg
<del>date:11-05 Sat</del>	<del>extra lab</del>	<del>Bluescreen studio live recording session</del>

~~(Subject to the COVID-19 pandemic situation)~~

<b>date:11-04 Mon</b>	Class 08	Figures and Props
	Lab	Animating Figures in Spatial Design Populate video tutorial (Autodesk tips/tricks) <a href="#">1</a> , <a href="#">2</a> , <a href="#">3</a> , <a href="#">4</a> , <a href="#">5</a> , <a href="#">6</a> <a href="#">Lab Note for 3DS Max Populate/Unity 3D Export</a>
		Biped Character Animation (Character Studio) <a href="#">Lab Note for 3DS Max Character Animation</a> <a href="#">Sample figures and setup</a> (Skinned Figures/BIP Motion/Blue Screen Set: Download and unzip the Max file and texture file to a directory together before use.)
		<a href="#">Emerging "Video to Motion" apps (Figure Mo-cap)</a>
		<a href="#">Modeling by Gesture</a> <a href="#">Tracking a walk by Kinect</a> Circulating a figure in architectural model <a href="#">example</a>
	Screening	<a href="#">Space Re-Actor</a> by Taro Narahara
<b>date:11-11 Mon</b>		Veterans Day holiday <del>Monday classes shift to Tuesday this week.</del>
<b>date:11-18 Mon</b>	Class 09	Precedents: Final project for 4.502/4.562 Physics Simulation
	Deadline	<b>Excercise #4</b> (in-class presentation)
	<b>Excercise #F</b>	OUT: Final project <a href="#">Final Project Handout</a> Spatial Experience in Motion Graphics
	<b>Reading #3</b>	OUT: Eisenstein: Film Form/Sense <a href="#">Questions.pdf</a> <a href="#">arch.pdf</a> , <a href="#">form.pdf</a> , <a href="#">sense.pdf</a> Acropolis 360 on Plan <a href="#">YouTube video by TN</a> (Use Chrome for 360 view)
	Screening	Final projects of previous students Kuleshov Experiment, Psycho, Battleship Potemkin Psycho, <a href="#">Hitchcock 1964 Interview on Montage</a>
	Lab	Motion Dynamics/Inverse Kinematics in MassFX <a href="#">demo file (MassFX basics): after Max 2012</a> <a href="#">demo file (Reactor, part 1): before Max 2011 (old)</a>  <a href="#">Lab Note for Max MassFX</a> <a href="#">Lab Note for Max ART rendering</a> <a href="#">Lab Note for Max iray rendering (old)</a>
		Physics Animation Examples <a href="#">example (gravity, collision, wind)</a>
		More procedural material <a href="#">Simple Water in 3DS Max</a>
	Screening	<a href="#">SONY Bravia CF</a> /transformating daily life (at MIT)
<b>date:11-25 Mon</b>	Class 10	Predictive Visualization: Unbuilt Monuments
	Discussion	<b>Reading #3</b> [required for 4.562]
	Reference	Automated Cinematographer <a href="#">A Synthetic Moviemaker (Siggraph 2006 paper)</a> <a href="#">Man with the Movie Camera</a> (YouTube link)
	Deadline	<b>Final Project Proposal review</b> (Storyboard + Set)

	Lab	VRay (Global Illumination Rendering with Caching) <a href="#">Lab Note for 3DS Max Vray (Check yellow part.)</a> <a href="#">Rendering Animation with VRay</a>
	<b>Reading #4</b>	OUT: Andre Bazin: What is Cinema? <a href="#">Questions.pdf</a> <a href="#">bazin.pdf</a> <a href="#">Special Effect use in Citizen Kane (YouTube)</a> <a href="#">YouTube Clips (Flaherty/Lamorisse/Chaplin, etc)</a>
	<del><b>Reading #5</b></del>	<del>Christian Metz: Film Language</del>
	Screening	Unbuilt Monuments
<b>date:11-28 Thu</b>	No class	Thanksgiving Holiday Week (Th 28, Fr 29)
<b>date:12-02 Mon</b>	Class 11	Augmented and Virtual Reality
	Discussion	<b>Reading #4</b> [required for 4.562] <del><b>Reading #5</b> [required for 4.562]</del>
	Lab	<a href="#">Palladio Burns and 360</a> (Chrome recommended.) <a href="#">Double Tour: S. Giorgio Maggiore Refectory</a> <a href="#">QuickTime VR by Apple</a> (History) <a href="#">Interior Panorama with IES Light (Citrohan House)</a> <a href="#">QTVR Panorama conversion tool</a> demo file: <a href="#">3d citrohan v13c panorama.max (zipped)</a> Workshop (Consultation for Final Projects)
		Reference 4: Augmented Reality in Architectural Exhibitions (Nagakura, et. al.)
<del><b>date:12-09 Mon</b></del>	<del>Class 12</del>	<del>TBA</del>
<b>date:12-09 Mon</b>	Class 12	Final Presentation 1 (Recommended for UG Students)
	Lab	<del>Clothes, Hair, Snow, etc.</del> Workshop (Consultation for Final Projects)
<b>date:12-11 Wed</b>		Last day of class at MIT
<b>date:12-16/20</b>	(during MIT Final exam week)	Final Presentation 2