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

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Staff

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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 Stromgre+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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date:09-02 Mon   Labor Day holiday

date:09-03 Tue   Registration Day

date:09-09 Mon   Class 01   Introduction – Telling a story
                    Lab   Digital NLE (Premiere/After Effects)
                                   Compositing and Editing with Audio Clips
                                       [Lab Note for Premiere Tutorial](#)
                                       * Login as 4.562. Password required.
                    `Excercise #1` OUT: Imagining Storyboard (Digital Pre-vis)
                                       [Exercise 1 Handout](#)
                                       [Audio Clips and Demo](#) ([registration](#))

                    Screening   Mr. Jones, My Architect
                    `Reading #1`   OUT: Mascelli, The five C's of cinematography
                                       [camera_angle (pdf)](#)

date:09-16 Mon   Class 02   Composition and Motion Camera
                    Discussion   `Reading #1` [required for 4.562]
                    Deadline   `Excercise #1` (in-class presentation)
                    `Excercise #2` OUT: Opening Sequence
                                       -Architecture of Cinematic Reality –
                                       [Exercise 2 Handout](#)
                                       [Furniture models (Herman Miller, etc)](#)

                    Lab   3DS Max Basics (and Radiosity Intro)
                                       [Lab Note for Max install/Setup](#) READ THIS FIRST!
                                       [Lab Note for Max basics and radiosity](#)
                                       [Lab Note for Max importing files](#)

                                       [Radiosity Diagrams](#)
                                       [MIT_3dsMax2017_selector_classic_design.zip](#)

                                   Camera Animation (Key framing and motion path)
                                       [Lab Note for Max Camera animation](#)

                                   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):
                                       [3d_citrohan_v13c2.dwg/max (zipped)](#)
                                       [image sample](#)
                                   - Set 2 (MIT office):
                                       [rotch_d_07b_4562_v01.dwg/max (zipped)](#)
                                       [image sample](#)
                                       [Lightscape (old tool: for reference only)](#)

                    Screening   Charade, Psycho, Ginza Walk Through

date:09-23 Mon   Class 03   Lighting the Scene
                                   Illumination Model, Radiosity and Raytracing
                    Lab   Daylight Simulation, Photometric Lights in 3DS
Max

                                   Radiosity Visualization
                                   IES Photometric Data, Render Farm/Cloud Rendering
                                       [Lab Note for Max Photometric Light/IES](#)
                                       [Photometric Lights Catalogues](#)

              Sample Photometric Lights
              Citrohan House Lighting Transformation
          Reference
              Film Analysis Example, Kyoung KWon (part #1)

         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- Exercise 3 Handout
	Reference	Baker House VR (YouTube v2007), (Oculus app

v2024)

              Baker House AR (2021) (YouTube)
              MIT Machu Picchu Project (YouTube)

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                          Capturing History Bit by Bit
                          Kangaku-in Villa Desktop VR

              Lab   Photogrammetric capturing, Lidar
                          Example (Use Chrome for viewing)
                            Design Heritage Workshop 2013(i_palladio models)

                          Tutorials 1
                            3D capture, Design Heritage, and Gravity Sketch
                            Scanning tools (Metashape, Recap Pro, Polycam),
                            Design Heritage and Gravity Sketch

                          Tutorials 2 (for class 06)
                            Baking to Texture in 3DS Max

date:10-14 Mon   Indigenous Peoples Day holiday
date:10-15 Tue   Student Holiay

date:10-21 Mon Class 06 Interactive Experience vs Linear Montage

              Lab   Game Engine software
                          Setting up a Scene in Unity 3D
                            Download Free Personal Edition of Unity 3D

              Deadline   Excercise #3 (in-class presentation)
              Excercise #4 OUT: Virtual Tour of Location X
                          Exercise 4 Handout

                          Examples (desktop VR and AR)

                          Mies van der Rohe's drawings (zipped jpg)

              Reference   Automated Cinematographer
                            A Synthetic Moviemaker (Siggraph 2006 paper)
                            Man with the Movie Camera (YouTube link)

              Screening   The Umbrellas of Cherbourg

              Reading #2 OUT: Rudolph Arnheim: Film as Art
                            Questions.pdf, FaA1.pdf, FaA2.pdf

date:10-28 Mon Class 07 Video Composite, Visualization with Network Model
              Discussion Reading #2

              Lab   NeRF: Neural Radiance Fields, Gaussian Splatting

                          Shot Planning with Premiere/Unity: Chroma key
                            Lab Note for Premiere Chroma Key
                            Example (Firminy Long Lounge)
                            Blue Screen (Chroma Key) demo
                            Blue background session rig files (zipped)
                          Camera Motion Capture/Tracking
                            Blender Tracking tutorial(See Dropbox location)
                            SynthEyes (optional for self-learning)
                            Example (Firminy Pepsi Can)
                            Blender home page (free)
                            Blender Tutorial (pointers to videos)
                            SynthEyes home page
                            Synthedyes (Video) Tutorials
                            Syntheyes Manual for v2013
                            (Old Manual for v2008+1)
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3DS Max Channel rendering, Video post, G-channel
                          (Render by Elements and Video Composite)
                              example

            Reference   Mies van der Rohe's drawings (zipped jpg)
                           Shot examples in pre-vis. format
            Marker-based Motion Tracking example
                           GE Plugin Smartgird.com
                           AR Media 3DS Plug-in
            Screening
                           Video: Setting up a Blue Screen Studio at MIT

~~date:11-05 Sat   extra lab   Bluescreen studio live recording session~~
~~(Subject to the COVID-19 pandemic situation)~~

date:11-04 Mon   Class 08   Figures and Props

            Lab   Animating Figures in Spatial Design
                           Populate video tutorial (Autodesk tips/tricks)
                               1 , 2 , 3 , 4 , 5 , 6
                           Lab Note for 3DS Max Populate/Unity 3D Export

                           Biped Character Animation (Character Studio)
                               Lab Note for 3DS Max Character Animation
                               Sample figures and setup
                               (Skinned Figures/BIP Motion/Blue Screen Set:
                               Download and unzip the Max file and texture
                               file to a directory together before use.)

                               Emerging "Video to Motion" apps (Figure Mo-cap)

                               Modeling by Gesture
                               Tracking a walk by Kinect
                               Circulating a figure in architectural model
                                   example
            Screening   Space Re-Actor by Taro Narahara

date:11-11 Mon   Veterans Day holiday
                           ~~Monday classes shift to Tuesday this week.~~

date:11-18 Mon   Class 09   Precedents: Final project for 4.502/4.562
                           Physics Simulation
            Deadline   Excercise #4 (in-class presentation)
            Excercise #F   OUT: Final project
                               Final Project Handout
                               Spatial Experience in Motion Graphics

            Reading #3   OUT: Eisenstein: Film Form/Sense
                               Questions.pdf
                           arch.pdf, form.pdf, sense.pdf
                           Acropolis 360 on Plan
                               YouTube video by TN (Use Chrome for 360 view)

            Screening   Final projects of previous students
                           Kuleshov Experiment, Psycho, Battleship Potemkin
                           Psycho, Hitchcock 1964 Interview on Montage

            Lab   Motion Dynamics/Inverse Kinematics in MassFX
                               demo file (MassFX basics): after Max 2012
                               demo file (Reactor, part 1): before Max 2011
(old)

Lab Note for Max MassFX
                                        Lab Note for Max ART rendering
                                        Lab Note for Max iray rendering (old)

                                        Physics Animation Examples
                                        example (gravity, collision, wind)

                                        More procedural material
                                        Simple Water in 3DS Max

                    Screening   SONY Bravia CF/transformating daily life (at MIT)

date:11-25 Mon   Class 10   Predictive Visualization: Unbuilt Monuments
                    Discussion   Reading #3 [required for 4.562]
                    Reference   Automated Cinematographer
                                        A Synthetic Moviemaker (Siggraph 2006 paper)
                                        Man with the Movie Camera (YouTube link)

                    Deadline   Final Project Proposal review (Storyboard + Set)
                    Lab   VRay (Global Illumination Rendering with Caching)
                                        Lab Note for 3DS Max Vray (Check yellow part.)
                                        Rendering Animation with VRay

                    Reading #4   OUT: Andre Bazin: What is Cinema?
                                        Questions.pdf
                                        bazin.pdf
                                        Special Effect use in Citizen Kane (YouTube)
                                        YouTube Clips (Flaherty/Lamorisse/Chaplin, etc)

                    Reading #5   Christian Metz: Film Language
                    Screening   Unbuilt Monuments

date:11-28 Thu   No class   Thanksgiving Holiday Week (Th 28, Fr 29)

date:12-02 Mon   Class 11   Augmented and Virtual Reality
                    Discussion   Reading #4 [required for 4.562]
                                     Reading #5 [required for 4.562]
                    Lab   Palladio Burns and 360 (Chrome recommended.)
                                     Double Tour: S. Giorgio Maggiore Refectory
                                     QuickTime VR by Apple (History)
                                     Interior Panorama with IES Light (Citrohan House)
                                     QTVR Panorama conversion tool
                                     demo file: 3d_citrohan_v13c_panorama.max (zipped)
                                     Workshop (Consultation for Final Projects)

                    Reference 4: Augmented Reality in Architectural Exhibitions
                                     (Nagakura, et. al.)

date:12-09 Mon   Class 12   TBA

date:12-09 Mon   Class 12   Final Presentation 1 (Recommended for UG
Students)
                    Lab   Clothes, Hair, Snow, etc.
                                     Workshop (Consultation for Final Projects)

date:12-11 Wed   Last day of class at MIT

date:12-16/20   (during MIT Final exam week)

date:12-17 Tue   9am -12noon   Final Presentation 2 (Rm 1-371)