

SCHOOL/DEPARTMENT: Architecture & Planning

COURSE OUTLINE: ARCHDES300 / Semester 1, 2017

1.0 GENERAL COURSE INFORMATION

Course Code:	ARCHDES300
Course Title:	Design 5
Points Value:	30 points
Prerequisites:	ARCHDES200 or 210
Restrictions:	ARCHDES310
Course Director:	Prof Andrew Barrie, Room 335, Building 421, a.barrie@auckland.ac.nz
Course Co-ordinator:	Assoc. Prof. Uwe Rieger, Room 544, Building 421, u.rieger@auckland.ac.nz>
Teaching Staff:	Assoc. Prof. Uwe Rieger & Yinan Liu [oml]

2.0 CLASS CONTACT HOURS

Monday, Tuesday & Friday, 1pm – 5pm; Level 4 Design Studios, Building 421.

3.0 COURSE PRESCRIPTION

The Collected: An introduction to a complex architectural thinking. Examines both conceptual and exceptional spaces and develops an understanding of the corresponding architectural systems.

Research Lab

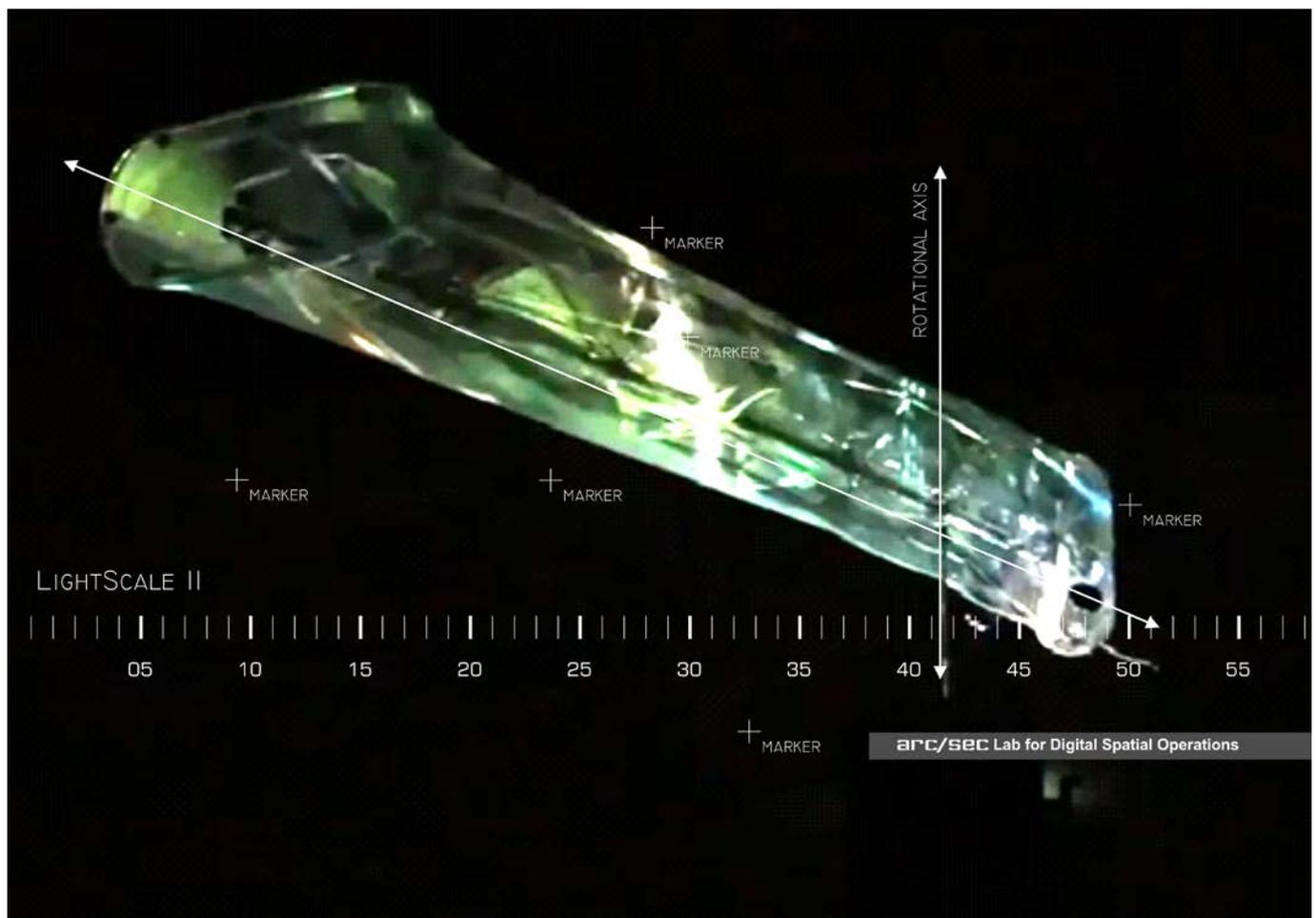
The *arc/sec Lab for Spatial Digital Operations* connects postgraduate and undergraduate studios and seminars with ongoing research projects. Collectively we explore concepts of *Tangible Data* and *Programmable Matter*. The aim is to create a new form of *Reactive Architecture*, in which digital information is given physical form and physical spatial appearance.

The *arc/sec Lab* utilizes large-scale interactive installations as the driving vehicle for the exploration and communication of new dimensions in architectural space. Our experiments are aiming to make data “touchable” and to construct real time responsive environments, which add new dynamic properties to our traditional perception of the build environment. In parallel they are the starting point for both, the development of practice oriented applications and the speculation of how our cities and buildings might change in the future.

The work at the *arc/sec lab* is conducted in a cross disciplinary design environment, it fosters new knowledge through an innovative approach with emerging technologies and it focuses on outcomes at the intersection of education, research and industry.

The key areas of investigations are:

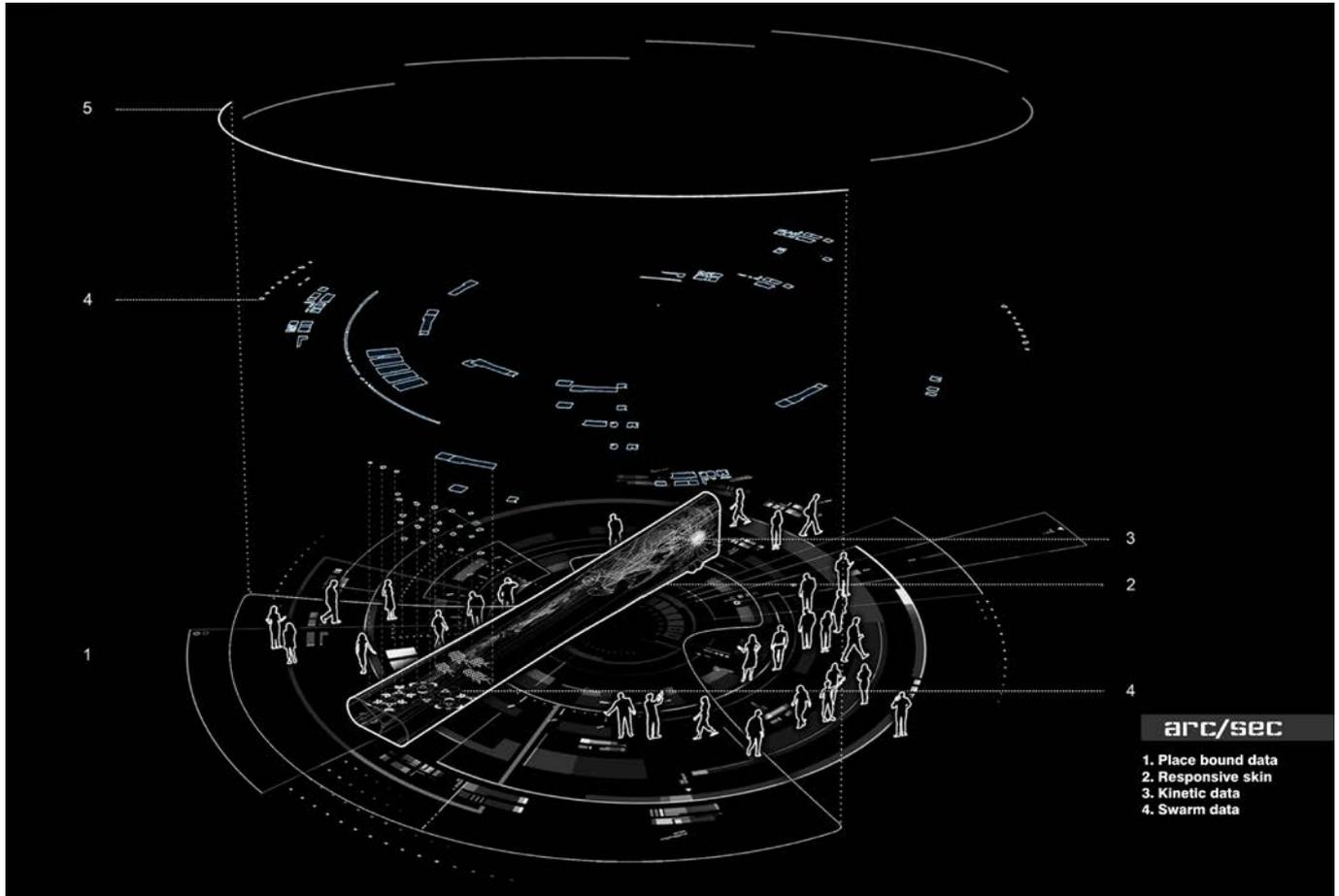
- Theory, expanded exploration of functional and programmatic applications within urban design and architecture
- Design, development of haptic-digital spaces and intuitive interfaces
- Realisation, well resolved technical solutions and constructions of prototypical environment



LightScale II, 1:10 motion capture test model

Research Project

LightScale II is based on place bound data concepts, overlaying a kinetic physical model with a dynamic digital model. The Installation consists of a 20-meter long carbon mast construction, surrounded by multiple layers of black mesh. The object is mounted asymmetrically on a single-point support. This allows the construction to oscillate freely in space. A tracking system recognizes the position and movement. A 3D live render program overlays the physical construction with projections from multiple directions, creating holographic volumes. The animation follows the movement of the physical model precisely and responds according to its position and the interaction with the visitor.



Place Bound Data, LightScale II : Drawing by Eq Hong

Research Task

The arc/sec Lab has been invited to present our latest research projects in the Ars Electronica Festival 2017. The annual festival is one of the most important events at the intersection of technology, art and society and attracts an international audience of over 90,000 people. It will take place in Linz , Austria from 7.9 to 11.9.17

The D5 **arc/sec** studio will join the LightScale II development team to finalize the project. The task is to utilize the technical setup as a tool to develop and demonstrate new dimensions in architectural space. The underlying research question of the project is: *What are the functional, programmatic and aesthetic design parameters for haptic-digital architecture and its user interaction?*

Our team will focus on 4 areas:

- Technology: exploration of 3D projection technologies and spatial tracking
- Construction: detailing of the light weight carbon construction and material investigations for tensile structures

- Functionality: development of a new spatial user navigation system
- Aesthetic: design of holographic structures and interactive spatial behaviour

Throughout the first half of the semester we will work in small teams to explore 3D holographic, projection principles, motion based tracking, user interaction and develop detailed solutions for the physical setup. We will have prototypical 1:10 setup will be the host for a series of individual 3D animations.

Based on a series of experiments we will commonly finalize the full scale immersive.

The studio will be supported by our Open Media Lab Team (oml). We will run a series of workshops to introduce the gaming engine *Unity 3D*, motion tracking systems and projection technology.



LightScale II, carbon construction

4.0 TEACHING AIMS

The aims of this course are to:

Design 5 presents an introduction to complex architectural thinking. It examines both conceptual and exceptional spaces and develops an understanding of corresponding architectural methodologies and systems. Topics will explore the cutting edge of architecture, with an individual emphasis on the theoretical, contextual, architectonic, communicative, material, spatial, sociological or topographical.

5.0 LEARNING OUTCOMES

General ARCHDES300 Course Outcomes

On successful completion of this course, students should be able to:

- Theory: Show evidence of engagement with selected / prescribed areas of architectural theory and knowledge. Further, to show evidence of the exploration of the possible influence of this upon the development of architectural propositions.
- Architectonics: Demonstrate abilities to project, explore and develop the tectonic characteristics of the project through the creative engagement with material, structural or constructional propositions.
- Programme: Show evidence of engagement with identified cultural, social and functional positions as they might inform speculative architectural propositions.
- Performance: Show abilities to advance conceptual thinking through engagement with environmental and contextual conditions that could bear upon the project, and to examine the way in which the architecture may affect those same conditions in return.
- Form and space: Demonstrate abilities to develop speculative three dimensional architectural form and space.
- Media: Display skill in the communication and development of design propositions through the considered use of architectural media.

Specific Topic Outcomes

This studio topic will engage with the general course outcomes in the following ways:

- Theory: To gain an understanding of the of the concept of *Tangible Data* and its relationship to dynamic architectural space and user interaction
- Architectonics: To explore new architectural applications for the fusion of physical and digital construction
- Performance: To develop an understanding of responsive environments, user behaviour and navigation.
- Form and space: To explore the point where the technical and aesthetic aspects of Tangible Data meet to create the disciple of architecture
- Media: To develop a full scale technical and atmospheric multimedia installation and to test and communicate both, inspirational architectural visions and solid programmatic opportunities. Specific emphasis is given on both, a well detailed physical construction and highly esthetical graphical appearance.

6.0 COURSE STRUCTURE AND CONTENT

[Expand and amend as necessary. Include assignment due dates. Identify any classes led by guest presenters]

Week	Date	Topic	Required reading (or other). [Delete if not needed]
Week 1		Overview Tangible Data: oml digital workshop I Basic Unity	
Week 2		Graphics : oml I digital workshop II; Basic Animations in Unity Tensile constructions	
Week 3		Tracking oml : digital workshop III : Tracking / actions in Unity Projection materials	
Week 4		Projection and projection surfaces: oml digital workshop IV : Projection and calibration LightScale detailing	
Week 5		Concept development	

Week 6	Interactive components oml digital workshop V : Advanced animations in Unity Mid-semester crits
MID-SEMESTER BREAK	
Week 7	Concept finalization
Week 8	Research and construction phase: oml : I digital workshop VI (as required)
Week 9	Research and construction phase
Week 10	Final construction phase
Week 11	Final construction phase
Week 12	Final Presentation



LightScale II at Ars Electronica 7.9-11.9.2017

7.0 LEARNING RESOURCES

7.1 Required Reading

7.2 Recommended or Supplementary Reading

ACADIA 2013 adaptive architecture: proceedings of the 33rd Annual Conference of the Association for Computer Aided Design in Architecture

ACADIA (Conference) (33rd: 2013 : Cambridge, Ont.) Philip Beesley 1956- editor of compilation.; Michael Stacey editor of compilation.; Omar Khan 1969- editor of compilation.; University of Waterloo. School of Architecture, host institution. Toronto : Riverside Architectural Press. 2013.

Architecture in formation: on the nature of information in digital architecture

Pablo Lorenzo-Eiroa editor.; Aaron Sprecher editor.

London : Taylor & Francis Ltd. 2013.

Responsive environments: architecture, art and design;

Lucy Bullivant; London: V&A Publications 2006. ; ISBN:1851774815 (pbk.) :

Theories of the digital in architecture

Rivka Oxman editor of compilation.; Robert Oxman editor of compilation.

London ; New York : Routledge, Taylor & Francis Group. 2014

Hyperbody : first decade of interactive architecture

Kas Oosterhuis

Heijningen : Jap Sam Books 2012.

Towards a new kind of building : tag, make, move, evolve

Kas Oosterhuis

Rotterdam : NAI c2011.

Responsive Materials and Methods : State-of-the-Art Stimuli-Responsive Materials and Their Applications

Tiwari, Ashutosh; Kobayashi, Hisatoshi, Wiley, 2013

Installations:

4dspace : interactive architecture

Lucy Bullivant

Chichester : Wiley 2005.

Interactive architecture

Michael Fox 1967 Aug. 22- Miles Kemp 1979-

New York : Princeton Architectural Press c2009.

Interactive Experience in the Digital Age : Evaluating New Art Practice

Candy, Linda; Ferguson, Sam

Springer. 2014

Interactive contemporary art : participation in practice

Kathryn Brown (Kathryn J.), editor.
London : I.B. Tauris. 2014.

aRt&D : research and development in art

Joke Brouwer
Rotterdam, Netherlands : V2_Publishing/NAi Publishers c2005.

From technological to virtual art

Frank Popper
Cambridge, MA : MIT Press c2007.

Aesthetics of interaction in digital art

Katja Kwastek
Cambridge, MA : MIT Press. 2013

A touch of code : interactive installations and experiences

Robert Klanten; Sven Ehmann; Verena Hanschke; Lukas Feireiss
Berlin : Die Gestalten Verlag 2011.

Interact or die

Joke Brouwer; Arjen Mulder; Brian Massumi; Detlef Mertins; Lars Spuybroek;
Moortje Marres; Christian Hubler
Rotterdam : V2_Publishing-NAi Uitgevers 2007

Programming:

Programming Interactivity

Joshua Noble, : O'Reilly Media, Inc. July 21, 2009
Print ISBN-13: 978-0-596-15414-1
736
Subscriber Rating:

Processing for visual artists : how to create expressive images and interactive art

Andrew S. Glassner
Natick, Mass. : A.K. Peters c2010.

Processing 2 creative programming cookbook : over 90 highly-effective recipes to unleash your creativity with interactive art, graphics, computer vision, 3D, and more

Jan Vantomme ebrary, Inc.
Birmingham : Packt Pub. 2012.

Generative Design

Visualize, Program, and Create with Processing
Hartmut Bohnacker, Benedikt Groß, Julia Laub, Claudius Lazzeroni editor
Princeton Architectural Press
ISBN 978-1-61689-077-3

7.3 Other Materials or Software

Unity online tutorials

7.4 Use of Canvas

Monitor announcements

7.5 Other Assistance / Student Support Available

The studio is supported by oml

8.0 INCLUSIVE LEARNING

Students are urged to discuss privately any impairment-related requirements face-to-face and/or in written form with the course convenor/lecturer and/or tutor.

9.0 OTHER INFORMATION

The Studio will be structured as a research lab. While participants will be working in distinctive areas of investigation it requires the willingness and ability to work in teams and collaborate on a common aim. The assessment will be based individual achievements within this context.

10.0 ASSESSMENT

10.1 Method of Assessment

100% coursework

All student work is assessed by the named staff member(s) offering each course topic, who are appointed as examiners. Provisional grades are confirmed at an examiners' review of the work of all students in that particular design course, in order to ensure parity of grading standards across course topics. All marks are indicative until confirmed in the Design Grading Moderation Review.

10.2 Assessment Criteria

Detailed information on assignment format and assessment criteria are provided below. The grading of work is based on the NICAI Grade Descriptors printed on the Faculty website:

<https://cdn.auckland.ac.nz/assets/creative/for/current-students/course-planning-enrolment/Planning-and-enrolment-assets/NICAI%20grade%20descriptors.pdf>.

In addition to the criteria set out in the School handbook, assessment will be based on the following:

- Theory: Level of critical engagement with selected or prescribed areas of architectural theory and knowledge and the consideration of its bearing upon the design process.
- Architectonics: Ambition of the design project and the quality of design development through the creative engagement with material, structural and constructional issues.
- Programme: Quality of engagement with relevant cultural, social and functional issues to inform the pursuit of cutting edge architectural propositions.
- Performance: Extent of design development through the consideration of environmental and contextual conditions bearing upon the project.
- Form and Space: Quality of engagement with and development of speculative three dimensional architectural form and space.
- Media: Quality and clarity of presentation, the extent of design development facilitated by, and the consideration given to the architectural media utilised.
- Quality of engagement in studio – singularly, in group discussions and in formal crits. Attendance in studio and for the duration of crit days is mandatory – students are expected to support and learn from their colleagues.

Specific topics will weight the factors presented above according their identified emphases.

10.3 Academic Integrity

The University of Auckland will not tolerate cheating, or assisting others to cheat, and views cheating in coursework as a serious academic offence. The work that a student submits for grading must be the student's own work, reflecting his or her learning. Where work from other sources is used, it must be

properly acknowledged and referenced. This requirement also applies to sources on the world-wide web. A student's assessed work may be reviewed against electronic source material using computerised detection mechanisms. Upon reasonable request, students may be required to provide an electronic version of their work for computerised review.

10.4 Attendance and Participation

Attendance in class as well as engagement with course activities and readings supports academic success. Therefore it is strongly recommended that students make every effort to attend class and complete all the necessary in-class requirements.

10.5 Output Requirements

The course be structured as a research group working towards a common goal. We will develop technical skills and practice in parallel. While participates will collaborate in teams, each team member will work on distinctive tasks. Areas include: graphics, animation, spatial design, orientation system, tracking, programming, construction, projection technology, etc

The Output requirements are:

- Individual: Development of an applied holographic digital construction and a physical structural component
Extended practice and activity report following given template (text , drawings , photos, videos, animations)
- Team based: Prototypes and concept development
- Team based and individual: Final installation and including individual digital animation.
Coordinated oral and visual team presentation and individual discussion of components developed.

11.0 STUDENT FEEDBACK

Students will be asked to complete an evaluation of the course at the end of the semester, usually on the morning of final presentation.

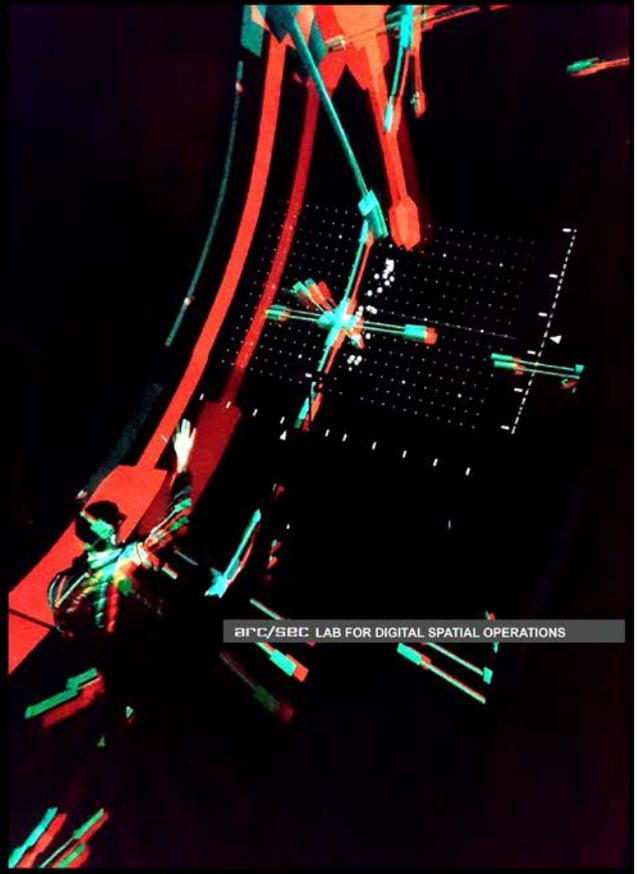
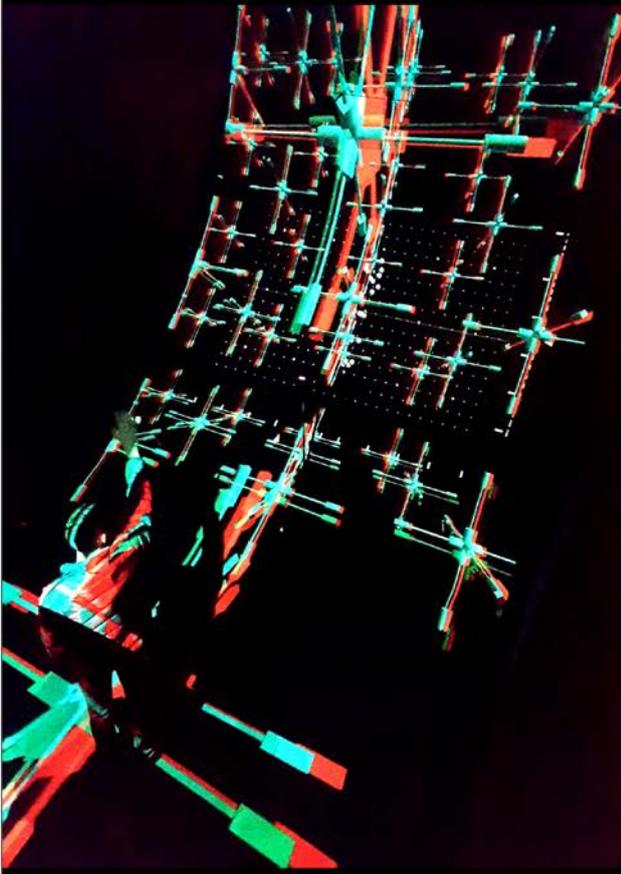
12.0 UNIVERSITY POLICIES AND GUIDELINES

This course is based on the university policies and guidelines. For further information, see the University and Faculty websites. On the Faculty website, the 'Quick Reference Guide for New Students' provides useful information on such things as key dates, where to go for help and advice, personal support and academic policies and procedures.

Students must note the following warning that applies to all material provided for this course. This includes printed material and electronic material, and material posted on Canvas. If you are not sure about the requirements, ask for clarification from the course coordinator.

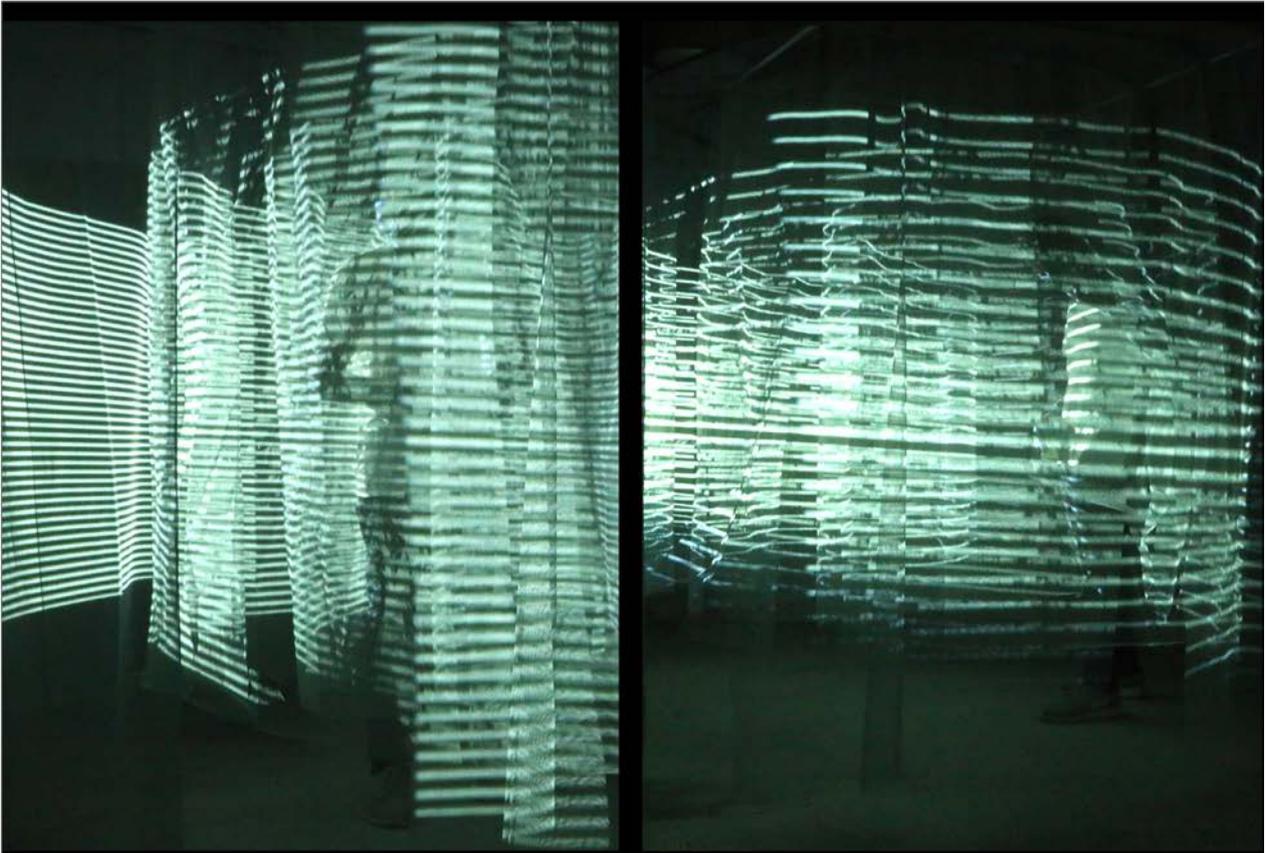
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top: SINGULARITY, arc/sec Lab: Yinan Liu, Ying Miao 2016

bottom: AnaGlyph: arc/sec Lab: D5/AD2 2016



top: DataSkin, arc/sec Lab: AD2 2015

bottom: HyperSpace 1.0: arc/sec Lab: AD2 2015