

ARCHDES 301 | DESIGN 6 | TOPIC OUTLINE | SEM 2 2019

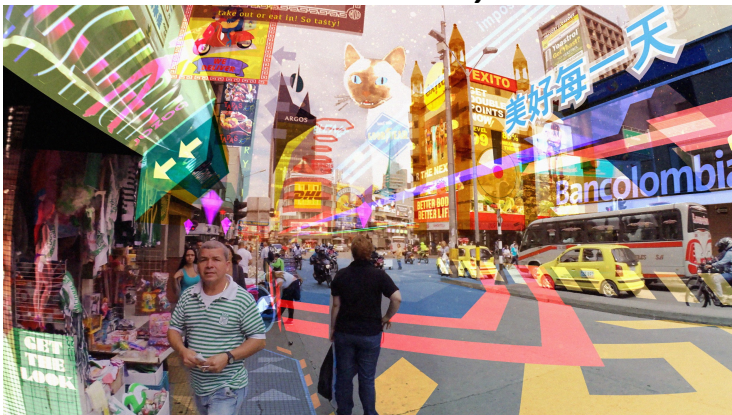
Design 6 **The Integrated**: The culmination of all aspects - conceptual, formal, material, tectonic, **environmental**, structural - of architectural design within the context of a larger network of infrastructural services. Also requires an understanding of the full range of drawings describing the workings of the building as both an active 'machine' and place for human comfort.

The culminating design course of the Bachelor of Architectural Studies in which students are expected to demonstrate appropriate knowledge and skill in the preparation of a resolved design proposal, in response to a challenging project topic. Design proposals are required to address issues of theory, architectonics (material, structures, construction), programme (cultural, social, functional), performance (contextual, environmental) and the formative influences of these factors on space and form through the skilful, considered use of architectural media.

Krishna Duddumpudi

Krishna has recently returned home to New Zealand after living and working in Amsterdam for the past two years. During his time in Europe he worked at UNStudio and RHDHV in both architectural and project management roles focused on large format commercial projects. With a keen interest in computational design and digital fabrication, Krishna is the CEO & co-founder of a young, ambitious and experimental design collective MASS Ltd based in Auckland.

Coded Materiality



Still frame from the short film *Hyper-Reality* by Keiichi Matsuda, 2016

GENERAL COURSE INFORMATION

Course :	Design 6 ARCHDES301
Points Value:	30 points
Course Director:	Andrew Douglas andrew.douglas@auckland.ac.nz
Course Co-ordinator:	Alessandro Premier alessandro.premier@auckland.ac.nz
Studio Teacher:	Krishna Duddumpudi
Contact:	k@mass.design
Location:	TBC
Hours:	Monday and Thursday 1:00-5:00pm

For all further general course information see the ARCHDES301 COURSE OUTLINE in the FILES folder on CANVAS.

CODED MATERIALITY

Situation & Context :

With the advent of ubiquitous and computationally powerful wearable technology, Augmented Reality (AR) is set to become an integral and inevitable part of the way we experience our built environment.

With the ability to readily stimulate and flood the audio-visual senses the integration and curation of AR content within the context of architecture will become paramount.

Keiichi Matsuda's dystopian short film Hyper-Reality paints a grim picture of a future where AR has manifested as an uncensored and omnipresent environment. Link to the short film (~6 mins) :

<https://www.youtube.com/watch?v=YJg02ivYzSs>

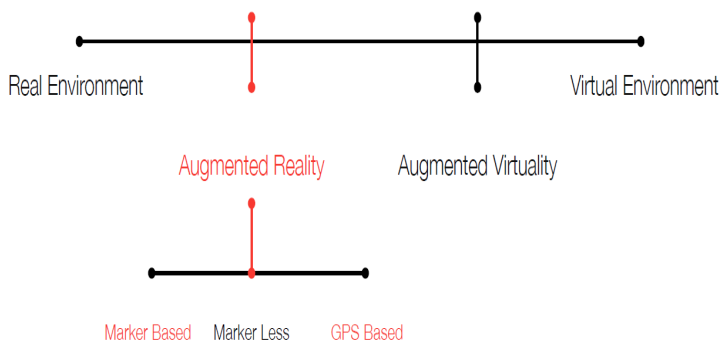
On the contrary, the use of AR as a crafted digital material has the ability to transcend geographies, enhance cultural or historical understanding and build bridges across generations. Operating within this physical-digital fringe, you (as an architect of this future) will be charged with pioneering this paradigm shift and address how it manifests within society. This shift will begin with architects working alongside a broader range of disciplines including media designers, programmers and material scientists.

The objective of the Coded Materiality studio is to explore the potential of a physical-digital material within the context of architecture.

We will be questioning the perceived value of “the digital” when it is designed to only be experienced in relation to a physical artefact. If the physical artefact is tainted or destroyed so is the “bound” digital content. Given this paradigm, would you now care more for the digital-physical artefact? Why / Why not?

Technical Background :

Augmented Reality is best described in reference to Paul Milgram’s diagram of the Virtuality Continuum, where the region between the two extremes of Real Environment and Virtual Environment is known as Mixed Reality (Milgram & Kishino, 1994).



The Virtuality Continuum, Milgram & Kishino 1994

Presently, AR can be experienced in one of 3 ways :

Marker Based: Where a printed image or 3D objects are analysed for distinct “features” by an algorithm which are then “tracked” through a smart device’s camera. The Digital content is then rendered to scale in relation to the printed image.

Markerless: In recent years big players such as Google, Apple & Qualcomm have been promoting this proprietary technology. The exact technology around marker-less feature recognition varies and is typically kept a trade secret. Markerless AR is **not** the focus of this studio as we are interested in creating physical-digital relationships.

GPS Based: This technology operates on a much larger scale where digital content is rendered typically within 2-4m accuracy of a specified GPS coordinate generally experienced from a distance for an urban scale visualization.

This studio will focus on marker based augmented reality with emphasis on the relationship between tactile architectural material and the digital content that is “bound” and experienced in relation to a physical artefact.

The Brief:

Projects completed within the Coded Materiality studio will have one foot grounded in reality and the other in fiction. The aim of this studio is to firstly understand current day manufacturing processes, architectural details and AR technologies. Armed with this knowledge we will then project forward into a plausible future that seeks meaningful application of our coded materials.

Students will then envision an architectural response for the year 2050 based one of three typologies of public buildings located in present day Auckland.

- *Places of Spirit - Places of worship or cultural gathering*
- *Places of Knowledge - Museums or Libraries*
- *Places of Death - Cemeteries or funeral homes*

Once a site is chosen, students will undertake an in-depth analysis with the aim of gaining a comprehensive understanding of the site usage, functions and critical needs. This process will inform the spatial brief for their projects.

Students will organise a visit to the local council and order a copy of the property file containing floor plans and relevant technical drawings to gain further insights into their chosen site.

Concurrently, students will focus on material and AR experiments exploring various methods of fabrication i.e. Printing, Heat transfer, CNC milling, casting, etching and 3D printing.

Students will then iteratively test their fabricated panels / material samples for AR compatibility and gain an insight into the possibilities and limitations of AR technology using Unity3D or similar software.

With a robust understanding of the technology, scope of materials and a spatial brief, students will begin to apply this knowledge within the context of their chosen site.

A successful project will :

- Critically consider how their “coded material” has enhanced the users spatial ritual, immediate site and contributed to a wider social ecosystem.
- Go beyond aesthetic use of AR as surface treatment. How does the use of AR altered the narrative and purpose of the existing site and inform your design response?
- Illustrate methods of meaningful engagement with the public realm at the urban, building and artefact scales.
- Have systematically and scientifically undergone several physical-digital studies to showcase an understanding of materiality and innovative use as a “coded material”.

- Produce a highly crafted & fully functioning module of their coded material such as a facade panel, floor tile, wall panel etc.

TOPIC STRUCTURE AND CONTENT

Week 1 :

- Introductions & project briefing
- Students to pick a building typology & location
- Organise a visit to the local council to pick up drawings
- Start Unity tutorials on AR (tutorial list provided)
- Basic paper studies with AR begin

Week 2 :

- Site analysis and spatial brief to be complete this week
- Material studies with AR continued, initial tests showcased to the studio group
- High level ideation and sketch discussions

Week 3 :

- Spatial briefs complete
- Material studies continued into complex 3D objects
- Sketching and ideation continued

Week 4 :

- Pin-up of ideas and short crit within the studio with live demonstrations. Guest critiques from industry will attend.
- High level sketch plans, sections and elevations up for discussion
- Material studies continued with attention to the linked AR content
- Robotics workshop / tutorial

Week 5 :

- Preparation for the week 6 mid semester crit
- Refining material studies & digital content
- Refining ideas, sketches and generation of a clean drawing set (plans, sections, elevations)

Week 6 :

- Mid semester critique

Week 7-11 :

- One on one feedback and tutoring starts at following mid semester critique with focus areas as discussed with individual students

Week 12 :

- Final commentary and advice
- Final critique, good luck!

SPECIAL NOTE:

Students will require a basic webcam to conduct their AR studies in the software Unity3D. You are also encouraged to innovate and seek sponsorship for any materials or consumables.

Week	Date	Event
Week 1	Mon 22.7	12:00 All architecture meeting, rm 311
	Thu 25.7	2:15 Design 6 staff presentations and studio ballot Design 6 Studio classes commence
Week 2	Mon 29.7	See topic Structure above
	Thu 1.8	See topic Structure above
Week 3	Mon 5.8	See topic Structure above
	Thu 8.8	See topic Structure above
Week 4	Mon 12.8	Internal crit and progress check with guest critiques (Thursday)
	Thu 15.8	
Week 5	Mon 19.8	See topic Structure above
	Thu 22.8	See topic Structure above
Week 6	Mon 26.8	See topic Structure above
	Thu 29.8	Design 6 Mid-semester crits
MID-SEMESTER BREAK		
Week 7	Tue 16.9	See topic Structure above
	Thu 19.9	See topic Structure above
Week 8	Mon 23.9	See topic Structure above
	Thu 26.9	D6 full group cross-crit
Week 9	Mon 30.9	See topic Structure above
	Thu 3.10	See topic Structure above
Week 10	Mon 7.10	See topic Structure above
	Thu 10.10	See topic Structure above

Week 11	Mon 14.10	See topic Structure above
	Thu 17.10	See topic Structure above
Week 12	Mon 21.10	Pin Up: 5-6pm, Mon, 21 Oct
	TUES 22.10	Final Crit: 9am, Tues, 22 Oct

RESOURCES

Journal articles:

- Kumaj Jena, P. (2010). *Indian Handicrafts in Globalization Times: an Analysis of Global-Local Dynamics. Interdisciplinary Description of Complex Systems*, 8(2), 119–137.
- Milgram, P., & Kishino, F. (1994). A Taxonomy of Mixed Reality Visual Displays. *IEICE TRANSACTIONS on Information and Systems*, E77-D(12), 1321–1329.
- Adzhiev, V., Comninou, P., & Pasko, A. (2003). *Augmented Sculpture: Computer Ghosts of Physical Artifacts. Leonardo*, 36(3), 211–219. doi:10.2307/1577364
- Dunston, P. S., & Shin, D. H. (2009). Key Areas And Issues For Augmented Reality Applications On Construction Sites. In X. Wang & M. A. Schnabel (Eds.), *Mixed Reality In Architecture, Design And Construction* (pp. 157–170). Springer Netherlands. Retrieved from: http://link.springer.com/chapter/10.1007/978-1-4020-9088-2_10

Websites :

- <http://hyper-reality.co/>
- <https://www.creativeapplications.net/>
- <https://hackaday.com/>
- <https://quayola.com/work/series/landscape-paintings.php>
- <https://borderless.teamlab.art/>
- <https://www.adobe.com/products/projectaero.html>
- <https://www.kimchiandchips.com/works/>

Mainstream film :

- *Ghost in the Shell* (original anime & 2017 Live action)
- *Blade Runner* (original & 2049)
- *The Fifth Element*
- *Tron - Legacy*
- *Elysium*

- *Black Mirror (Netflix Series)*

Instagram :

- *@shirokirin*
- *@illustrarch*
- *@ui.mob*
- *@creativecodeart*
- *@vitalybulgarov*
- *@nonotakstudio*
- *@ashthorp*

REQUIRED PRODUCTION

- A dedicated workbook that documents your design process and thinking. This workbook will be a collection of sketches, print clippings and notes. Your workbook will be passed around during the final crit.
- Material and AR compatibility studies, these will be ongoing experiments conducted across a range of material samples and geometries to determine the ideal material palette and fabrication process for your AR Marker. These digital-physical studies will be conducted at the rate of one per week and showcased as part of your final presentation. A working AR prototype must be demonstrated at your final critique.
- Your final presentation is to be in print and contain the necessary diagramming required to communicate your design narrative and intent.
- Your presentation may include :
 - Plans, sections, elevations and perspectives (scale as discussed with your tutor)
 - You may also include short process videos and animations.

ASSESSMENT & FEEDBACK

This course is assessed as 100% coursework. Conversational feedback is given throughout the semester. Written feedback, with indicative grading, is given at a date around the mid-point of the

semester. All further information regarding assessment is available in the ARCHDES 301 Design 6 Course Outline (on Canvas).

LEARNING OUTCOMES

General Course Outcomes & Specific Outcomes for this Brief

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.
Theory: Through iterative studies and self critique, you will take a stance on the role of augmented reality and (in a broader sense) the role of emerging technologies within the context of architecture.
- *Architectonics*: Demonstrate abilities to project, explore and develop the tectonic characteristics of the project through the creative engagement with material, structural or constructional propositions.
Architectonics: Demonstrate how the use of your coded material has informed the design outcome and influenced the design narrative.
- *Programme*: Show evidence of engagement with identified cultural, social and functional positions as they might inform speculative architectural propositions.
Programme: Use the design narrative to evolve the existing buildings programme as evidence of engagement with identified ecological, cultural, social and functional positions.
- *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.
Performance: Demonstrate how you have tailored your design to meet the pragmatic needs of your occupants such as

safety, shelter, sanitation and temperature.

- *Form and space*: Demonstrate abilities to develop speculative three dimensional architectural form and space.
Form and space: Show an understanding of how form and space are influenced by the introduction of a coded material.
- *Media*: Display skill in the communication and development of design propositions through the considered use of architectural media.
Media: Demonstrate interoperability across both physical and digital mediums to communicate a design narrative and architectural response.